Exploratory study for resilient wheat farming in Nigeria

By

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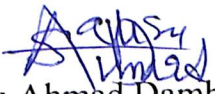VELLANIKKARA, THRISSUR – 680656

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DECLARATION

I hereby declare that the thesis entitled **"Exploratory study for resilient wheat farming in Nigeria"** is a bonafide record of research work done by me during the course of research and that the thesis has not previously formed the basis for the award of any degree, diploma, fellowship or other similar title, of any other university or society.

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Certified that the thesis titled "**Exploratory study for resilient wheat farming in Nigeria**" is a record of research work done by **Salisu Ahmad Dambazau (2018-21- 001)** under my guidance and supervision and that it has not previously formed the basis for the award of any degree, diploma, fellowship or associateship to him.

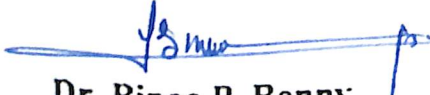Vellenikkara,

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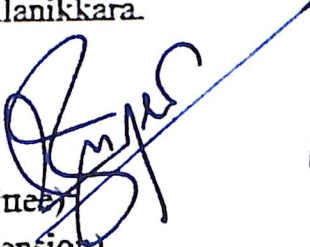Mannuthy P.O., Thrissur

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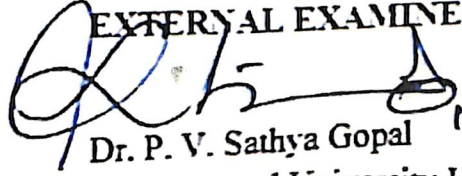
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CONTENTS

LIST OF TABLES

LIST OF TABLES CONTINUE

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDIX

ABBREVIATIONS

FMARD	Federal ministry of agriculture and rural development
ABP	Anchor borrower program
APP	Agricultural promotion policy
ATA	Agricultural transformation agenda
AWPP	Accelerated wheat production program
NiMet	Nigerian Metrological Agency
CBN	Central Bank Of Nigeria
P & S	Policy and scheme

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INTRODUCTION

1. INTRODUCTION

In the natural sciences, Holling introduced the concept of resilience in 1973 as "a concept to help understand the capacity of ecosystems with alternative attractors to persist in their original state subject to perturbations." Since then, this concept has been applied to economics and other social sciences, as well as ecology (Allison and Hobbs, 2004).

In the field of ecology, resilience refers to a system's ability to recover after being subjected to a major shock. Bouncing back is a neutral characteristic, but when combined with other progressive development goals (bouncing forward), it is frequently portrayed as positive (Darnhofer, 2010).

The ability of a system to embrace change and accommodate largely exogenous events is referred to as resilience. Due to the nature of constant change in the discipline as a result of scientific, governance, financial, lifestyle, and resource management changes, the definition in a social and economic context differs (McManus *et. al*., 2012).

Resilience is understood as the ability of the system to embrace change, with capacity to accommodate largely exogenous events. The definition in social and economic context differs due to the nature of constant changing in the discipline because of scientific, governance, financial, lifestyles, and resource management changes (McManus *et. al*., 2012).

Resilience in the socioeconomic sphere was ecstatically examined by (Adger, 2000; Carpenter *et. al*., 2001; Gunderson *et. al*., 2002; Walker *et. al*., 2004), and goes in line with the definition of resilience that has been adopted in the SHARP (self-evaluation and holistic assessment of climate resilience of farmers and pastoralists) approach (Choptiany *et. al*., 2015), namely: The ability of a system to recover, reorganize, and evolve in the face of external stresses and disturbances is known as resilience.

Wheat (Triticum spp.) cultivation dates back thousands of years. Wheat was one of the first domesticated crops, and it has been the staple food of most European, North African, and West Asian civilizations for over 9000 years. Wheat is now grown on more land than any other commercial crop, and it remains the most important source

of food grain for humans (Briggle and Curtis, 1987).

Wheat classification has traditionally been based on whether the crop is grown in the spring or winter. Heading of winter wheat is postponed until temperatures reach 0 to 50 degrees Celsius. It is planted in the autumn to germinate and develop into young plants that will remain in the vegetative phase throughout the winter before beginning to grow in the early spring. This has the advantage of utilising autumn moisture for germination while also maximising early spring sunlight, warmth, and rainfall. Spring wheat is typically planted in the spring and matures in the late summer, but in countries with mild winters, such as South Asia, North Africa, the Middle East, and the lower latitudes, it can be sown in the autumn (Hanson et al., 1982).

Wheat is the world's most important food security crop, with over 765 million metric tons produced on more than 220 million hectares in 2020. In comparison to the previous marketing year, this was an increase of over 30 million tons (Shahbandeh, 2021).

On ten million hectares of land, Africa produces more than 25 million tons of wheat. Sub-Saharan Africa (SSA) produced 7.5 MT of wheat on a total area of 2.9 Mha, accounting for 40 and 1.4 percent of African and global wheat production, respectively (FAO, 2017). Ethiopia, South Africa, Sudan, Kenya, Tanzania, Nigeria, Zimbabwe, and Zambia are the top wheat-producing countries in SSA, in that order. Ethiopia has the largest production area (1.7 million hectares), followed by South Africa (0.5mha).

Nigeria, Africa's largest regional economy, has a very low per capita income due to its population; it is Africa's most populous nation, with a population of about 206.14M people and expected to reach 216.75 million by July 1, 2022. (GeoNames 2020). The country imports a large amount of food and does not earn much foreign exchange from agriculture (Oirere, 2018). Nigerians eat a wide variety of wheat-based foods, including biscuits, cookies, cakes, spaghetti, noodles, bread, and Tuwo (swallow), Fura, Danwake, Funkaso, Alkaki, Dubulan, Dashishi, and so on. Apart from these food items, wheat bran is used in the production of animal feed (Donley, 2018).

Wheat farming has been the most difficult aspect of Nigerian agriculture for

decades, due to unsuitable temperatures for the crop (Ladipo, 2018). Wheat grown mainly in the northern states including Adamawa, Borno, Bauchi, Jigawa, Kano, Katsina, Sokoto, Kebbi, Yobe and Zamfara, where the night temperatures range between 15-20 degrees Celsius (°C), which makes the land good for massive hard wheat production. Borno is Nigeria's largest wheat-producing state, accounting for roughly 30% of the country's total wheat output. As a result, Nigeria has become increasingly reliant on imported wheat to meet the needs of its large population. Wheat farming, on the other hand, has attracted policymakers who see Nigeria's capacity to be self-sufficient since the oil shock of 2015-2016. The government is attempting to diversify the economy as the country grapples with a slowing economy and weakening local currency as a result of low global oil prices (Euromonitor International 2019). Wheat has arguably become one of the most important agricultural commodities in need of increased local production due to rising demand for wheat products (flour and flour-based foods). Nigeria imported approximately 4.3 million metric tons of wheat in 2015, at a cost of over \$3 billion. However, due to restrictions on access to foreign currency, wheat imports fell 5% to 4.1 million tons in the 12 months ending in May 2016, while local production remained low at 60,000 tons (KPMG, 2016).

Certain issues remain unresolved, posing a threat to the country's goal of diversifying revenue and reducing its growing reliance on imported wheat. Low wheat production, insecurity in Nigeria's wheat belt, a lack of mechanized and modernized farming techniques, and uncompetitive pricing are among the challenges. Nigeria can achieve non-dependence on imported wheat and reduce its trade deficit by approximately 3.06 percent if it can improve its wheat output to a level of self-sufficiency (Oirere, 2018).

Despite the fact that Nigeria's GDP increased by 0.8 percent in 2017, up from 1.5 percent in 2016, and positive projections of 2.1 percent and 2.5 percent in 2018 and 2019 respectively, production of wheat, rice, corn, and soybeans has remained below national demand (Oirere, 2018).

Imports from countries like the United States, which exported \$300 million and \$400 million worth of wheat to Nigeria in 2016 and 2017, respectively, have helped to close the gap. Wheat exports from the United States to Nigeria are expected

to total $530 million in 2018 and $534 million in 2019. Wheat was also imported from Russia, Canada, and Germany (Donley, 2018).

In 2016, the value of locally produced wheat in Nigeria was estimated to be $13 million, rising to $15.5 million in 2017, with local producers expecting to increase production to $16 million and $16.3 million, respectively, in 2018 and 2019. However, when compared to Nigerian market demand, which was valued at $1.2 billion in 2016 and $1.5 billion in 2017, and is expected to be $1.65 billion and $1.7 billion in 2018 and 2019, respectively, the national wheat production capacity is a drop in the ocean (Oirere, 2018).

For the past ten years, wheat has been Nigeria's most important imported commodity. Nigeria imports the majority of its wheat from the United States of America (USA) and, more recently, Australia. Wheat imports into Nigeria have averaged 4.1 million metric tons (MT) over the last three years, and are expected to reach 10 million MT by 2030. (AEGIC, 2015; USDA, 2016).

Wheat imports were prohibited in 1987, and the Accelerated Wheat Production Program (AWPP) was established to encourage local production. Subsidized inputs and necessary equipment were provided to farmers. Within three years of the programme, Nigeria's wheat production increased from 50,000MT to 450,000MT (Magaji *et at*., 2012). The programme, however, failed due to resistance from Nigerian wheat millers to patronise locally produced wheat and international pressure from wheat interests. The ban on imports was lifted in 1990, and the programme came to an abrupt end. As a result, production fell by 87 percent to 60,000MT in 1991. Other crops such as rice, maize, and vegetables were substituted by farmers (Haruna *et al*., 2017).

In 2011, the Agricultural Transformation Agenda was created (ATA). Designed to make agriculture work for Nigerians, particularly rural farmers, so that it becomes more than just a development programme but also a source of income (Adeyemi, 2011). The previous administration's transformation agenda was a policy package aimed at repositioning the economy by addressing poverty, unemployment, insecurity, and, most importantly, the diversification of the entire economy from total reliance on oil to a significant reliance on non-oil to drive the economy. The Transformation Agenda is a policy centered on good governance, power, security, and

non-oil sector development such as manufacturing and solid minerals, as well as infrastructure investment, education, and anti-corruption efforts. (IFPRI,2012).

The federal government increased import duties from 5% to 15% in 2012 in an attempt to discourage importers and encourage local wheat grain producers, but to no avail (USDA, 2016).

In July 2012, the government also formulated a policy to reduce wheat imports by 10% and proposed 40% cassava wheat composite flour, which would be included in future bread policies. Like previous attempts, the cassava inclusion policy failed (USDA, 2016). Wheat smuggling, poor cassava flour supply chains, poor policy implementation, technology and processing challenges, millers' reluctance to use cassava flour, and the insecurity of the cassava bread policy all contributed to the policy's demise (Haruna *et al.,* 2017).

Wheat Transformation Agenda (WTA) provides farmers with subsidies, improved seedlings, credit facilities, and inputs such as fertilisers, tractors, and implements under the Anchors borrowers' scheme, as well as marketing value chains for accrued harvests, with the goal of increasing production from 70,000MT in 2013 to 1.5MMT by 2017. While the government's commendable efforts to entice farmers to grow wheat are being improved on a yearly basis in the wheat value chain, wheat millers continue to ignore locally produced wheat to the point where farmers practically beg people to buy their wheat at any price because there is no market for wheat grown locally, discouraging farmers from growing wheat. The issue of Jibia farmers in Kastina State is a good example. A typical example is the case of Jibia farmers in Kastina State who claimed they were advised to start wheat production by government officials from the Sokoto River Basin Authority but later ran into problems disposing of the harvested wheat (Haruna *et al*., 2017).

The Growth Enhancement Support Scheme (GESS) aims to help resource-strapped farmers by providing various incentives to boost productivity, household food security, and income. Farmers all over the country benefit from the programme, which gives them access to agricultural inputs, particularly fertilisers. As of the 2013 dry season, 6,111 farmers had registered under the scheme, according to the Federal Ministry of Agriculture and Rural Development. A total of 3,646 wheat inputs and 7,172 NPK fertilisers were also distributed under the scheme. Following India's

success with a similar initiative, the scheme appears viable and, if properly monitored and implemented, could contribute to the achievement of the government's WTA objectives (KMPG, 2016).

As a result of successive changes in government, the Agriculture Promotion Policy (APP) was introduced in 2016 to replace the ATA. Despite the fact that, prior to the collapse of oil prices in 2015, ATA contributed to an 11 percent increase in the country's general agricultural output and a $1.3 billion reduction in the total food import bill. The cost of Nigeria's food imports is estimated to be $11 billion. The purpose of the APP was to address two major issues in agriculture: "an inability to meet domestic food requirements" and "an inability to export at the quality levels required for market success."

Wheat, rice, soybeans, and corn are among the crops for which Nigeria's Ministry of Agriculture plans to expand production areas and improve production methods in collaboration with the private sector. Apart from improving end-to-end value addition of these crops, the government hopes to entice a new generation of commercial farmers through the six-year APP scheme, which the ministry promises to support with a continuous supply of fertilisers, high-quality chemicals, and certified seeds to improve production (Odum, 2015).

Nigeria has also launched the Presidential Fertilizer Initiative and the Anchor Borrower's Scheme, under which the government has disbursed $150 million to 250,000 farmers in its quest for increased quality agricultural production. According to government records, the fertilizer initiative has resulted in the revitalization of 14 fertilizer blending plants with a total installed capacity of more than 2MMT annually, thereby supporting many farmers across the country. In addition, the government recently announced that it will privatize 20 of the country's 23 Strategic Grains Reserve Silos in order to ensure food security. Despite the preference of Nigerian millers for imported wheat, the government planned to cut wheat imports by half starting in 2017. The government is requiring millers to purchase local wheat at a fixed price of $400 per metric ton in order to reduce imports (NAN, 2016).

The Central Bank of Nigeria's (CBN) recent foreign exchange and import restrictions, as well as the expected modalities of the proposed flexible exchange rate regime, continue to be a key consideration for the industry's next course of action. In

February 2017, the Central Bank of Nigeria (CBN) effectively devalued the Nigerian naira (NGN) by allowing private individuals to purchase US dollars at nearly 20% above the normal rate for travel, school fees, and medical bills. The price of locally produced wheat has risen to $420 per metric tonne as a result of this devaluation (KMPG, 2016).

The acting President has established the Presidential Committee on Rice and Wheat to help the country achieve food self-sufficiency. "Identifying all that we need to do in order to make Nigeria self-sufficient in rice and wheat production," according to the committee's mandate. And figure out how to step up current efforts in Nigeria to produce both commodities for local consumption and export. Wheat farmers have already signed an agreement with flour millers in which the millers agreed to buy everything the wheat farmers have to offer (NAN, 2016).

Despite numerous policies initiated by various administrative regimes over decades that have consumed vast sums of money, wheat production remains a pipe dream.

In view of the above, the present study was conducted with the following specific objectives:

- To explore the socio political situation affecting wheat farming
- To study the perceived effects of climate change on production of wheat and livelihoodof the wheat farmers
- To analyze the government policies and schemes on wheat production
- To examine the marketing behavior of wheat farmers and
- To suggest policy Interventions for resilient wheat farming in Nigeria.

1.1. Limitation of the study

Apart from the primary data, the research involves the use of secondary data from various aspects of the public sector. The intent of the researcher is limited where there are no available documents or where it has been denied to support the findings. Moreover, where the literature was contradicted, the researcher used the most available one. Furthermore, because the data was gathered using an ex-post-facto research design, the respondents' personal opinions had to be taken into account. So

there may be a chance of personal bias to some extent. The researcher had taken care to convince them to get relevant information and set the study objectives.

1.2. Presentation of the study

The thesis is divided into six chapters. The present chapter, which is the first one, has already covered the specific needs for the study, specific objectives, and also the limitations of the study. The second chapter presents the review of the related literature to the study. The location of the study, sampling procedure, variables selected and operationalization, methods of data collection and statistical techniques employed are narrated in the third chapter. The fourth chapter presents the results and goes into a detailed discussion of the results. The fifth chapter summarizes the results and gives the implications of the study. The references, appendices, and abstract of the thesis are given at the end.

REVIEW OF LITERATURE

2. REVIEW OF LITERATURE

For research to be valid and highly recognized there is a need to explore the relevant scientific investigation, previous findings, and any other related media. This provides the basis for the research. In this chapter, an attempt has been made to review the available literature that is related to the research objectives. This helps the researcher to provide a basis for empirical investigation. The review of the literature is presented under the following headline:

2.0. Social and political effects on agricultural system

2.1. Resilient farming system

2.2. Status and trends of wheat farming in Nigeria

2.3. Problems in the wheat scenario and constraints experienced by farmers

2.4. Policy and scheme analysis

2.5. Effects of climate change on wheat production and livelihood of the farmers

2.6. Marketing behavior and Price spread/marketing margin of the farmers

2.1. Social and political effects on agricultural system

Cultural, political and social factors were normally ignoring when identifying factors that prevent the adoption of sustainable practices (Vanclay and Lawrence, 1994).

Boahene *et al.* (1999) the empirical evidence shows that the support that small-scale farmers receive through their social networks is more important than the advantage of farm size enjoyed by large-scale farmers in the adoption of hybrid cocoa. In comparison to small-scale farmers, however, access to a bank loan significantly increases the likelihood of adoption for large-scale farmers. Adoption is aided by interactions with extension agents, education, and the availability of hired labor. Farmers' social status has only a tangential impact on adoption: farmers with higher social status are more likely to obtain a bank loan, which has a positive impact on adoption.

Lambin *et al.* (2001) reported that the majority of people in the agricultural system are aware of social and political factors that affect systems, but there is a risk that some of the cause-and-effect relationships are just "stories" or expositions that

miss the true underlying cause.

Waggoner (2004) affirmed that farmers will inevitably improve mechanical innovations, such as when they use global positioning to refine planting and fertilising and then market their products electronically. Opportunities for labor-saving innovation will continue to exist as long as the cost of removing Florida oranges from the trees is as high as the total cost of growing them.

Van Calker *et al.* (2005) revealed that they discovered profitability for economic sustainability, working conditions for internal social sustainability, and food safety, animal health, animal welfare, landscape quality, and cattle grazing for external social sustainability, while ecological sustainability was attributed to eutrophication, groundwater pollution, soil dehydration, acidification, and biodiversity.

Agriculture is a part of our social and political systems, so it has a specific focus. As a result, if agricultural systems are to be sustainable, it is necessary to understand how they are affected by the social and political environments in which they operate (Archer *et al.* 2008).

Archer *et al.* (2008) revealed that external social factors (those that originate outside of the farm), internal social factors (those that originate within the farm), and political factors are three types of social and political factors that influence agriculture systems. This division allows for the analysis of a wide range of variables while keeping factor comparisons manageable.

Arovuori (2015) reported that political realities and existing political systems impose constraints on policymakers' decisions. Economic realities, the preferences of interest groups and other political supporters with varying levels of lobbying power, and international commitments are among these realities.

Manzoor *et al.* (2016) showed that only 21% of respondents thought EFS transfers were made on political grounds, while 66 percent thought they were made under the rules. The data also revealed that the majority of respondents (62%) were performing additional duties in addition to their official duties, and that supervisors' behaviour with their subordinates was cooperative and helpful, according to the overwhelming majority of respondents. Some respondents, on the other hand, believed that supervisors' behaviour was autocratic and negative. The data on promotions revealed that the majority of promotions were made under political duress,   with the

majority of respondents (72%) believing that the rewards were recommended on the basis of favouritism.

Mekonnen *et al.* (2016) concluded that as expected, belonging to certain groups like iddirs, having some form of relationship with network members in terms of kinship or informal forms of insurance, or having a high frequency of meetings with a network member all appear to increase the likelihood of forming an information link. When it comes to innovation behaviour, however, it appears that the quality of information is more important than the frequency of interaction. To be more specific, we found no evidence of a link between these indicators and the likelihood of implementing row planting.

Njabulo *et al.* (2018) find out that this emphasises the importance of increased extension contact between extension agents and farmers. Farmers who have a positive attitude toward no-till CA are more likely to adopt it and want to see it succeed on their farms. Individuals' psychological capital includes perceptions, and farmers with positive attitudes and a long-term outlook will adopt no-till CA technologies.

Sheikh and Mustapha (2018) concluded that the type of associations between alternative political setups and economic development and growth contradicts the finding that both political setups promote Pakistan's agricultural sector's economic growth and development. The link between economic development and growth and the democratic system is ambiguous and inexplicit in Pakistan's unique circumstances. Pakistan's economic growth and development have been better under tyrannical political regimes than under democratic regimes, and Huntington's causal relationship between democratic systems and economic aspects cannot be demonstrated on the basis of Pakistan.

2.2. Resilient farming system

Adger (2000) revealed that the resilience of their institutions and the natural systems on which they rely limit the adaptive capacity of all levels of society. Their ability to absorb shocks and perturbations and adapt to change is proportional to their resilience. In contrast, the less resilient a system is, the more vulnerable institutions and societies are to cope with and adapt to change.

Kaine and Tozer (2005) affirmed that their findings revealed that pasture had good biological stability (biomass, species composition, growth rates) but low cash

flow at low stocking rates. Increasing stocking rates weakened this stability to the point where pasture systems collapsed at alarmingly high rates. Cash flow increased in response to stock increases, as expected. In terms of rotation period, increasing the number of days per paddock had a negative impact on pasture composition. As a result, the business was less resistant to drought, and in moderate to severe droughts, it became economically and biologically unsustainable.

Young *et al.* (2006) concluded that observing different aspects and timeframes in agro pastoral society to see how resilient they are to external disturbances like drought. The amount of water that is "missing" at any given time and place, as well as the disruption that this lack causes, are used to quantify the drought's impact. Drought duration is also a significant variable because resilience is put to the test more each year. Several observations have confirmed that drawing on reserves and other resources allows for survival during the first year of a severe drought. By the second year, these reserves are usually insufficient, and stock must be reduced; by the third year, the enterprise's survival is jeopardized, as necessary stock reductions leave no resources for future revenue.

Darnhofer (2009) confirmed that the outcomes of these workshops should not be interpreted as a definitive or exhaustive list of farm resilience strategies. Rather, they demonstrate that the farmers who attended the workshops are well aware that change is constant, and that many changes are unpredictable and unexpected. They've devised strategies to mitigate surprise while also maximising the potential of change. Integrating resilience thinking insights into farm management could thus address two shortcomings of mainstream approaches: a lack of appreciation for the complexity and dynamics of the real world in which farmers must make decisions, and a relative disregard for both ecological and social aspects and their interrelationships within social-ecological systems.

Toledo and Barrera-Bassals (2009) concluded that traditional farming systems, which are still prevalent in many developing countries, provide a diverse range of management options and designs that improve functional biodiversity in crop fields and, as a result, support agro ecosystem resilience.

Darnhofer *et al*. (2010) confirmed that the various subsystems of a farm's resilience management maintain autonomy in the sense that they go through a long-term

cycle, but there are interactions with other subsystems at different spatial scales and within other domains that have an impact on the farm's systems.

Adger *et al.* (2011) find that some responses, such as increasing harvest rates in Canada to combat pine beetle infestations and expanding biofuels globally, have the potential to jeopardise resource systems' long-term resilience. Other strategies, such as decentralised water planning in Brazil and tropical storm disaster management in the Caribbean islands, have the potential to boost long-term resilience. We argue that most systems have multiple sources of resilience, and that policy should identify these sources and strengthen adaptability and learning capacities.

Davoudi (2012) concluded that in terms of planning, I believe it has promising parallels with the interpretive approach to planning that should be explored further. However, when applying an ecologically based concept to a social setting, we must tread carefully to ensure that we do not lose sight of critical social science insights in our attempt to understand society through the lens of ecology. Resilience in the social world has as much to do with shaping our challenges as it does with responding to them.

Herman (2015) reported that through the establishment of hopeful, disruptive, and demanding ethical practises, it places enchantment at the centre of shaping farmers' embodied and experiential connections with their farms. Farms become complex moral economies in which human and non-human actors are entangled in dynamic and contextual webs of power and responsibility. While acknowledging that all farms are embedded within broader, nested levels, this paper argues that the personal, contingent, and embodied relationships that connect farmers to their farms are experienced at the micro-scale, and that these relationships, in turn, govern their capacity to develop social resilience.

Asociacion-ANDES (2016) the findings show that by enhancing food security, incomes, biocultural heritage (including crop diversity), and community organization/social capital, the Potato Park's biocultural innovations have been effective in strengthening climate change resilience.

ICARDA (2017) suggested that more strategic conservation efforts are needed in provinces with the greatest diversity of landraces, provinces with rare species, and

provinces with the highest proportion of farmers growing both landraces and modern cultivars, given the likelihood that the latter will eventually replace the former. Researchers also suggested genetically improving landraces and returning them to farmers to help with rapid selection, incorporating desired traits, and maintaining integrity; outcomes that could increase landrace popularity and, as a result, secure the valuable genetic resources needed to strengthen modern agriculture's resilience.

FAO (2017) suggested that countries should design their social protection programmes in such a way that they contribute to increased agricultural productivity and employment while also protecting the livelihoods of the most vulnerable groups, increasing their resilience, and ensuring that rural transformation is as inclusive as possible.

Gil *et al*. (2017) confirmed that our findings suggest, but do not prove, that farm system integration can improve resilience, and they highlight the need for more research to see if integration policies can achieve similar results.

Daugstad (2019) the results indicated that the resilience framework is helpful in determining the priorities and situations of farmers. The responses and decisions, according to the author, are consistent with all three capabilities, as well as with bouncing back and forth. The majority of responses, however, were classified as bouncing back (i.e. adjustments and changes), but the farm system's logic remained unchanged.

Miranda *et al.* (2019) confirmed that the concept of resilience is complex, and it cannot be captured by a single indicator or by focusing solely on the characteristics of a farming system or the capabilities of a few actors. As a result, our framework necessitates and enables an in-depth assessment of a farming system's resilience, taking into account its multiple and changeable functions, internal and external interdependencies, and the full range of potential shocks and stresses. This allows for a more nuanced analysis, such as discovering an environment that limits resilience to social and economic challenges while increasing resilience to ecological challenges, or vice versa.

2.3. Status and trends of wheat farming in Nigeria

Anonymous (2006) indicated that wheat consumption and demand in Nigeria has risen as a result of increased and expanded bread and pasta industries, as well as the production of crackers, noodles, and other foods. Domestic wheat demand in the

country is currently far greater than local production; as a result, 90-95 percent of wheat consumed in the country is imported from the United States. For instance, in 2007, the country imported 4.3 million tonnes of wheat, up from 3.8 million tonnes in 2006.

Magaji *et al.* (2012) confirmed that Nigeria has a lot of potential for irrigated and rain-fed wheat production, especially the former. To find adaptable materials, a large number of wheat lines obtained from CIMMYT are being evaluated. Studies are currently underway to improve wheat production through improved technology development and the effects of innovations on livelihood. This will not only increase the country's total wheat output, but it will also improve national food and nutritional security while also creating jobs.

Falola *et al.* (2017) inferred that household commercialization of wheat production (54.7 percent) is currently at a low level. The study's gap of 45.3 percent indicates that nearly half of the wheat produced by households is consumed by households, leaving less wheat available for public and industrial use. This could be the reason for Nigeria's current reliance on massive wheat imports to bridge the demand-supply gap.

Donley (2018) inferred that according to a May 10 Global Agricultural Information report from the United States Department of Agriculture, Nigerians are expected to increase wheat imports by 4% in 2019-20 as they shift to consuming more wheat flour-based products (USDA). According to the USDA, the increase in consumption is due to population growth of 2.5 percent per year in Nigeria, which accounts for nearly half of West Africa's population.

Demaree-Saddler (2020) concluded that according to a report from the US Department of Agriculture's Global Agricultural Information Network (GAIN), Nigeria will continue to rely on grain imports for food security as the country grapples with coronavirus (COVID-19) restrictions, currency depreciation, and climate change (USDA). In the 2020-21 marketing year, domestic wheat production is expected to drop 8% to 55,000 tonnes. Wheat is planted in November and harvested in April in Nigeria, where farmers do not live on wheat farms.

Ibrahim (2020) reported that adoption of a recently introduced technology that entails the use of a machine that ridges and plants at the same time, the new technology is expected to produce positive results because the techniques were able to

increase wheat yield per hectare compared to previous techniques.

Knoema (2020) shows that Nigeria produced 67,000 metric tonnes of wheat in 2017, and 60,000 metric tonnes of wheat were produced in 2019. These revealed that Nigerian wheat production increased from 6,000MT in 1970 to 60,000MT in 2020, indicating a 12.34 percent annual growth rate.

WFAN (2020) reported that total local wheat production in Nigeria was around 200,000 metric tonnes last year, which was lower than expected due to harsh weather conditions and limited seed varieties available. According to the FAO, flour millers imported 4.7 million tonnes of wheat per year on average over the last few years, leaving Nigeria's local wheat production woefully inadequate to meet demand.

Boluwade (2021) reported that Nigeria is on track for yet another year of low wheat output. Nigeria's wheat production is expected to reach 55,000 metric tonnes in the marketing year 2021/2022, according to FAS Lagos (Post) (MT). The amount of land harvested in the same marketing year is expected to drop by 5,000 hectares, from 60,000 hectares predicted by USDA last year to 55,000 hectares this year. Banditry and kidnapping have reached epidemic proportions in Northwest Nigeria, the primary wheat-growing region. Wheat is primarily grown in the states of Borno, Bauchi, Yobe, Kano, Jigawa, and Zamfara. These countries are currently undergoing intensive military operations to expel terrorists and bandits. Farmers' access to their farms is severely restricted as a result of these restrictions.

Ekott (2021) indicated that Nigeria's wheat production has been so poor for the past decade that the country has only managed to produce about 2% of the wheat it consumes. According to data from the United States Department of Agriculture, as wheat consumption increased between 2010 and 2020, the country failed to grow more wheat and instead filled the supply gap by importing significantly more wheat. During that time period, the country produced only 2.06% of the total amount of wheat consumed.

2.4. Problems in the wheat scenario and constraints experienced by farmers

Magaji *et al.* (2012) confirmed that development of heat tolerant wheat varieties that are high yielding, development of rain-fed wheat cultivars that are tolerance/resistant to high temperatures, humidity, pests and diseases, promotion of wheat as a staple food, and market outlets for surplus produce are some of the

challenges confronting wheat production in Nigeria.

Negassa *et al*. (2013) revealed that the average wheat yield in Africa is among the lowest in the world, so there is a good chance of increasing wheat productivity by introducing and using high-yielding wheat varieties, as well as better management practises. Wheat could also be used as a rotation crop in an existing cropping system without causing too much disruption to the existing production system.

Understanding farming systems, mechanisation, and other socioeconomic constraints that may affect farmers' incentives and ability to cultivate and supply wheat to markets, even if it is profitable In non-traditional areas, switching to a new crop may necessitate a significant amount of demonstration and value chain development before farmers can effectively engage in wheat production.

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Ahmed (2014) reported that high transportation costs, a lack of access to capital, middlemen's activities, and inadequate storage facilities are among the major wheat marketing issues faced by respondents in the study area. According to the findings, the majority of respondents (39.5 percent) believe that high transportation costs have a negative impact on their profits. In addition, respondents report difficulty taking advantage of large-scale purchases due to a lack of capital (33.3 percent) to expand their current business scale. Furthermore, middlemen's activities and insufficient storage facilities are issues for the respondents.

Lobell *et al.* 2011; Chand *et al.* (2014) confirmed that drought, soil acidity, erosion, poor soil fertility, water-logging, and pre-harvest sprouting are the most important abiotic stresses in rain-fed environments, according to the findings. The East African highlands of Ethiopia, Eritrea, Kenya, Tanzania, Uganda, Rwanda, and Burundi are the most affected. Rain-fed environments in mid-altitude areas of South Africa, Angola, Zambia, Malawi, and Madagascar face similar difficulties. In the irrigated environments of Sudan, Nigeria, Zambia, Zimbabwe, Mali, Malawi, Senegal,

Chad, and Somalia, the most significant abiotic constraints are heat and a lack of irrigation water. High temperatures during wheat reproductive stages, which are linked to climate change, result in significant yield loss and grain quality reductions, owing to shorter developmental stages and lower biomass.

Minot *et al.* (2015) observed that most crop yields on farmers' plots are roughly thrice and twice as low as wheat yields at research stations and on farms, respectively. This is also significantly lower than global standards, with two North African countries, Egypt and Morocco, each producing more than 7 million tonnes, and 27 other countries surpassing them.

Falola *et al.* (2017) found that Farm size, fertiliser, use of farm machinery, access to credit, and improved wheat varieties were found to positively influence household commercialization of wheat production in the study area by Falola et al. (2017), whereas the age of the household head and non-farm income had a negative impact. Low output price, insufficient credit facilities, a lack of production inputs and high input costs, transportation issues, diseases/pests, and insufficient land are all major constraints to market-oriented wheat production in the country, according to the study.

Heena *et al.* (2018) observed that due to a lack of irrigation facilities in the state, 77 percent of the sample farmers did not use recommended input doses. Due to a lack of funds, approximately 75% of the farmers in the sample did not use the recommended dose of inputs. Due to unfavourable climatic conditions, approximately 40% of the sample farmers stated that they did not use the recommended dose of inputs. 27 percent of the farmers in the sample did not use the recommended dose of inputs due to a lack of technical knowledge. About 35% of the farmers in the sample said they didn't have fertilizer at the right time.

Tadesse *et al.* (2018) concluded that the researchers concluded that the region's low productivity (2t/ha) is primarily due to abiotic (drought and heat) and biotic (yellow rust, stem rust, septoria, and fusarium) stresses, which are increasing in intensity and frequency as a result of climate change. Furthermore, rising production costs, rising population, increased rural-to-urban migration, low public and private investment, weak extension systems and policies, and low adoption rates of new technologies continue to be major challenges for wheat production in Sub-Saharan

Africa.

Anteneh and Asrat (2020) confirmed that Ethiopian wheat yields are low by international standards. The main reason for this is that there are numerous issues. Limited storage capacity, lack of demand due to poor quality of local wheat, lack of grade and standardisation, presence of crop worms and diseases, input shortages and prices, infrastructure shortages, subsistence or traditional production systems, farmer price cheating by traders, and very limited irrigation access were the major production and marketing problems for the development of Ethiopian wheat.

Dube *et al*. (2020) reported that we identified the major constraints to irrigation wheat yield and explored opportunities for improving yield and farmer profits through exploratory research that included field inspections and farmer and researcher interviews. The low market price for grain, which makes farmers hesitant to invest in inputs to increase wheat yield, was identified as the most significant constraint to yield. Yields are being harmed by poor cultivar selection, cereal-based mono-cropping, high irrigation costs, insufficient irrigation water, low crop stands, soil acidity, no-till practises, and red-billed quelea (Quelea quelea) birds. We also highlight a gap between current research efforts and farmer priorities.

Fisseha *et al.* (2020) the result indicates that The average wheat production per hectare (2.7 tons/ha) has increased with inter-annual variability, but the yield is still low when compared to the research station (6-7 tons/ha) and the estimated average potential (5 tons/ha) in the country's highlands. When the national average yield was compared to the actual yield at research stations, farmers' plots, and potential yield in the highlands, the yield gap analysis revealed a 61 percent, 55 percent, and 46 percent wheat yield gap, respectively. Wheat growers have statistically significant yield variability, according to the empirical analysis. The study found that the primary factors that cause wheat yield variation in Ethiopia are improved technologies and production inputs, household assets, support services, and agro-ecologies.

WFAN (2020) confirmed that limited access to improved seed varieties, fertilisers, and chemicals, high production costs, inadequate irrigation infrastructure, insufficient funding systems, a lack of a cohesive national strategy on wheat development, and the unclear role of various stakeholders are among the challenges facing wheat production in the country.

Boluwade (2021) reported that lack of modern agronomic practises and the lack of improved seeds have hampered wheat production in Nigeria. Wheat yields on average 1MT/Ha across the country. The CBN imported improved wheat seeds late last year to help wheat farmers. The central bank intends to carry out a seed multiplication project this year by cultivating 80,000 ha and then offloading and recirculating the seeds in the following planting season. This year, there will be a lot of seed multiplication activities, which will affect total wheat output.

Mukoka (2021) conclude that yields are being harmed by poor cultivar selection, cereal-based monocropping, high irrigation costs, insufficient irrigation water, low crop stands, soil acidity, no-till practises, and red-billed quelea (Quelea quelea) birds. Expanding the area under production (horizontal expansion) and increasing the yields of existing croplands are the two main ways to increase wheat production in Zimbabwe (vertical expansion). The majority of farmers cite insufficient water supply during critical periods of crop growth as a major yield constraint. Wheat grown in summer rainfall areas is almost entirely reliant on irrigation for growth and yield, so adequate irrigation is essential, particularly during flowering and grain filling periods.

2.5. Policy and scheme analysis

Kolawole (1993) the results indicates that wheat production is more profitable in Kano State, where farmers made an average profit margin of 26% per hectare, but less so in Kaduna, where farmers were unable to cover their operating costs. Second, while the current wheat price incentive was found to be sufficient to encourage farmers to continue production, it was far from satisfactory for the Nigerian Flour Millers Association and, inevitably, consumers who could not afford wheat bread. Third, the country's inefficient pricing system has, ironically, created some marketing issues.

Azih (2011) confirmed that Agriculture is a vital part of the Nigerian economy, with enormous potential for job creation, food security, and poverty alleviation. In the 1960s, the agricultural sector was Nigeria's primary source of employment, income, and foreign exchange earnings. This was due to targeted regional policies based on comparative advantage in commodities.

Oluigbo (2012) reported that Nigeria was the world's leading groundnut exporter in 1961, with a 42 percent market share. As the major West African cotton

exporter, the country also exported 27 percent of the world's palm oil, 18 percent of cocoa, and 1.4 percent of cotton. Agriculture accounted for well over 80% of Nigeria's Gross Domestic Product (GDP) and the majority of the country's exports until the early 1970s.

Madu *et al*. (2013) concluded that these findings have implications for low-income countries' poverty reduction efforts. For projects that benefit rural communities, policymakers and authorities should consider using a community-driven development approach. Given the numerous constraints that the poor face, a CDD project like Fadama II that addresses multiple constraints at the same time will likely build synergies that will result in larger impacts than a project that addresses only one or two constraints.

Nwanekezi (2013) revealed that if the wheat flour in the composite flour is of good quality and quantity (14 percent or more), composite flour containing 80 percent or less wheat flour can undoubtedly be used to make good quality bread. Also, composite flour containing equal blends of wheat flour and local food flour as wheat flour containing as little as 6–7% can be used to bake good quality biscuits and cakes.

Ohimain (2014) reported that over the next four years, the WTA is expected to generate about 1 million jobs and over N42 billion in revenue for farmers and millers. The wheat transformation agenda could boost domestic wheat production while also complementing the government's other bread intervention programmes and policies, such as the 40% cassava bread policy and increased wheat importation levies. National food production increased by 15 million MT within two years of the ATA's implementation, while food imports decreased from $19.02 billion in 2011 to $4.35 billion in 2013, while agricultural exports increased by N 720 billion. Regime change and militancy/insecurity, particularly in northeastern Nigeria, are two major challenges that could jeopardise the WTA's success.

Obiora (2014) the study reveals that the technology transfer sub-system, which should naturally be the major stakeholder in Nigeria's ongoing Agricultural Transformation Agenda, has weak capacities in terms of training, human resource development, and workforce. This appears to demonstrate that the sub-system is unable to meet the demands/needs of farmers and other stakeholders along the targeted commodity value chains in the ongoing transformation. The study also

identifies some strategies for strengthening the subsystem, including capacity building for extension personnel (M=4.0), proper extension funding (M=4.0), and proper extension staffing (M=4.0). To make the sub-system relevant and effective in the transformation agenda, the study strongly recommends increased funding and general strong support.

Obasi (2015) the results of the study showed that small and medium-scale farmers both use farm inputs efficiently, but small-scale farmers are technically more efficient than medium-scale farmers. Borrowers with a secondary or tertiary education were efficient in their use of inputs, but borrowers with a tertiary education were technically more efficient than those with a secondary education. ACGSF and CACS are the most efficient lending schemes in Nigeria, but ACGSF was technically more efficient than CACS.

Adenegan *et al.* (2018) shows that the factors that influenced farmers' participation in the Growth Enhancement Support Scheme were investigated using the probit regression model. Farmers' associations, participation in previous programmes, and access to credit were statistically significant in influencing farmers' decisions to participate in the GES Scheme at the 1%, 1%, and 10% levels of significance, respectively.

Felix and Bassey (2018) concludes that Advocating for a conducive legislative and agricultural knowledge framework, macro policies, security-enhancing physical infrastructure, and institutional mechanisms for coordination and enhancing access to adequate inputs, finance, information on innovation, agricultural services, and markets is an effective way of implementing the policy.

Oluwale *et al.* (2018) observed that the magnitude and direction of the relationship between cassava flour availability and cassava bread production (r=0.187, p5%), as well as product quality and cassava bread production (r=0.388, p10%). According to the findings, bread consumers have a low level of awareness of cassava bread, and bread bakers have a low level of compliance with cassava flour composite in bread production due to the high cost.

Tinuke and Joseph (2018) revealed that the Anchor Borrower Program, which was implemented in Kabbi State and Argungu in particular, has made significant contributions in the areas of job creation, food production, income generation, and

the provision of raw materials to industries. In particular, the programme achieved notable results in its efforts to replace rice imports, farmer empowerment through the provision of subsidised agro inputs, starter packs, and cash, farmer profiling, and the development of cooperative and banking culture. The wide range of targeted value chains increased the number of smallholder farmers who participated. Despite the program's perceived benefits, the paper found that some aspects of ABP implementation arrangements are still unclear due to a lack of awareness of the program's implementation arrangements, roles of stakeholders overlap, updates at a base are still an issue, a credible monitoring and evaluation framework is lacking, and cases of elite capture may be common.

Odunze (2019) said that the APP was reviewed and found to recognize inherent constraints that affect entrepreneurship in the sector and to go to great lengths to provide clear policies on how to address each of them. The policy prioritizes private-sector partnerships and agricultural input and output market liberalization, is gender and age-sensitive, and recognizes the need for infrastructure development, particularly in rural areas, to create an enabling environment for entrepreneurial opportunities, among other things. The policy, if properly implemented, will promote entrepreneurship in the sector, according to the findings.

Okeke *et al.* (2019) the findings revealed that rice farmers in the study area have increased their income and farm output thanks to the Anchor Borrowers' Program (ABP). Rice farmers' access to ABP was influenced significantly by their socioeconomic status. In terms of farm income, both beneficiary and non-beneficiary rice farmers were no better or worse than a random rice farmer from the samples. Beneficiary rice farmers acquired fewer productive assets than a random rice farmer from the sample would have earned, whereas non-beneficiary rice farmers acquired more productive assets.

Uduji *et al.* (2019) said that the results of the recursive bivariate probit model revealed that the GESS had a significant impact on rural farmers' access to and use of fertiliser; and that contact with extension agents, ownership of mobile phones, power for charging phone batteries, value output, mobile network coverage, and ability to read and write were positive determinants of rural farmers' participation in the GESS; whereas increased distance to registration and collection centres, a lack of access to

information, and a lack of access to information were negative determinants.

Christian (2020) conclude that it's worth noting that the issues and challenges have remained largely unchanged since Nigeria's agricultural beginnings. Past national agricultural development policies/programs have failed to improve the living standards of millions of Nigerians or the country's economic development. The majority of farmers (more than 65 percent) still farm in a primitive manner; storage ideas and facilities have not improved significantly, resulting in high losses from postharvest handling; Infrastructure development has not kept pace with current challenges, resulting in process stagnation and logistical chaos. Access to markets has remained a persistent issue, making farming unappealing to the majority of people.

Ejiogu (2021) the study found that the difference between the prescribed interest rate and the actual interest rate paid by participating farmers in Imo State's Anchor Borrowers' Program is statistically significant. It is suggested that the programme be monitored and evaluated on a regular basis to ensure its overall effectiveness.

2. 6. Effects of climate change on wheat production and livelihood of the farmers

Lobell *et al.* (2011) found that temperature trends from 1980 to 2008 exceeded one standard deviation of historic year-to-year variability in most cropping regions and growing seasons, with the notable exception of the United States. Global maize and wheat production fell by 3.8 and 5.5 percent, respectively, in comparison to a counterfactual without climate trends, according to models that link yields of the four largest commodity crops to weather. In the case of soybeans and rice, the winners and losers were nearly equal. In some countries, climate trends were large enough to offset a significant portion of the increases in average yields due to technology, carbon dioxide fertilization, and other factors.

Moldestad *et al.* (2011) revealed that during grain filling, there was a significant temperature difference between seasons and between locations within seasons. The latter was primarily caused by differences in sowing time, which resulted in different temperature courses during grain filling. Within a genotype, there was a lot of variation in gluten resistance, ranging from Rmax of 0.13 to 1.12 N. Gluten quality was positively related to a higher mean temperature from the start to about halfway through the grain filling period. When the diurnal mean temperature in these

periods dropped below 18 0C, gluten resistance was found to be weaker.

Arbuckle *et al.* (2013) reported that farmers' attitudes toward adaptation are heavily influenced by their perceptions of climate risk. Concern about the negative effects of climate change was a strong predictor of support for more protective measures and investment in agricultural drainage to adapt to increased precipitation. Farmer attitudes toward adaptive action, on the other hand, were not significantly linked to climate change beliefs.

Russell *et al.* (2014) conclude that increased temperatures, precipitation, and CO2 concentrations will undoubtedly pose a challenge to the wheat industry, but the climate in Kentucky appears to be conducive to profitable wheat production. The impact of a warming climate on wheat pests, on the other hand, raises questions. It is likely that a more diverse and robust set of cultivars with heat tolerance, freeze tolerance, and pest resistance will be required. Wheat growers, agronomists, plant pathologists, entomologists, climate scientists, ecologists, and crop physiologists will all be needed to develop successful adaptation strategies.

Asseng *et al.* (2015) inferred that regardless of the input data used, the model ensemble median was consistently more accurate in simulating the crop temperature response than any single model. Warming is already slowing yield gains at the majority of wheat-growing locations, according to extrapolation of the model ensemble temperature response. Global wheat production is expected to drop by 6% for every 0°C increase in temperature, and become more variable over time and space.

Aniaha *et al.* (2016) the finding inferred that climate change has posed a threat to household livelihood activities such as crop and animal farming, trading, fishing, basket weaving, and Shea butter processing due to rippling effects such as drought, flood, pest and disease outbreaks, post-harvest losses, and a decline in crop yield and animal production. As a result, the household's livelihood was in grave jeopardy. Non-farm/off-farm livelihood activities provided a large portion of the income generated by agricultural activities.

Howard *et al.* (2016) the estimated results said that in both the short and long run, Kansas farmers are supply responsive to changes in the price of wheat and its substitute, oats. In the short run, a rise in temperature boosts wheat production, but in the long run, it has no effect. Increasing precipitation has a positive short-term effect

on wheat production but a negative long-term effect.

Nguyen *et al.* (2016) the findings showed that through personal sensory impressions, most farmers were able to learn about changes in their environment as a result of changing climate conditions (perceiving to learn). They were, however, talking about inter-annual weather variability rather than CC. Different farmer groups had different perceptions of climate patterns due to different ways of understanding and interpreting them. These are the result of personal experiences, socioeconomic and cultural factors, as well as perceived relationships between climate factors and their effects on specific farming systems (learning to perceive).

Zhao *et al.* (2017) concluded that at the global scale, the results from the various methods consistently showed negative temperature impacts on crop yield, which were generally backed up by similar impacts at the country and site scales. Each degree Celsius increase in global mean temperature would reduce global wheat yields by 6.0 percent, rice yields by 3.2 percent, maize yields by 7.4 percent, and soybean yields by 3.1 percent without CO_2 fertilisation, effective adaptation, and genetic improvement.

Sajjad *et al.* (2017) the results of the study reveal that the effect of maximum temperature on wheat production is negative, whereas the effect of minimum temperature is positive and significant for all crops. With the exception of wheat, rainfall has a negative impact on crop yield. For the rice crop, the maximum temperature has a significant impact. Temperature and relative humidity were found to have a positive relationship with sugarcane crop yield. Climate change has a negative impact on the yield of major food crops in general. Almost 60% of the Pakistani population lives in poverty.

Mukherjee *et al.* (2019) revealed that yield loss is linked to climate variability and change. During the period 2002–2010, there were decreased trends in monsoon rainfall, winter rainfall, and the increase in average winter temperature, all of which contributed to a negative effect on wheat yields (both directly and indirectly). Multiple sources of data suggested that multi-year drought conditions during this period related to low rainfall, estimated groundwater level, and soil water storage contributed to the continuous wheat yield losses.

Sikha (2019) found that farmers all over the world are dealing with climate

change, which is primarily caused by rising temperatures, unpredictable rainfall, and reduced crop yields. In agricultural production, the majority of people have seen a decrease in yield. Farmers have various explanations for the changes and respond accordingly to combat them. When formulating adaptation plans and policies, it is critical to recognize and understand the perspectives of those who are already experiencing and trying to respond to such changes.

Ali *et al.* (2020) shows that in 2030, 2050, and 2080, the results predicted lower wheat grain yields by an average of 8.7%, 11.4 percent, and 13.2%, respectively, compared to the baseline yield. Amidst some uncertainly in GCMs (i.e. 2.1, 5 and 8%) and CMs, negative effects of climate change are likely (i.e. 2.2, 6 and 9.2 percent). Changing the planting date by plus or minus 5 or 10 days from the current practise was evaluated as a possible effective adaptation option that could partially offset the negative effects of climate change.

Chhogyel *et al.* (2020) found that farmers' views on climate change varied, but they were all aware of the problem. Climate change meant unpredictable weather (79 percent), less or no rain (70 percent), and drying of irrigation sources for the majority of farmers (55 percent). Climate change was described by some farmers as the emergence of diseases and pests (45%), high-intensity rains (30%), less or no snow (24%), and shorter winters (24%). (11 percent).

Daloz *et al.* (2021) shows that During the planting season, or Rabi season (November–April), there is an increase in mean temperature, rainfall, and maximum temperature. Wheat yield losses range from 1% to 8% depending on the site studied due to the direct impact of climate change via changes in temperature and precipitation. The indirect impact of climate change is then considered, taking into account the impact of climate change on water availability, which leads to a decrease in irrigation. In this case, yield losses are significant and much higher, ranging from -4 percent to -36 percent, depending on the site and irrigation regime selected (6, 5, 3 or 1 irrigations). This research suggests that the indirect effects of climate change on future wheat yields may be more detrimental than the direct effects.

2.7. Marketing behavior and Price spread/marketing margin of the farmers

Jain (1977) revealed that the sales to government agencies were made under a mandatory levy on producers and a price support programme, and farmers faced

difficulties in weighing and payment while selling to those agencies. After one week of weighing, nearly 38% of the farmers received payment. Two-thirds of the farmers preferred to sell their wheat at a single location rather than in an open market. Over time, the proportion of farmers selling wheat in the village and at the market has decreased by about 12%.

Anil and Joshi (2001) founded that in terms of bringing active economy to the hill, it is necessary to decentralize technology for local and marketing channels. Natural resources and settlers should be integrated with decentralized technology and market needs. This would result in a large number of people being employed.

Michael (2001) revealed that the marketing margin, which is calculated as a function of the difference between the retail and farm prices for a given farm product, is used to calculate the cost of marketing services. Shifts in retail demand, farm supply, and marketing input prices all have an impact on the margin. Other factors, such as supply and demand time lags, market power, risk, technical change, quality, and spatial considerations, can all be important. Improved specifications for margins and demand and supply shifters, retail-to-farm price transmission of retail demand changes, and the effects of inner layers and policy interventions are all topics for future research.

Moni (2001) affirmed that in order for agriculture to be a more profitable venture, production must be guided; the necessary skills must be developed so that farmers can analyse and identify market demand for their produce; and farmers should be exposed to successful market-led extension experiences to help them gain more profit from their produce.

Santucci (2001) concluded that the majority of farmers lack proper marketing skills, and wholesalers were their primary marketing channel. They sold their property locally with no help or advice. They normally promote themselves at the weekly local market and the annual local fair.

Bano (2002) confirmed that tribal women market and sell a portion of their produce at market and move freely in the weekly markets, laughing and giggling, but they are rarely involved in the production process or social counselling.

Kumar *et al.* (2004) stated that tribal farmers sell their produce to local traders without the involvement of the procurement agency. It should also be noted that the

majority of farmers were unaware of the MSP offers on the crops in question. Maize, paddy, sawa, and ragi were all cheaper on the open market than the MSP.

Byrne (2005) reported that there is a link between investment experience and risk. Corter and Chen (2006) found that an investor's prior experience influenced their risk perception in terms of risk attitude and risk tolerance. Chen et al. (2007) backed this up, stating that long-term investment experience had a significant impact on individual investors' investment decisions.

Kumar and Lee (2006) confirmed that due to the various factors that influence their decision-making, investors do not always act rationally in all financial markets. Psychological, sociological, and demographic factors are the elements in question.

Rundh (2007) the findings inferred that There is no significant difference in international marketing behaviour between small and large businesses. Because of local representation and service demand in the local market, market entry is heavily influenced by proximity. Administration and technical barriers, as well as a highly competitive environment, are the main roadblocks.

Johnson and Manoharan (2009) reported According to the respondents' marketing behaviour, the majority (54.44 percent) had a medium level of marketing behaviour. (26.67 percent) of respondents had a low level of marketing behaviour, whereas (18.89 percent) had a high level of marketing behaviour.

Kumar and Kapoor (2010) concluded that marketing channels have been found to be well established in the state, particularly in the coastal areas, according to Kumar and Kapoor (2010). At no point do the players add any significant value. The existence of functional channels explains how the state's coconut production and marketing system can handle both increased supply and demand. In the channel, the study discovered a high ratio of vendors to farmers and aggregators to vendors. Despite this high ratio, both vendors and aggregators are profitable and continue to do business.

Muthukumar and Thiyagarajan (2010) found that farmers' main marketing behaviour was characterised by a lack of consistency in marketing and related activities such as marketing channels, seed buyer distribution, price fixation method, postharvest management, mode of transport, and market information sources.

Seru *et al.* (2010) find out that Individual investors' psychological factors in

investment decision-making have always been influenced by their investment appraisal process.

Raina *et al.* (2011) found that the majority of respondents sold their flowers directly to a small processor at the farm, without grading for quick cash and without attempting to contact outsiders to inquire about current prices before selling their lot. Furthermore, the majority of respondents (52 percent) used a combination of modes of transportation and marketing channels to sell lowers in the form of garland to markets.

Shaikh and Kalkundrikar (2011) concluded education level, income level, and marital status were significant sociological attributes determining investors' behaviour and influencing their investment decision, according to their exploratory research.

Sreekala *et al.* (2011) reported that multiple handling, loss of quality, and malpractices in weighment, handling, and payment are all consequences of the involvement of intermediaries in Kerala's vegetable and fruit marketing system. As a result, farmers received a low share of the consumer's price and intermediaries received exorbitant merging. In Kerala, small marginal and landless agricultural labourers who leased the land were primarily responsible for vegetable and fruit cultivation. It is necessary to identify the marketing channel that ensures a good and remunerative price for producers as well as a reasonable price for consumers with the fewest possible intermediaries. The marketing share of vegetable and fruit farmers in Kerala has improved as a result of intervention from concerned bodies.

Janani *et al.* (2012) concluded that the majority of Jasmine growers sold their crops through an agent and packaged their crops in polythene bags. Almost half of the respondents sell their produce within the village, and the majority of them consider immediate payment to be the most important criterion for market selection, despite the fact that they lack adequate marketing facilities.

Aguinaldo *et al.* (2012) findings revealed that in general, farm prices are falling faster than wholesale and retail prices. The farm gate price share retail price is decreasing over time. The findings show that there is a high rate of wastage at the retail level, which can be attributed to the high costs incurred, and this gives retailers the largest share of the chain. Farmers receive the least benefit of all the actors in the chain, according to price spreads analysis.

Meena (2013) found that for marketing their produce, the majority of farmers use the farmer-broker-exporter channel, while others use the farmer-exporter channel. However, collector – broker – local traders – farmer was the most common marketing channel, because the broker paid the collector in advance to collect from the wild, and they were able to contact a larger number of collectors. To market the onion, there were primarily three types of channels.

Abassian *et al.* (2012) observed that the functions of retail marketing margin and wholesale marketing margin are influenced by retail price and marketing cost, while the functions of wholesale marketing margin and marketing cost are influenced by wholesale price and marketing cost, and the function of exporting margin is influenced by exporting price. Given that, under the current marketing system, wholesalers and retailers take a large portion of the profit, while date producers receive very little. Because the price of a date is much higher than the cost of services provided on the date, and because wholesalers and retailers market it,

Mishra *et al.* (2012) reported that in harvesting/collection, tribal women's participation in the marketing process was recognised to a high degree. Furthermore, tribal women are said to sell their products directly to consumers (43%), as well as to traders (42 percent). As a result, the need for women to develop strategies for dealing with customers cannot be overstated in order to have a reasonable price.

Sushil *et al.* (2013) observed that channel I has a higher marketing efficiency than channels II and III. The efficiency of channel I has not been harmed by the higher marketing costs in channels I and II. The fact that channel II's marketing costs are lower in absolute terms does not imply that it is more efficient. When compared to channel I, channel II had a lower absolute marketing cost due to the absence of two actors in the channel. The market's efficiency indicated the farmer's relative percentage share of the consumer rupee. The marketing efficiency would be higher if the farmer received a larger portion.

Anuse *et al.* (2014) findings of the study revealed that because of pressing cash needs and indebtedness to traders, the respondents sold their produce immediately after processing if prices were favourable. In the regular market yard, the majority of the respondents sold their produce to wholesalers through commission agents. The newspaper, radio, and television were the primary sources of market   information for

the majority of respondents.

Dutta and Hazarika (2014) revealed that the total production had a direct impact on the marketed surplus, because of a lack of adequate storage and transportation facilities. The majority of post-harvest losses occurred among medium-sized farmers. Because only one intermediary was involved, the producer-wholesaler (local) - commission agent (distant)-Retailer (local)-Consumer was found to be the most effective marketing channel for vegetables. The producer's share of the consumer's rupee was highest in channel II as well as marketing efficiency than channel one.

Meena and Singh (2014) said that total marketing costs accounted for 18.20 percent of the consumer's rupee, while marketing margins accounted for 31.80 percent. The producer's share of the consumer's rupee in Kota was 52.73 percent. The total marketing cost was 18.21%, and the marketing margins were 29.06% of the consumer's rupee. The total marketing cost was 18.22%, and the marketing margins were 38.45% of the price paid by the consumer. The total marketing cost was 18.40%, and the marketing margins were 34.333% of the price paid by the consumer.

Srinivas *et al.* (2014) concluded that the majority of farmers have a medium level of marketing behaviour, harvesting when the tomatoes are half-ripe, packaging them in wooden boxes, transporting their lot by tempo, and not grading. Furthermore, nearly all of the respondents used a 15kg box as a standard scale for weighing, and the price was set through an open auction with payment made on the spot.

Bhat *et al.* (2015) said that there were three types of marketing chains identified, with an average marketing cost per quintal of Rs.438.65 for channel I, Rs.264.00 for channel II, and Rs.226.67 for channel III at the producer level. The retailer's average marketing cost per quintal was found to be Rs.30.95 for channel I and Rs.19.40 for channel II. In terms of price spread analysis, the net price received by the producer per quintal for channel I (44 percent), Rs.1036.00 for channel II (51.29 percent), and Rs.1073.33 for channel III was around Rs.945.90 for channel I (44 percent), Rs.1036.00 for channel II (51.29 percent), and Rs.1073.33 for channel III (82.56 percent). When comparing different channels, it was discovered that in channel III, producers receive a larger share of the consumer's rupee than in other channels, and that the consumer also paid the lowest price of Rs.1300.00 per quintal in the same

channel, as opposed to Rs.2150.00 per quintal in channel I and Rs.2020.00 per quintal in channel II. This demonstrates that a direct sale from the producer to the final consumer is advantageous to both parties. With a marketing efficiency of 4.74, channel-III was the most efficient, followed by channel-II and channel-I, respectively, with marketing efficiency of 1.05 and 0.79.

Jain *et al.* (2015); Tekce and Yılmaz (2015) reported that in reality, a combination of specific psychological factors, such as overconfidence and representativeness, influence individual investors' investment behaviour.

Kumar (2015) reported that due to the perishability of the product and financial urgency, the majority of vegetable growers sell their crop immediately after harvesting, regardless of the price offered to them. Furthermore, because of its proximity, the majority of respondents sold their produce directly to the consumer at a nearby weekly market and received immediate cash payment, and the majority were found to have a medium level of marketing behaviour.

Omer and Tuncer (2016) reported that the majority of farmers lack the necessary knowledge of their revenue and credit usage, which may be why the majority of them indicate a need for foreign capital. Farmers who lack financial literacy end up taking out unnecessary credit that they can't afford to repay. Farmers should be aware of the risk of receiving an unwanted loan from financial service providers who should advise and manipulate their decisions appropriately. Furthermore, the study revealed that fellow farmers had a significant influence on individual farmer decisions.

Hassan *et al*. (2017) indicated that wheat marketing margins at the farm-wholesale level always exceed those at the wholesale-retail level. The above analysis also shows that in years of increased wheat production growth, marketing margins decline due to lower prices at all levels of the marketing chain, and vice versa. The relationship between marketing margins and retail prices is positive, but the relationship between marketing margins and farm gate prices is negative. As farm gate prices rise, marketing margins fall, while retail prices rise, marketing margins rise. Marketing margins fall in years when private traders are allowed to enter the wheat market on a competitive basis, according to an analysis of marketing margins at various levels.

Mark and Ip (2017) inferred that Psychological, sociological, and demographic factors all played a role in predicting the investor's behaviour. As a result, financial service providers would make marketing and strategic decisions based on their ability to predict their customers' investment preferences.

Prashant and Badodiya (2017) the study revealed that majority 72.50 percent of respondents had a medium level of vegetable marketing behaviour. Education, land ownership, annual income, irrigation potentiality, mass media exposure, innovativeness, market orientation, knowledge of vegetable production by vegetable growers, and awareness were all positively and significantly related to marketing behaviour.

Balaji *et al.* (2018) concluded that, in the case of starch, the marketing efficiency of channel III was relatively higher in both approaches (Channel III and IV). Despite the fact that the marketing efficiency was exceptional. In the case of sago manufacturing and consumption, channel V had a higher marketing efficiency, but this channel started with the white flour processor.

Kumar *et al.* (2018) reported that Farmers spent over six hours per week grading and standardizing their lot and selling their produce through a private transportation system, preferring to market their produce through relatives, friends, and merchants. Their preferred method of selling the produce was through a distant mandi.

Phukan *et al*. (2018) concluded that the majority of farmers (23%) got market information from their local market, and 43% of respondents had a medium level of vegetable marketing knowledge. According to the study, regardless of price, the majority of farmers (48%) sell their produce immediately after harvest, while others (35%) sell when prices become favourable, and others (16%) store for one or two months in order to obtain a high return.

Bernardia *et al.* (2019) shows that Bantul Regency semi-organic rice was sold through five different channels. Marketing channel I, in which producers sell directly to consumers, was the shortest marketing channel. Marketing channel I had the lowest marketing margin and the highest marketing efficiency. Marketing margin was influenced by packaging costs, transportation costs, other costs, marketing volume, and marketing channel.

Dinesh and Sharma (2019) inferred that In channel-I, the wholesaler's margin was Rs. 228 per 1000 eggs, or 5.70 percent of the consumer's price. For the same number of eggs, the price spread and marketing efficiency in this channel are Rs. 400 and 2.30. In channel-II, the wholesaler margin was 7.00 percent of the consumer's price, or Rs. 306 per 1000 eggs, while the retailer's margin was Rs. 272 per 1000 eggs, or 6.20 percent of the consumer's purchase price. In channel III, the marketing efficiency was 1.80, and the retailer's margin was Rs 166 per 1000 eggs, or 4.30 percent of the consumer's price. As a result, the price spread and marketing efficiency in this channel were Rs. 300 and 2.2 for 1000 eggs, respectively.

Imlibenla and Sharma (2019) found that Farmers sold their produce to commission agents in Channel-I, who then sold the tea to a processing unit for processing. Farmers in Channel II sell their lots directly to the factory, which is much more profitable than in Channel I. In Channel-I and Channel-II, the total marketing cost was Rs 7.08/- per kg and Rs. 6.55/-, respectively. This revealed that the cost of marketing in Channel-I was higher than in Channel-II. The margin in Channel-I was slightly higher than the margin in Channel-II, which was Rs 77.94/- and Rs 76.94/-, respectively. Marketing efficiency was found to be 14.1 in Channel I and 15.3 in Channel II.

Irfan and Handayani (2019) found that there were three marketing channels: channel I (farmers - traders - consumers), channel II (farmers - farmer groups - retail - consumers), and channel III (farmers - farmer groups - retail - consumers) (farmers - tengkulak - consumers). Organic rice II is more efficient than marketing channels I and III in terms of marketing channel economics. With a farmer's share of 80.95 percent and a margin of IDR.4000 per kg, market channel II has the highest farmer's share value.

Sodhi and Patel (2019) reported that in comparison to other channels, channel III provided a higher share of the consumer's rupee to potato farmers. In channel III, the price spread was very small because the produce was sold directly to the retailer by the farmer. The marketing efficiency of channel III was the highest. When channel I and channel II were compared, it was discovered that channel II had a lower marketing efficiency due to the involvement of an additional intermediary (commission agent).

Ogunwande *et al.* (2020) revealed that the processors had the highest gross margin (N617, 188.00), while farmers had the lowest (N201, 058.19). Customers and monthly revenue positively influenced net returns among input dealers, quantity of maize marketed extension contacts increased net returns among farmers, and number of customers, input cost, and experience directly related to net returns among processors, according to the OLS regression for determinants of net returns (NR). It was suggested that farmers be given important opportunities to cover more than one productive activity in maize production in order to maximize profit.

METHODOLOGY

3. RESEARCH METHODOLGY

After deciding on the research problem, the next step was to have enough theoretical background of the problem. For this a detailed study of different books, journals, and reports, more directly or indirectly related with the problem, was made. Every research conducted on scientific line should have a research design to be followed as per stated problem. For this a design has been drawn from classification of research methods in this study.

3.0. Research design of the study

3.1. Locale of the study

3.2. Sample and sampling procedure

3.3. Variables and their measurement

3.4. Instruments used for data collection

3.5. Statistical methods used to analyze data

3.1   Research design of the study

Keeping the major research objectives in view, the ex-post method research design was employed. Ex- post facto research is a systematic empirical enquiry in which the scientist does not have any direct control over the independent variables because their manifestations have already occurred or because they are inherently not manipulated.

3.2. Locale of the study

3.2. 1. Description of Nigeria

Nigeria is located in West Africa, sharing a border with Benin, Niger, Chad and Cameroon. To the south, it borders the Gulf of Guinea, part of the Atlantic Ocean. Nigeria has a range of natural environments, from semi-deserts in the north to tropical rainforest in the south. The total area of 923,768 square kilometer falls within the latitude and longitude of Nigeria. The country of Nigeria is located within the Equator and the Tropic of Cancer. The latitude of Nigeria falls within the tropical zone but the climatic conditions are not entirely tropical in nature. The climatic condition

varies in most parts of the country, in the north the climatic condition is arid and to the south there is an equatorial type of climate. It is a federal republic comprising 36 states and the Federal Capital Territory, where the capital, Abuja, is located. Nigeria is the most populous country in Africa and the seventh most populous country in the world, with an estimated 206 million inhabitants as of late 2019.

Figure 1 Map of Nigeria with state
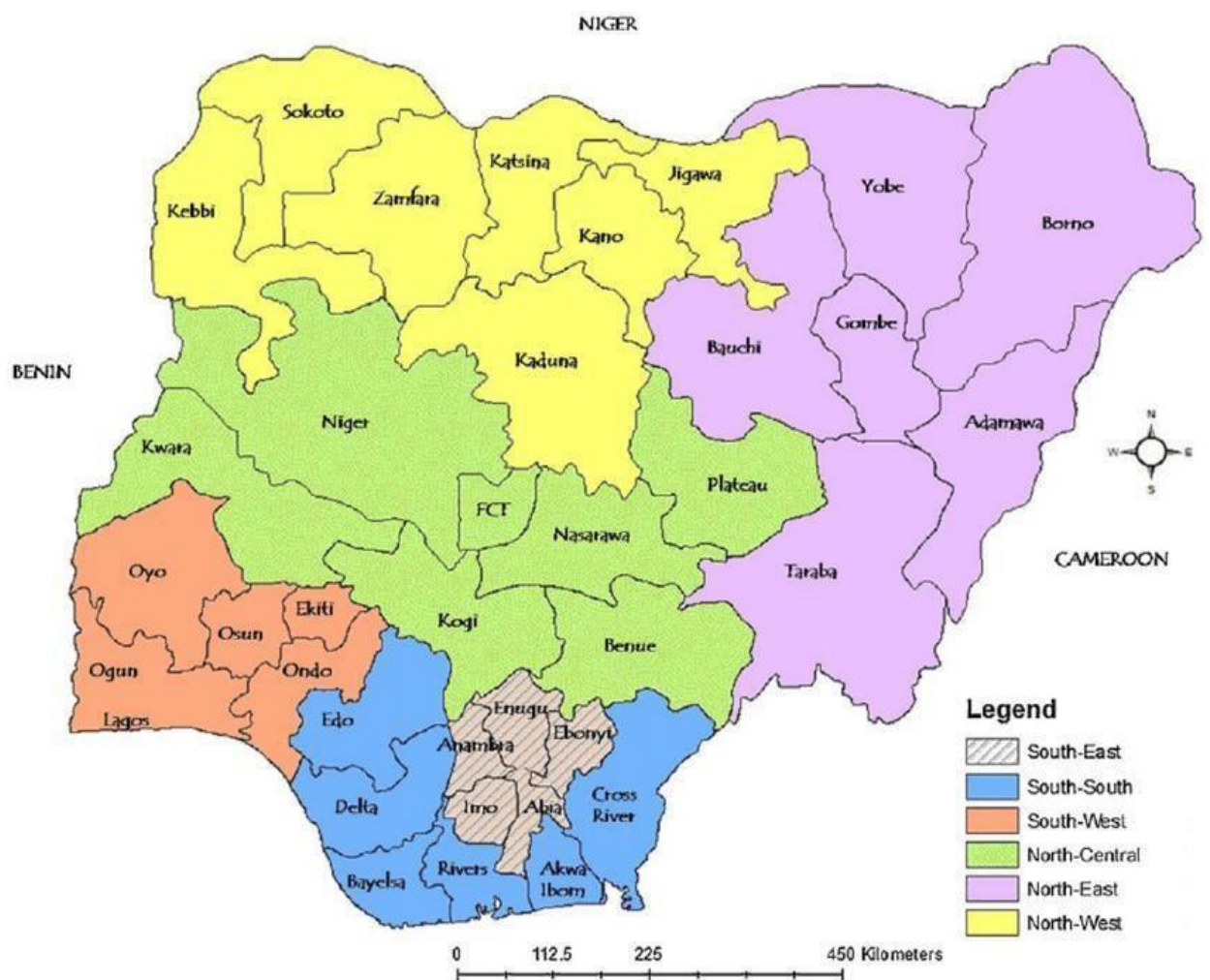
3.2.2. Description of Kano state

Kano state lies between latitude 120 40' and 100 30' N and longitude 7 0 40' and 9 0 30'E. The climate is characterized into dry and wet season. The dry season usually starts from November – March, while the rainy season starts from May to September. Mean annual rainfall is about 674 mm 26.5 inch per year. While, the mean annual temperature ranges between a maximum of 38°C and a minimum of 13°C (weather atlas, 2021). The vegetation is mainly savanna, climatically defined into Northern guinea savanna and Sudan savanna. Northern guinea savanna is characterized by open woodland or brush with shorter grasses while the southern guinea savanna has taller grasses. The Sudan savanna has scattered trees in open grassland. common tree and shrubs found in this region includes; Adansonia digitata, Vitex doniana, Diospyros mespiliformis, Tamarindus indica, Khaya senegalensis, Acacia senegal, Acacia nilotica, Acacia seyel, Faidherbia albida, Balanites aegyptiaca, Parkia biglobosa, Guiera senegalensis, Borassus aethiopum, Piliostigma thonningii, Ziziphus spina-christi, Hyphaene thebaica and Anogeissus leiocarpus (Wakawa *et al.,* 2016).

Figure 2 Map of Kano State

Plate 1: Interview with a moderate farmer at Kafin Hausa

Plate 2: Farmers' interface at Ringim

3.2.2. Description of Jigawa state

Jigawa State is one of thirty-six states that constitute Federal Republic of Nigeria. It is situated in the northwestern part of the country between latitudes 11.00°N to 13.00°N and longitudes 8.00°E to 10.15°E. The state consists mostly of plains covered by wooded savanna in the south and scrub vegetation in the north. It is drained by the Hadejia River, a seasonal stream that flows north east ward through the state. The state's major crops include peanuts (groundnuts), sorghum, cotton, cowpeas, millet, and the rice grown in the river valley. The herding of cattle, goats, and sheep is widespread. Most of the state's inhabitants are Hausa or Fulani. Dutse (the state capital), Gumel, Hadejia, Kazaure, and Birnin Kudu are the chief market centres.

Figure 3 Map of Jigawa state
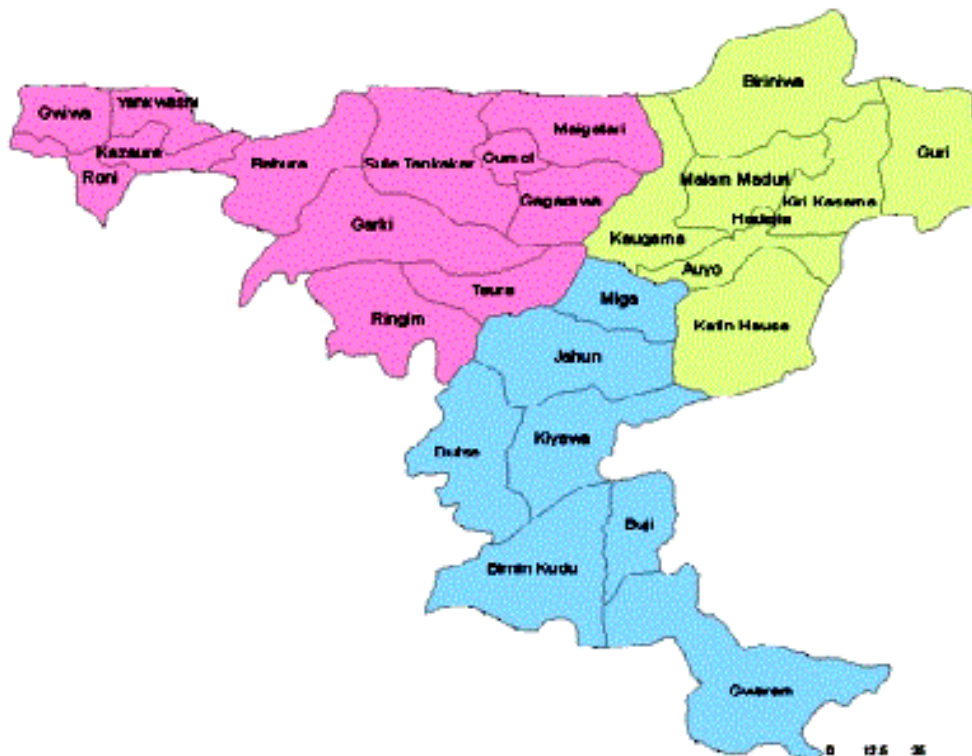
3.2.4. Description of Yobe state

Yobe state located in northeastern Nigeria. A mainly agricultural state, it also has rich mineral deposits, including gypsum and kaolin in Fune Local Government and very rich agricultural resources as well. The state's agricultural produce include gum arabic, groundnuts, beans, and cotton. The state also has one of the largest cattle markets in West Africa, located in Potiskum. The major ethnic groups living in Yobe State are the Kanuri and Fulani, while other major ethnic communities include Bolewa, Ngizim, Karai-Karai, Bade, Hausa, Ngamo, Shuwa, Bura, Marghi and Manga.

Figure 4 Map of Yobe state
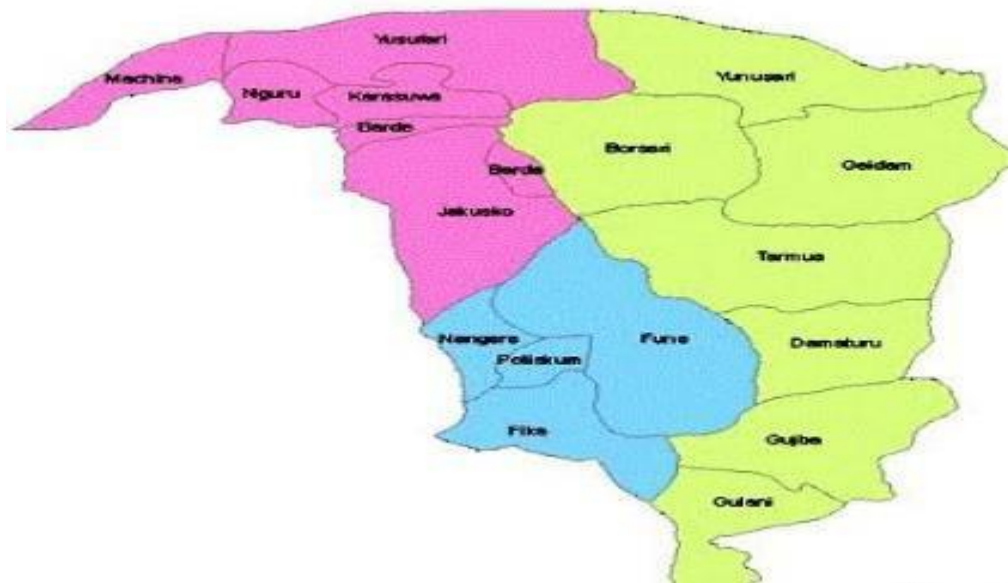
3.3. Sample and sampling procedure

Multi-stage sampling technique was adopted for this study. Wheat crop is basically produced in northern Nigeria. There are nineteen states in the northern part of the country out of which eleven states were known as wheat producing states.

Figure 5 Map Nigeria showing wheat producing state
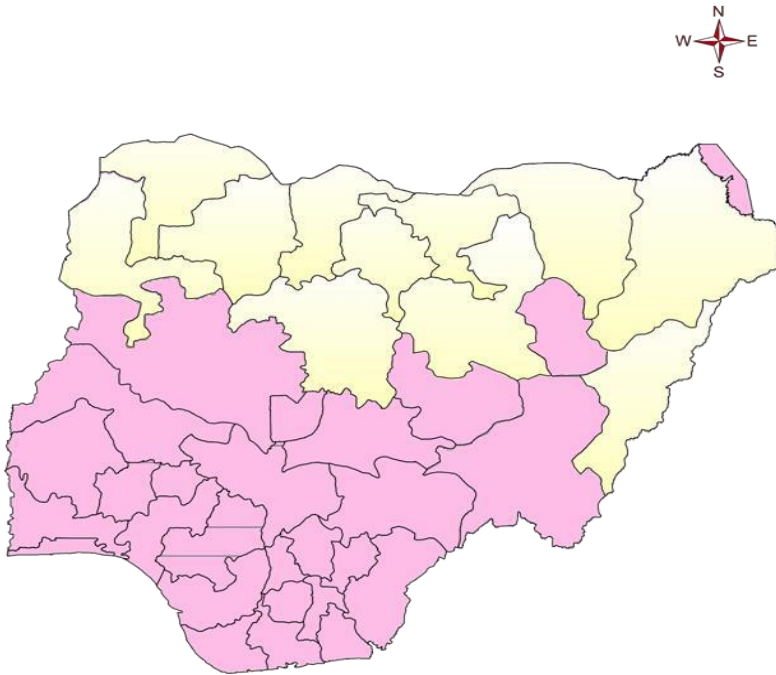
In stage one; Jigawa, Kano and Yobe states were purposively selected based on the highest number of registered wheat farmers as well as safety of the researcher due to the raising level of insecurity.

Figure 6 Map wheat producing states showing selected states
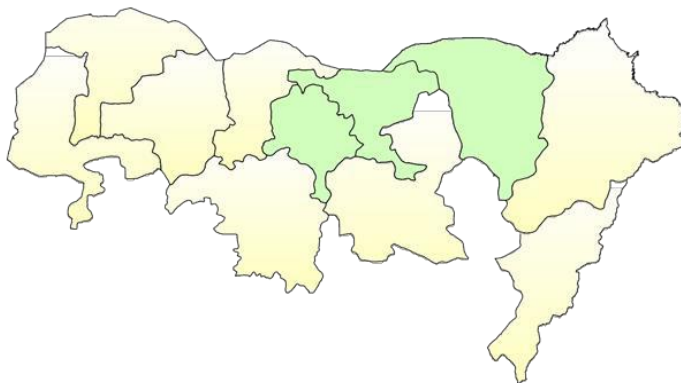
In stage two; a total of six local government areas were selected based on the higher number of registered wheat farmers within the state, where two local government areas were selected from each state. Kafin Hausa and Ringim were

Plate 3: Data collection in Kano (Ajingi)

Plate 4: Data collection in Yobe (Nguru)

Plate 5: Harvesting of a ripped wheat crop

Plate 6: Threshing on the farm

Plate 7: Women winnowing on the farm side

Plate 8: Fresh Nigerian wheat grain

selected from Jigawa state, Ajingi and Garim Malam were selected from Kano state and Bade and Nguru were selected from Yobe.

In stage three; forty respondents were randomly selected from each local government making a total sample size of 240.

Table 1: summary of sample size of the farmers

S/N	State	Number of registeredfarmers	Local governmentarea	Number of registeredfarmers	Selected
1	Kano	13,567	Ajingi	2,543	40
			Garum Malam	2,789	40
2	Jigawa	5686	Ringim	1,453	40
			Kafin Hausa	896	40
3	Yobe	4679	Bade	768	40
			Nguru	557	40
Total	3	23,932	6	9006	240

3.3. Variables and their measurements

The variables and prescribed measurements were selected in line with objectives set forth, review of the relevant literature, discussion with experts, and consultation with known stakeholder and observation made by the researcher.

3.4.1. Resilient wheat farming

Resilient wheat farming can be defined operationally as the ability of wheat production to change from the present status to the desire status and capable of competing with production of other crops and resist any drawback either political or social in nature.

3.4.2. Profile of the respondents

3.4.2.1. Age:

In every society, age is one of the most important determinants of an individual's social status and social role. In this study, the respondent's chronological

age at the time of the interview was used as a measure of age. The average age was compared with the life expectancy of Nigerian males. According to Varrella, (2021) was about 60.87 years old as at 2021 and two-thirds of that value was considered the best productive point of the respondents.

3.4.2.2. Sex

This refers to the biological differences between male and female or it is the two maincategories in which human and most living things are being classified base on their reproductive system. It indicates the role that someone plays in his society, in most of the society values and norms divided the role to play for each sex known as gender role. For this study nominal score value was assigned to categorized the sex of the respondents

Category	Nominal score value
Male	1
Female	2

3.4.2.3. Marital status:

Marital status is a criterion used to describe a respondent's relationship in the social system. Usually married men and women are more responsible and deserve certain social respect by virtue of the norms and values of many societies. In this study nominal score was assigned to each category of relationship as follows:

Category	Nominal score value
Single	1
Married	2

3.4.2.4. Education Status:

Educational status of the respondents refers to the highest formal educational qualification obtained by the respondents as well as knowledge acquired with no formal qualification. Individual respondent with higher qualification were assumed to have more positive social characteristics and involvement in development program in the society. For this study educational status has been categorized as ordinal score value

assigned to eachcategoryas follows:

Category	Ordinal score value
Can't read and write	1
No formal education	2
Primary	3
Secondary	4
Tertiary	5

3.4.2.5. Secondary occupation:

Secondary occupation is another variable that may influence the behavior of the people in general and the entrepreneurship in particular. In view of that, the nominal score value was awarded as follows:

Category	Nominal score Value
Civil servant	1
Trading	2
Craftsman	3
Market middleman	4

3.4.2.6. Monthly Income:

Monthly income is the economic measurement of one's status. It was operationally defined as the gross income from all the sources of income in a single month. It was measuredin terms of rounded of Naira. Income plays a significant role in decision making, adoption of new ideas and participation in economic activities of an individual. The mean income were found and compared with Nigeria's poverty line. According to the (World Bank 2020) the Nigeria's poverty line was NGN376.52/day.

3.4.2.7. Land holding:

Land size implied the resources and symbol of socio-economic status. Land size alsoboosts up the risk bearing capacity to sustain and steer the decision making. The number of standard hectares of land owned and cultivated by each respondent family was considered in determination of their size of land holding. Depending upon the farm size, the farmers were grouped in to five categories and ordinal score value was assigned to each as under:

Category	Ordinal score value
Less than 1ha (marginal)	1
1 – 2 ha (small)	2
2 – 4 ha (semi medium)	3
4 – 10 ha (medium)	4
Above 10 ha (large)	5

3.4.2.8. Household size:

The household size of the respondents refers to the number of persons regardless to theage and gender living in an economic unit and share common meal. The household size is serving as basic unit of analysis in many social, microeconomic and government models. In this study, the total average household size of the respondents was compared with national average household size as reference point. The average rural and urban household size was 5.9 and 4.5 respectively (Statista Research Department, 2021). The data was collected in rural area then rural reference point was considered as best point.

3.4.2.9. Earning member among the respondent household

This refers to the number of persons in the respondent family engaged in economic activities and contributes part of his/her earning to support the respondents family. For this study, the average earning member was considered and compared it with expectations of two earning member per household may be reasonable best and considered as reference point.

3.4.2.10.   Year of experience:

Years of experience are an important factor in acquiring diverse knowledge in a particular field of expertise. It is operationally defined as the number of years spent by a single farmer in the wheat-growing sector. Experience allows a farmer to gain a broader range of knowledge about wheat farming, which can aid in the adoption of new practises and serve as a source of information for problem solving. The overall average age of the respondents was compared with reasonable experience of 15 years and considered it as best point.

3.4.2.11.   Contact with extension agent:

Contact with extension agent operationally defined as how frequent an individual farmer meeting with extension agent for problem solving or receiving new information. The response was collected from the respondents on the basis of five points responses on which the respondents was asked to select one and score was assigned to each:

Response	Score
Never	1
Rarely	2
Sometimes	3
Frequently	4
Very frequent	5

3.4.2.12. Farmland acquisition of the respondent

This is operationally defined as the process through which an individual farmer acquiredwheat farming land. This was helpful in finding out how important the wheat production is with farmer. The question was asked with different process of land acquisition and the respondents were asked to select one or more process from the available options of family land, gift land, purchase land, rent land or inherited land. Descriptive method was used to find out the percentage of each process.

$$P = \frac{F}{N} \times 100$$

3.4.3. Social and political situations affecting wheat production

Social and political issues affecting wheat production could be operationally defined as those factors that influenced the operation of wheat production either directly or indirectly, physically or hiding in nature. The social and political issues dimension studied were followed the method used by Archer *et al.,* 2008. They classified social and political issues into three categories: "Internal social" those originated within the farmer, "External social" those within the micro social system which is beyond farmer control, and "Political" issues those of larger social system concern.

The stakeholder's National focus group discussion method was adopted for answering this objective. After consultation and review of relevant literatures eleven questions were developed to guide the discussion. Four steps were involved in the selection process.

First step: In this step, relevant institutions, NGOs, association and private consultant firms were selected for participation. The selected institutions were Federal ministry of agriculture and rural development, states ministries of agriculture, Abubakar tafawa Balewa University of technology and Lake Chad research institute. Sasakawa Africa association was selected to represent NGOs. Wheat farmer's association of Nigeria at both national and state levels were selected to represent farmers and Nigerian miller's association represent milling industries and one private consultant.

Second step: development of eleven points question to guide the discussions after adequate literature review and proper consultation of the relevant stakeholder.

Third step: Focus group discussion session was conducted and all the relevant stakeholders were fully participated

Fourth step: After the session, report was drafted and factors were identified based on Archer et al, 2008 categorization of social and political factors affecting agricultural system and conclusion and recommendations were drawn. All the stakeholders unanimously accepted the report. The data were analyzed using MAXQDA software for qualitative data analysis.

3.4.5. Perception of wheat farmers on the effect of climate change on production and livelihood:

Perception of wheat farmers on the effect of climate change on production and livelihood has been operationalized as way in which the farmer understands the vastness of the effect of climate change on wheat crop production that serves as the source for his livelihood.

For measuring these aspects, ten relevant statements were developed after reviewing past findings and discussion with expert. The responses of farmers were collected along withfive points continuum with score of 1, 2, 3, 4, and 5 for strongly disagree, agree, undecided, agree and strongly agree respectively. The total individual score obtained by summated scores of responses from ten statements and the respondents were categorized into three groups viz: low, medium and high on the basis of mean and standard deviation of the total score as follows.

Category

Low	< Mean – Standard deviation
Medium	Mean ± Standard deviation
High	>Mean + Standard deviation

3.4.4. Livelihood activities of the respondents

It is operationally defined as a source for which respondent depended on additional income to argument income from wheat production. To measure this, three responses such as production of other crop, off farm, and non-farm were given and multiple choices were allowed. The collected data was tabulated and analyzed using frequency and percentage.

3.4.6. Perception of wheat farmers on the government policy and scheme

Perception of wheat farmers on the government policy and scheme has been operationalized as the extent to which the farmer views the importance of government policy and scheme for sustaining wheat farming.

For measuring these aspects, six relevant statements were developed after

reviewing past findings, and discussion with expert. The responses of farmers were collected using the same procedure as described in section 3.4.5.

3.4.4. Marketing behavior of the wheat farmers

Marketing behavior of the wheat farmers is operationally defined as the processes, ways,places, time, period, and conditions that a farmer sells his produce for physical and psychological satisfaction. The marketing behavior dimensions to be studied were inspired by Maratha and Badodiya (2017) and finalized in consultation with the social scientists. The statements used to analyze marketing behavior of farmers were as follows: when do you sell the produce, reasons for selling at a particular period/ time, whom do you sell the produce, where do you sell the produce, which mode used for transport, reasons for selling at a particular place. Based on the above, statement responses were attached to each and recorded from the respondents. Sources of market information and mode of products promotion were included. The collected data was processed and analyzed by using frequency and percentage analysis to find outthe importance of each statement. The overall score of marketing behavior of wheat farmers comprises a composite skill and of many qualities and traits. The scores were assigned to the respondents on the basis of numbers of reasons for a particular statement i.e., score 1 for one reason and score 2 for two, while score 3 for 3 or more reasons.

3.4.7 Constraints affecting wheat farmers

This was done to find out the constraints faced by the wheat farmers in the study area. The respondents were believed to face one problem or the other. Presently, farmers are facingclimate change effects, lack of government intervention, problem of rising in pest and disease etc. the respondents were asked to indicate the presence (Yes/No) of certain problem by the use of close ended questions. The collected responses were analyzed using frequency and percentage.

3.5. Instruments used for data collection

In light of the objectives set forth and variable under study, research review, consultation with expert and professionals in agricultural extension, economics,

agronomists, and practical farmers, a semi-structured interview schedule was prepared for data collection. The primary data were collected by the use of mixed method of both qualitative and quantitative aspects. To ensure the validity of the instruments, pre-test was conducted. The semi- structured interview schedule was used to collect quantitative data as well as part of the qualitative data. National stakeholder's focus group discussions with specified questions were consideredfor part of qualitative data collection. The secondary data were gathered from policies documents, consultation of pass relevant literatures, government reports newspapers.

3.6. Statistical methods used to analyze data

The following statistical tools were used in the present study.

3.6.1. Percentage analysis

Percentage analysis was done to make simple comparisons whenever necessary.

3.6.2. Average (X):

The average (X) was calculated by adding the total scores obtained by the respondentsand divided it by the total number of respondents using the following Formula:

$$\bar{x} = \frac{\sum X}{N}$$

Where,

$\bar{x}$ = Average or mean

$\sum x$ = Total number of scores obtained byrespondent

N = Total number of respondents

3.6.3. Compound annual growth rate

Compound annual growth rate (CAGR) was computed for Nigeria with respect to variable, total production, total harvested area, and total imports using yearly time-series data for the study period, the study period into 5 groups according to the administration regime (1986 – 1990, 1991 – 1999, 2000 – 2009, 2010 – 2015, and 2016 – 2020) for making comparison across the period for each variable and drawing conclusions.

The growth rate of total production, Total harvested area, and total imports were computed by using the formula,

CAGR = [V Final/V Begin]$^{1/t}$ – 1

Where,

V Final: Final value

V Begin: Beginning Value

t: number of years

3.6.4. Spearmans correlation

The Spearman's rank correlation coefficient (rs) is a method for determining the direction and the strength (positive or negative) of a correlation (connection) between two series of ranks of the variables. A statistical measure of the strength of a monotonic relationship between paired data is Spearman's correlation coefficient. It is denoted by in a sample and is constrained by design as follows: $-1 \leq r_2 \leq 1$.

The formula computed as follows:

$$r_s = 1 - \frac{6 \sum D^2}{n(n^2 - 1)}$$

r_s = Spearman rank correlation value

d = margin of each pair value

n = Spearman rank pair values

3.6.5. Kruskal – Wallis one way analysis of variance by ranks

The Kruskal – Wallis one way analysis by ranks was used to determine whether K independent samples are from different populations or from identical population with respect to averages

H = 12/N (N+1) $\Sigma^k_{j=1}$ Rj^2/nj – 3 (N+1)

K = Number of samples

nj = number of cases in the jth samples

N = Σ nj, the number of cases in all samples combinedR = Sum of ranks in the jth sample (column)

$\Sigma_{j=1}^k$ directs to sum over K samples (column)

3.6.6. Discriminant function analysis

The main goal of discriminant analysis is to create a rule based on their sample observations that will allow us to classify new observations into one of the populations. As a result, discriminant analysis is a useful tool for dividing a large sample into two or more mutually exclusive and collectively exclusive groups based on the same clearly defined criterion variable (s). The ability to infer the relative importance of each characteristic used to discriminate between different groups in the population is a byproduct of developing such a procedure. A linear discriminant function is a weighted linear discriminant function of predictor variables that best discriminates between groups with the least amount of error. Linear discriminant function of predictor variables $X_1, X_2, X_3, \ldots X_k$ is of the form

$D = l_1X_1 + l_2X_2 \ldots . l_kX_k$

Where l'$_s$ represent the discriminant coefficients

D is the value of the discriminant function of a particular entity such that if this value is greater than a certain critical score D_* the entity would be classified in one group, otherwise, in the other group.

3.6.7. Multiple linear regression

Multiple linear regression (MLR) is a regression equation which contains one dependent variable which is influenced by more than one independent variable. The model is expressed as below,

$$Y_i = \beta 0 + \beta 1\ X_{i1} + \beta 2\ X_{i2} + \ldots . \beta p\ X\ _{ip} + \varepsilon$$

From the model it can be seen that there are several independent variables along with their respective regression coefficients including the intercept error term (ε). The parameters of the regression equation are calculated by the method of ordinary least-squares (OLS). The above regression model is given by:

Y_i = i th independent variable, where i = 1, 2, . . . n

X_i = i th independent variable

$\beta 0$ = constant term (y-intercept)

βp = regression coefficient of the respective independent variable

ε = error term (residual)

As a consequence of the Gauss – Markov theorem the predicted value of Y has a

minimum variance among all linear predictors of Y for given values of X 1 X 2. . . .. .
. . X p. The proportion of variation of Y explained by regression of Y on X 1 . . . . . .
X p is calculated by the ratio,

$$R^2 = \sum_{i=1}^{p} \frac{bi\ Siy}{Syy}$$

Where, Syy is a total sum of squares of the values of dependent variable y.

The coefficient of determination. R^2, thus provides with a measure of goodness of fit.
That is, larger the R^2, better the model approximates Y

3.6.8. Kendalls coefficient of concordance (W)

Kendall coefficient of concordance W (Siegal and Castellan, 1998) was used to
determine the agreements on constraints among the respondents of the states viz.
Jigawa Kano and Yobe. The data were analyzed using Statistical Package for Social
Science SPSS 23.

3.6.9. Content analysis

Content analysis is a research tool used to determine the presence of certain
words or concepts within texts or sets of texts.

3.6.9.1. Step involved in content analysis

1. Select the content you will analyze

Based on your research question, choose the texts that you will analyze. You need to
decide:

The medium (e.g. newspapers, speeches or websites) and style (e.g. radio
programme, opinion pieces)

2. Define the units and categories of analysis

The unit(s) of meaning will be coded. For example, are you going to record the
frequency of individual words and theme, the set of categories that you will use for
coding.

3. Develop a set of rules for coding

Coding is the process of grouping, meaning units into previously defined
categories. To ensure that all texts are coded consistently, it's critical to clearly define
the rules for what will and won't be included, especially with more conceptual
categories.

4. Code the text according to the rules

Checking throughout each text and record all relevant data in the selected categories.

5. Analyze the results and draw conclusions

After the data has been coded, it is examined for patterns and conclusions in response to your research question.

3.6.10. Price spread analysis

The difference between the price paid by consumers and the net price received by the producer for an equivalent quantity of farm produce is known as the price spread.

It is expressed as a percentage of the price paid by the consumer.

Price spread = <u>(Consumer price – Net price of producer)</u> ×100Consumer price Costs in price spread include:

The cost involved in moving the product from the point of production to the point of consumption i.e. marketing cost. Profit of the various market functionaries involved in moving the produce from the initial point of production till it reaches the ultimate consumer.

RESULTS AND DISCUSSION

4. RESULT AND DISCUSSION

Result has been arranged in the order of the objectives of the study. However, it has been made in such a way that the key points of observation envisaged in the objectives are presented and discussed. Presentations of the results are followed by discussion of the concerned portions. Attempts have also been made to interpret the results in line with the objectives of the study and overall framework of research. The results have been presented in the following sections.

4.0. Personal profile of the respondents

4.1. Most common biotic, abiotic, social and political stress affecting wheat crop and farmers

4.3.0. Social and political situation affecting wheat production in Nigeria

4.3.1. Comparing different administration regime commitment toward wheat production inNigeria from 1986 – 2020

4.3.2. Impact of each administration regime on wheat production

4.4.0. Study the perceived effects of climate change on production of wheat and livelihood ofthe wheat farmers

4.4.1. Farmer's awareness about climate change

4.4.2. Opinion of farmers toward climate change effect totheir livelihood

4.5.0. Analysis of the government policies and schemes on wheat production

4.5.1. Farmer's awareness about government policy/scheme onwheat crop

4.5.2. Farmer's opinion on government policies and scheme

4.6.0. Examine the marketing behavior of wheatfarmers

4.6.1. Utilization of market information sources

4.6.2. Most important source ofpromotion

4.7.0. Price spread analysis

4.8. States comparison in terms of respondents personal profile, inputs application, output andconsumption

4. 9. Multi linear regression analysis

4.10. Constraints face by wheat farmers in the study area

4.11. Policy suggestion for resilient wheat farming inNigeria

4.1 Personal profile of the respondents

Personal profile is the sociological and economic activities that combine total measuresof individual's and family work experience, economic and social position in relation to other. It is the same variable that plays a key role in influencing farmers to adopt or reject a new idea at his disposal. In view of that, this study presents the personal profile of the farmer's in the study area, the variable identified were: age, sex, marital status, educational status, secondary occupation, household size, years of experience, monthly income, actual number of land under wheat farming, size of the farm land, livelihood activities, contact with extension agent. The farmer's profiles are presented below.

Figure 7 the average age and income of the farmers
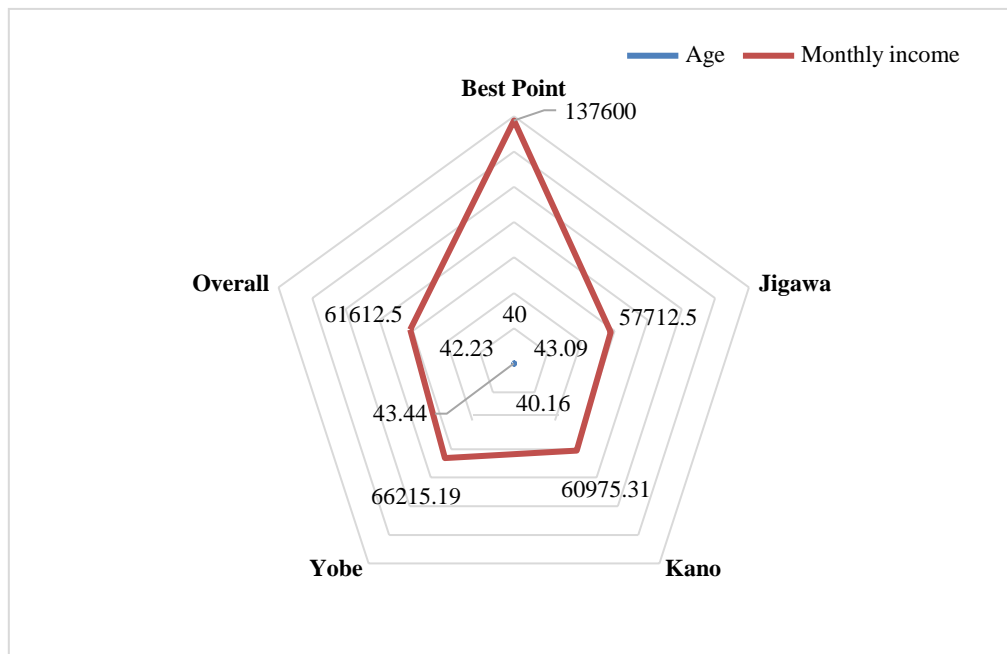
The average age of the farmers in Kano, Jigawa and Yobe were 40.16, 43.09 and 43.44 respectively and the overall average age was 42.23. This implies that the farmers were within their active age, farmers in Kano were having less age than the Jigawa and Yobe. According to Varrella (2021), the life expectancy of Nigeria's male was about 60.87 years, considering this report we may say that the farmers in both states were at last third quarter oftheir age. The findings agreed with Felix and Thomas (2020), who reported that, the mean age of the agricultural workforce, was within 38 to

45 yearsof age. More younger age need to be influence into the wheat farming for more production andcontinuation. The average monthly income of the respondents in Kano, Jigawa and Yobe were NGN60237.5, NGN57712.5 and NGN66887.5 respectively, and the overall average was NGN61612.5. The average monthly income of the Yobe farmers were high when compared with Kano and Jigawa counterpart, this may be Yobe farmers engaged more in secondary occupation than farmers of other states. According to the (World Bank 2020) 83 million people in Nigeria live below the country's poverty line of NGN376.52/day. This means the farmers are living below poverty line and they could be categorized as poor

Figure 8 the profile of Jigawa state respondents
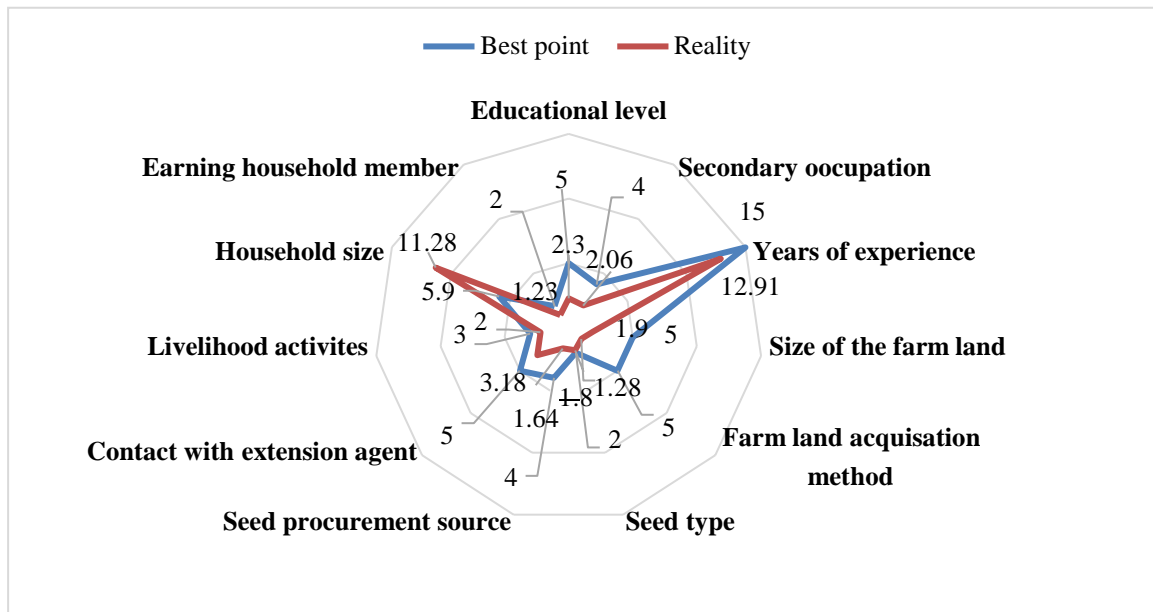
The profile of Jigawa state respondents could be seen from Figure 8, which presents the required scores and the obtainable (average) scores. It shows that the average scores with respect to the variables were educational level (2.3), secondary occupation (2.06), year of experience (12.91), size of the farm land (1.9), farmland acquisition method (1.28), seed type (1.8), seed procurement sources (1.64), contact with extension agent (3.18), livelihood activities (2.0), household size (11.28), and earning household member (1.23). This implies that the respondents have low levels of education, have explored two or more ways of income, and have reasonable years of experience. The respondents have marginal land size and acquired it through one

method, using mostly certified seed and sourcing it from one or more places while in contact with an extension agent most of the time. The respondents also participated in other activities for livelihood earning and have a larger number of household members and fewer earnings members.

Figure 9 the profile of Kano state respondents
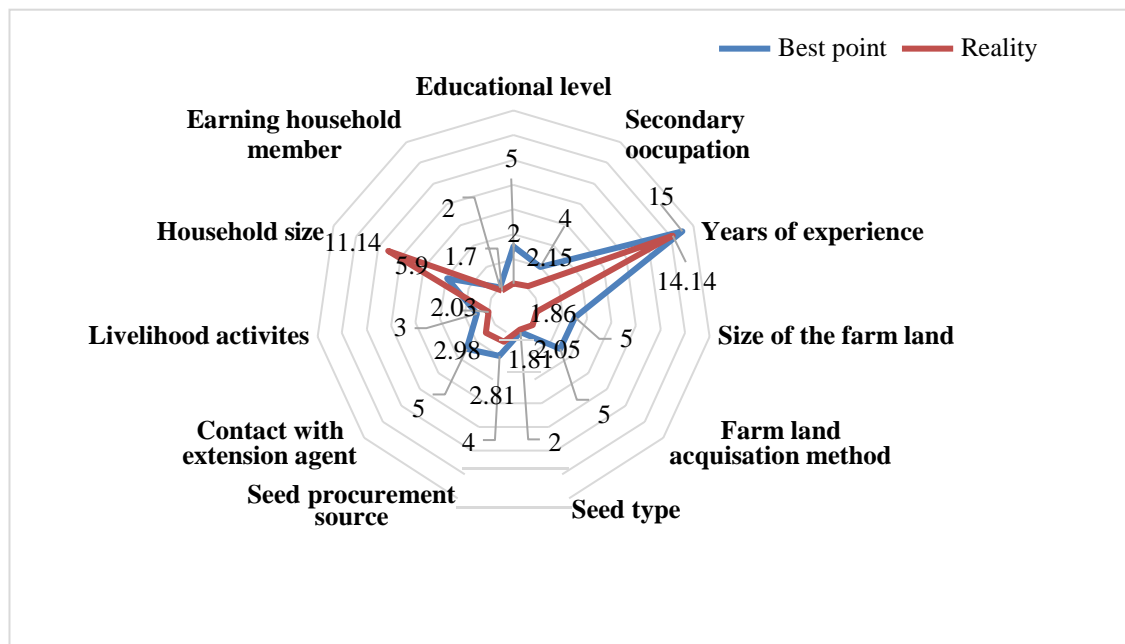
The profile of Kano state respondents could be seen from Figure 9, which presents the required scores and the obtainable (average) scores. It shows that the average scores with respect to the variables were educational level (2.0), secondary occupation (2.15), year of experience (14.14), size of the farm land (1.86), farmland acquisition method (2.05), seed type (1.81), seed procurement sources (2.81), contact with extension agent (2.98), livelihood activities (2.03), household size (11.24), and earning household member (1.7). This implies that the respondents have low levels of education, have mostly explored additional away of income, and have enough years of experience in wheat farming. The respondents have marginal land size and acquired it through two or more methods, using mostly certified seed and sourcing it from two or more places while in contact with an extension agent most of the time. The respondents also participated in other activities for livelihood earning and have a larger number of household members and fewer earnings members.

Figure 10 the profile of Yobe state respondents
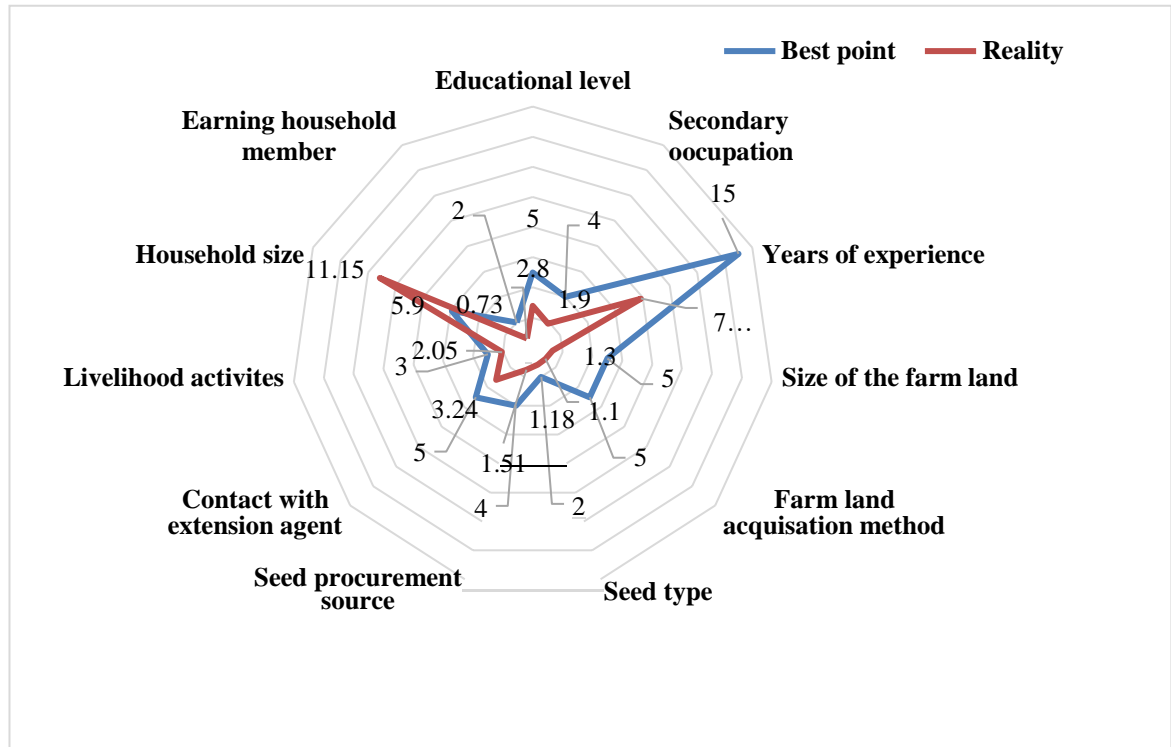
The profile of Yobe state respondents could be seen from Figure 10, which presents the required scores and the obtainable (average) scores. It shows that the average scores with respect to the variables were educational level (2.8), secondary occupation (1.9), year of experience (7.88), size of the farm land (1.3), farmland acquisition method (1.1), seed type (1.18), seed procurement sources (1.51), contact with extension agent (3.24), livelihood activities (2.05), household size (11.15), and earning household member (0.73). This implies that the respondents have low levels of education, have mostly explored additional away of income, and have considerable years of experience in wheat farming. The respondents have marginal land size and acquired it through one methods, using mostly non-certified seed and sourcing it from one or two places while in contact with an extension agent most of the time. The respondents also participated in other activities for livelihood earning and have a larger number of household members and less than one earnings members.

Figure 11 Overall profiles of the respondents
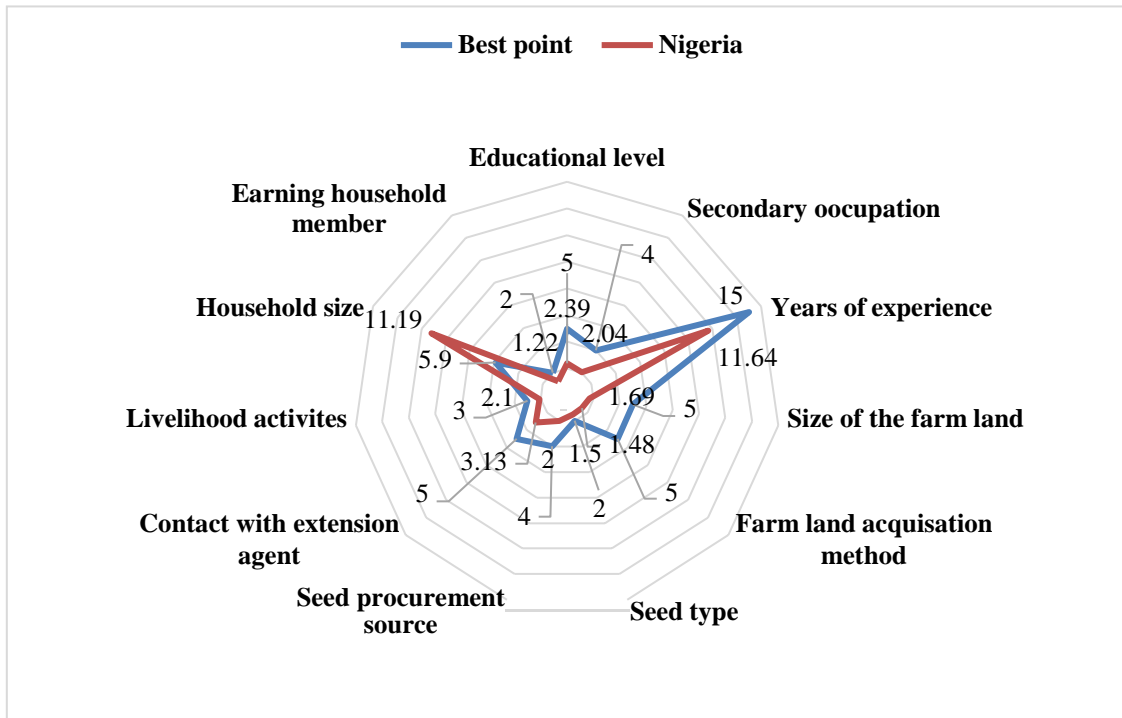
The profile of the respondents could be seen from Figure 11, which presents the required scores and the obtainable (average) scores. It shows that the average scores with respect to the variables were educational level (2.39), secondary occupation (2.04), year of experience (11.64), size of the farm land (1.69), farmland acquisition method (1.48), seed type (1.5), seed procurement sources (2), contact with extension agent (3.13), livelihood activities (2.1), household size (11.19), and earning household member (1.22). This implies that the respondents have low levels of education, have mostly explored additional away of income, and have enough years of experience in wheat farming. The respondents have marginal land size and acquired it through one methods, using mostly certified and non-certified seeds and sourcing it mostly from two places while in contact with an extension agent most of the time. The respondents also participated in other activities for livelihood earning and have a larger number of household members with mostly one earnings member. This is in line with findings of (Soneye, 2014) whose findings reported that, the farmers has 0.61ha and less than 0.1ha as farm holding per head in both the study areas, and in consistence with findings of (Alawode, 2020) who inferred that, the present land/plot means of acquisition were inheritance (53.4%) and rent(20.1%).

Figure 12 Sex of the respondents
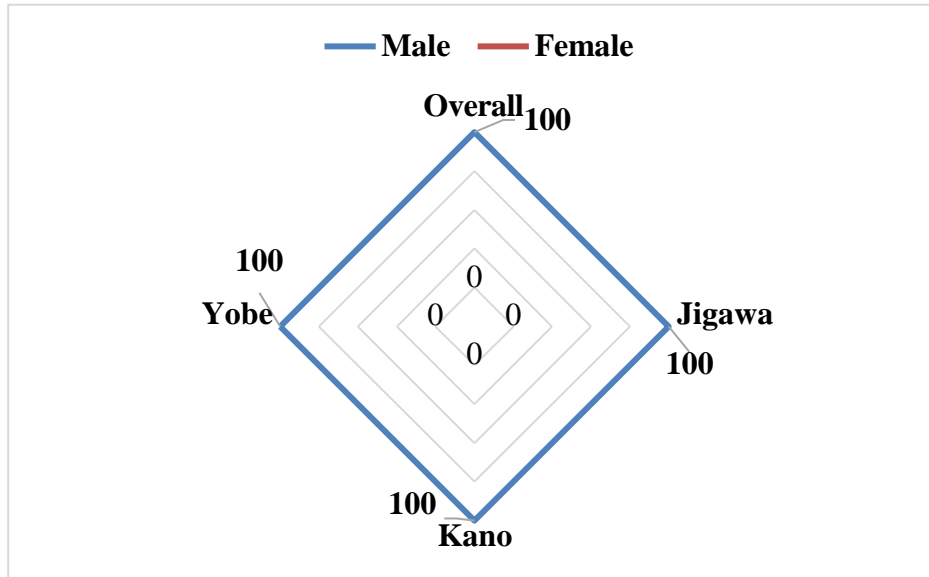
Figure 12 Shows that 100% of the respondents in all states were male. This indicated that, male dominated their female counterpart in wheat production area which is mainly the sourceof male livelihood. This has to do with cultural orientation in relation to gender role in the communities. This corresponded with findings of Mustapha *et al*, (2012) who affirmed that, majority (73.8%) of the farmers in central agricultural zone of Borno state were males.

Figure 13 Marital status of the respondents
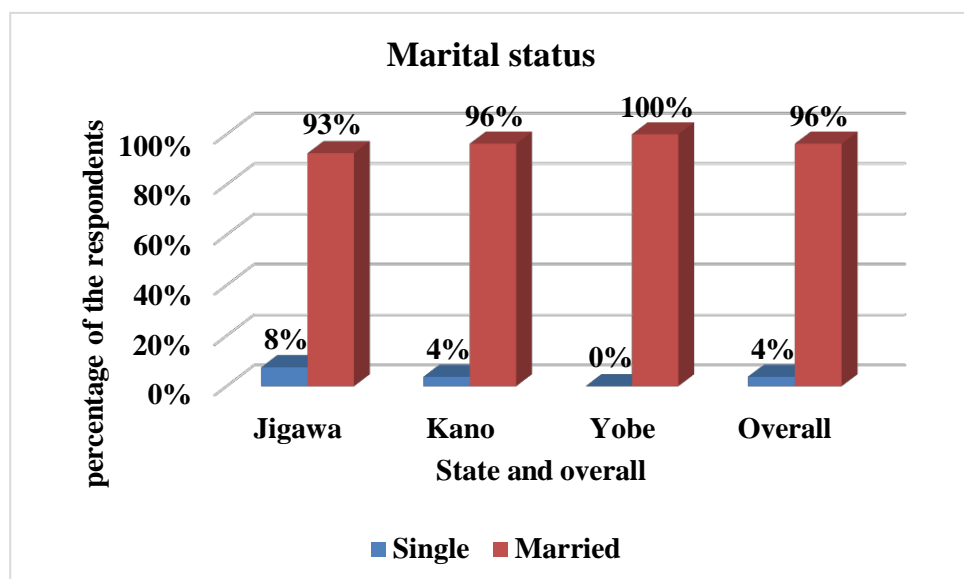
The Majority of the farmers in Jigawa and Kano were married, while (100%) of farmers in Yobe were married as shown in figure 13. The overall results shows that (96%) of the respondents were married and (4%) were single. This proved that farmers have higher responsibility and other obligations that are expected to meet. This is in line with findings of Anyoha *et al.* (2013), where they revealed that, 64.2% of the in their study area were married and had a familyresponsibility.

4.2.0. Most common biotic, abiotic, social and political stress affecting wheat crop and farmers

The study was aims to report different type of stresses affecting wheat farmers in the study area, the stress here refers to be biotic and abiotic which is basically disturbing crop plant, whereas social and political stress were basically affecting farmer himself. The figures below shows the distribution of different types of stress believed to be affecting the crop plant and thefarmers in the study area as indicated by the farmers.

Figure 14. Most common biotic, abiotic, social and political stress affecting wheat crop andfarmers in Jigawa state.

Most common biotic, abiotic, social and political stress affecting wheat crop and farmers

Stress	percentage of the respondents
Family problems	49%
Bureaucratic bottlenecks	73%
Regular policy changing	53%
Terrorists	25%
Herdsmen	68%
Marketing	80%
Rodents	100%
Wild bird	98%
Chicken/Guinea fowls	55%
Animal	80%
Drought	53%
Pest and disease	98%
Saline/Alkaline	60%
Heat	90%
Waterlogging	89%
Cold	23%
Moisture	35%

Source: Filed survey multiple response

Fig. 14. In Jigawa (100%) of the farmers reported about the rodents problem, (98%) were suffered from pest and diseases and wild bird, (90%) reported heat stress on crop, (80%) were suffered from domestic animal and marketing, while, (73%) suffered from bureaucratic

bottleneck, (68%) suffered from herdsmen attack, (60%) reported about saline/ alkaline, (55%) suffered from domestic chicken/guinea fowl, (53%) complained on drought and regular policy changing, (49%) suffered from family problem, (35%) complained moisture stress on crop, and(23%) reported about cold stress on crop. This implies that, the major stress affecting the farmers were biotic, social and political in nature, most of the abiotic stress reported does not affect their yield.

Figure 15. Most common biotic, abiotic, social and political stress affecting wheat crop and farmers in Kano state

Most common biotic, abiotic, social and political stress affecting wheat crop and farmers
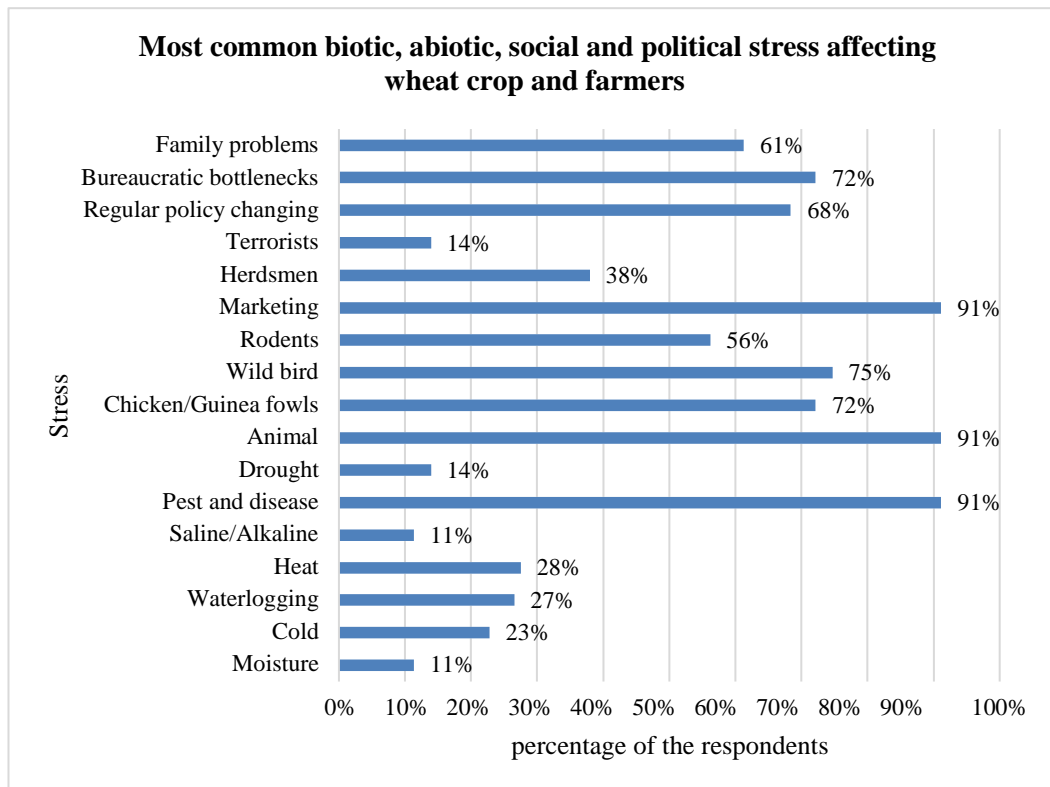
Source: Filed survey multiple response

Figure 15 shows that, in Kano (90%) of the farmers reported pest and diseases, domesticanimal and marketing as their main stress suffered from, followed

by (74%) wild bird, (71%) Chicken/Guinea fowls and bureaucratic bottleneck, (61%) family problem, (56%) rodents, (38%) herdsmen attack, (28%) heat stress, (26%) waterlogging, (23%) cold stress, (14%) drought, and moisture and saline/alkaline reported with (11%) each. This implies that, the

major stress affecting the farmers in Kano were biotic, social and political in nature, most ofthe abiotic stress reported does not have much effect on crop in the study area.

Figure 16. Most common biotic, abiotic, social and political stress affecting wheat crop andfarmers in Yobe state
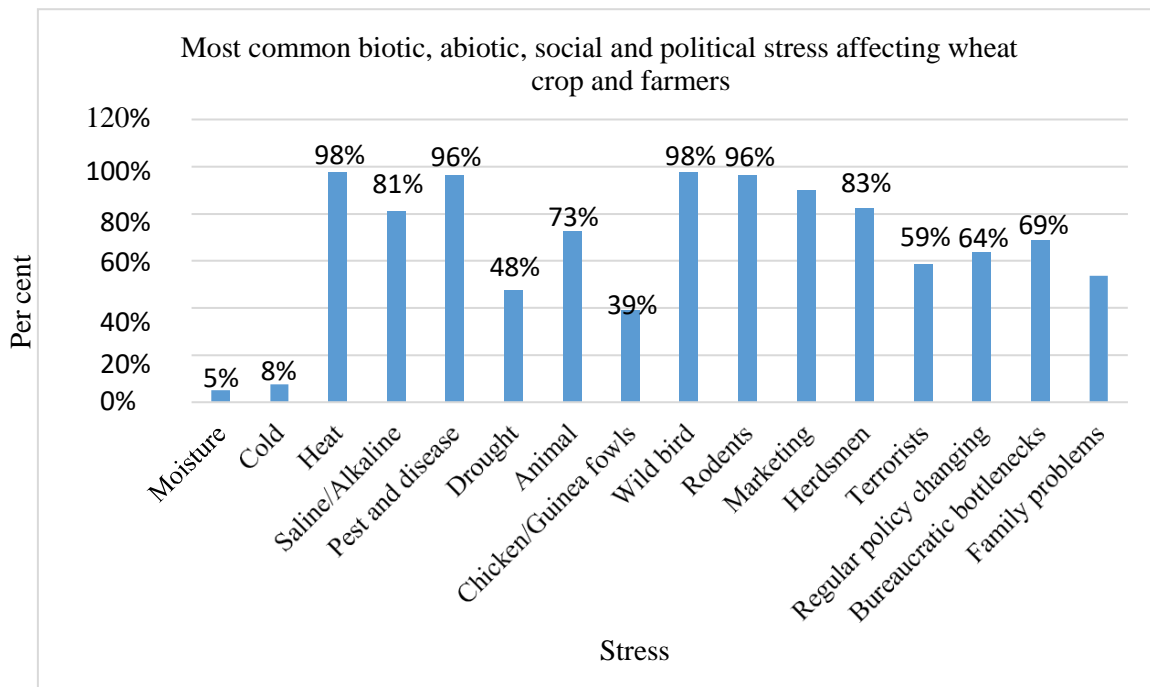
Figure 16. Shows that, in Yobe over (90%) of the respondents reported stress from heat, pest and disease, wild bird, rodents, and marketing. Followed by (83%) herdsmen, (81%) saline/alkaline, (73%) domestic animal, (69%) bureaucratic bottleneck, (64%) regular policy changing, (59%) terrorist, (54%) family problem, (48%) drought, (39%) chicken/Guinea fowls, (8%) and (5%) cold and moisture respectively. This implies that, the major stress affecting the farmers in Yobe were abiotic, biotic, social and political in nature. The farmers in Yobe were suffered most when compare with other two states.

Figure 17. Most common biotic, abiotic, social and political stress affecting wheat crop and farmers in Nigeria
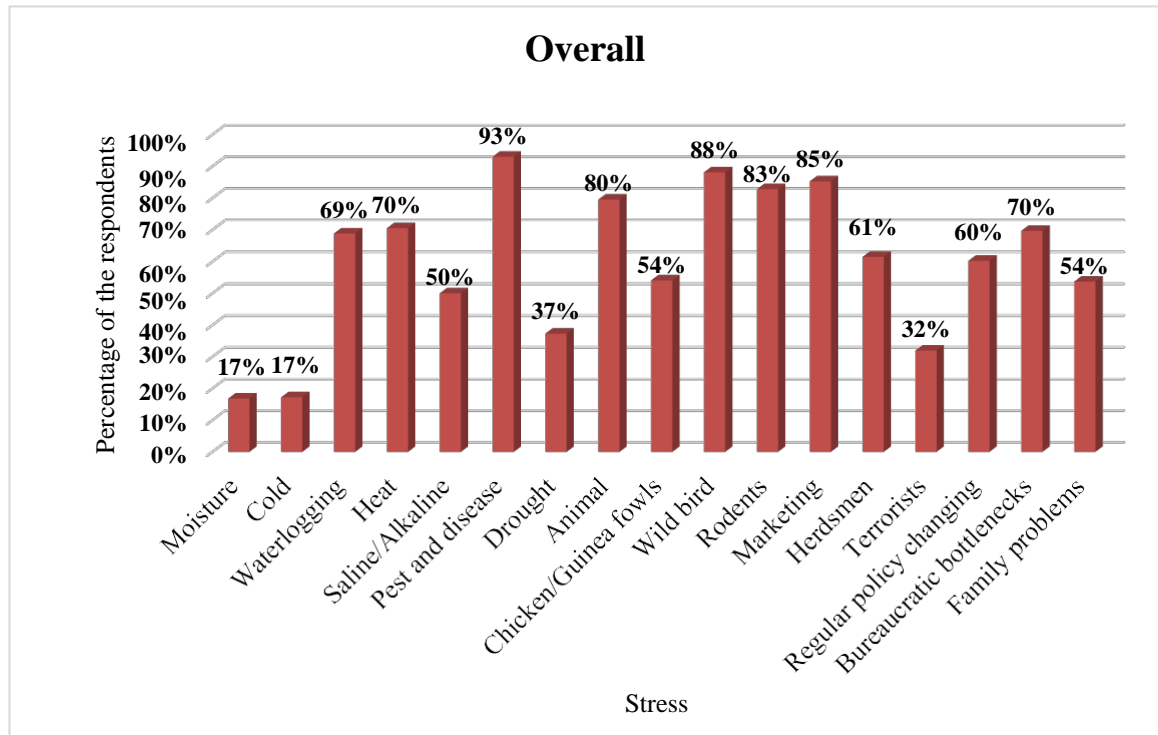
The study revealed that, the most common biotic, abiotic, social and political stress affecting wheat crop and farmers differs with regards to location. Pest and diseases, wild bird, marketing of their produce, rodents and domestic animals   attack were the major stresses affecting wheat farmers in Nigeria.

Objective 1. To explore the socio-political situation affecting wheat farming

4.2. Social and political situation affecting wheat production in Nigeria

Agricultural systems operate in social and political situations that have a significant impact on how they function. It is vital to understand how social and political variables influence agricultural systems if they are to be sustainable. Outside of the official political domain, political risks to agriculture can so emerge. In view of that, the focus group discussion was conducted to find out the social and political issues surrounding wheat production in Nigeria.

Figure 18. Document portrait focus group discussion result
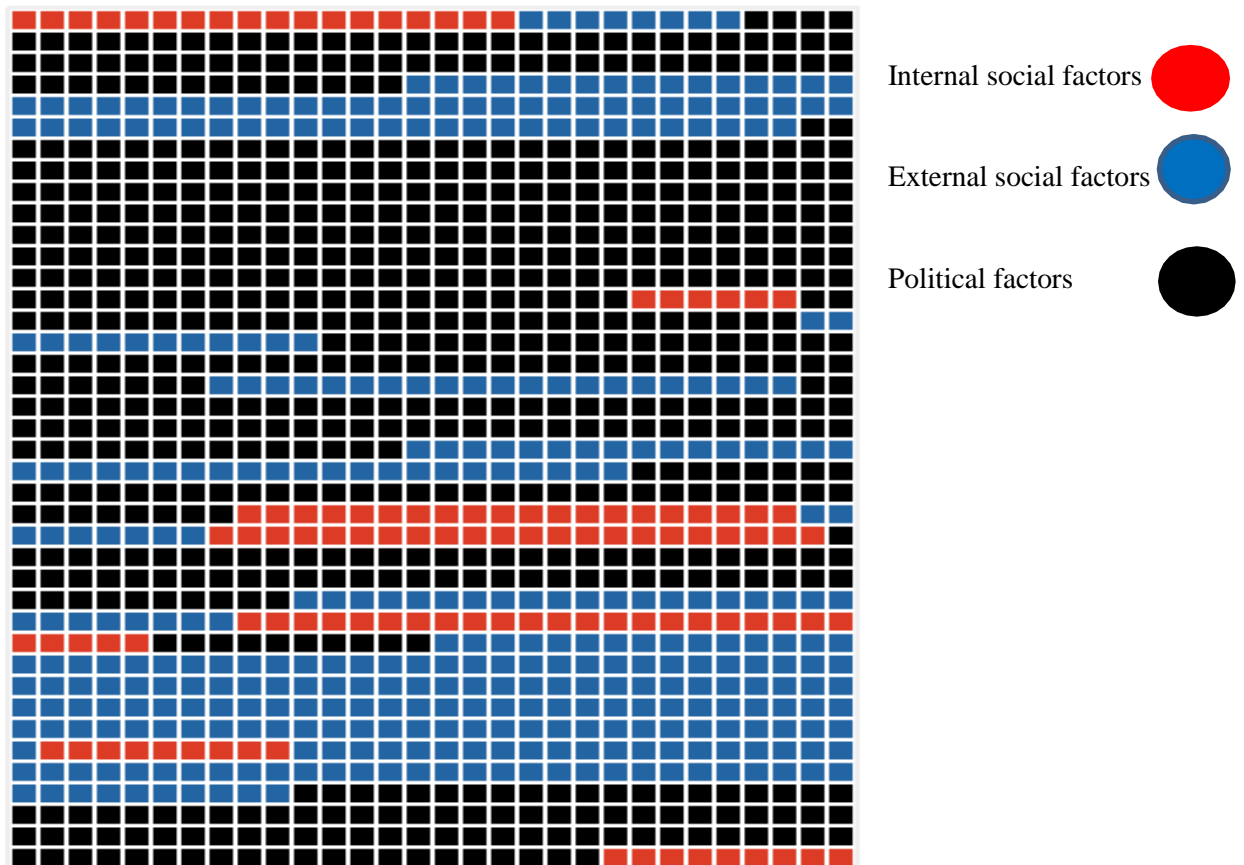
Figure 18 shows that one or more political factors and social external factors were identified by every participant during the session. Internal social factors were also playing a significant role. The results indicated the extent to which political factors affect wheat production in Nigeria more than others. The degree to which

external social factors affected the sector was lower   when compared with political factors and higher than internal social factors.

Table 2. Social and political factors identified

Internal social factor	External social factor	Political factors
Poor cultivation condition Knowledge level of the farmers Adoption of the recommended agronomic practices poor yield of the crop	Consumer food habits Consumer demand for convenience Low price of the produce High cost of input. Lack of adequate extension personnel Low yield of the crop Lack of availability of certified seed Rapid population growth	Social security issues Role of media in publication Inconsistent government policies Intricacies in policy implementation Role playing by the milling industries International trade interest Lack of political will Limited land area Lack of irrigation infrastructure Persistence of corruption Lack of wheat value chain policy. Insufficient funding Lack of cohesion among the national strategy in wheat development.

Table 2 shows that poor cultivation conditions, the knowledge level of the farmer, the adoption of recommended agronomic practices, and poor yields of the crop are the most common internal social factors affecting the farmer's production. Consumer food habits, consumer demand for convenience, rapid population growth, low price of the product, high cost of input, lack of adequate extension personnel, low yield of the crop, and lack of availability of certified seed are major external social factors affecting the production. While social security issues, the role of the media, inconsistent government policies, intricacies in policy implementation, role-playing by

the milling industries, international trade interest, lack of political will, lack of irrigation infrastructure, persistence of corruption, lack of wheat value chain policy, and insufficient funding are the major political factors stagnating growth in the wheat farming sector.

4.3.1. Internal social factor

Internal social factors are those that arise on the farm and have an impact on the farmer's decision-making. The stakeholders agreed that the poor yield was a consequence of the non-adoption of proper recommended practices by the farmers. This correlated with the findings of (Ibrahim, 2020; Boluwade, 2021) both of which attributed wheat production in Nigeria is being hampered by a lack of modern agronomic practices. Now, there is "hope" as the millers are trying everything possible to help Nigeria achieve wheat self-sufficiency by eliminating bunches of middlemen that benefit from the sweat of the farmer through the establishment of 15 wheat aggregation centers in Ajingi, Danbatta, Kura, Garin Malam, Bagwai, Ringin, Taura Birnin Kudu, Kafin Hausa, Malam Madori, Arugungu, Augi, Gunza, Jega, and Birnin Kebbi. The major challenges facing certified seed availability are the lack of adequate seed companies that have the mandate to multiply breeder and foundation seeds and make them available to farmers for all time. This is consistent with the findings of (Kawale, 1993; Magaji, 2012; WFAN, 2020; Boluwade, 2021) which found that wheat farmers in Nigeria experienced low yields due to a lack of improved varieties. farmers in Nigeria experienced low yields due to a lack of improved varieties.

4.3.2. External social factors

External social factors are those originating from outside the farm, which could be managed within the micro-social system. Food habits were one of the factors, because elites were avoiding Nigerian wheat due to its high gluten content and others were running away from it due to the perceived difficulties in processing it for consumption at household level. Since 1990, when AWPP was aborted, the wheat crop has been left with no policy as it was not considered vital like other crops due to foreign influence. According to (Andrae and Beckman, 1984) a good example is the late 1960s 'eat wheat' campaign in South Korea, which was led   by private and public US interests working together. Such forces have also been active in Nigeria.

4.3.3. Political factors

Political factors are the factors that are of greater social concern and are beyond our control at the micro-social level. The role of the media in the publication was highlighted. The media were blamed for making and duplicating false publications that did not represent the actual Nigeria's wheat situation. The stakeholders disputed the statement credited to (USDA, 2015; 2016; 2017; 2018; 2019; 2020; KMPG, 2016) which said Nigeria's farmers produce an average of 1 ton of wheat per hectare, which clearly termed it a political attempt to show the inability of Nigeria to achieve wheat self-sufficiency. They rightly pointed out that Nigeria's farmers produce an average of 2.5–3MT per hectare with the use of the available certified seeds such as Atilla Gan Atilla and the use of the seeds developed by the Lake Chad Research Institute (LACRI). Climate change is termed as a major threat to wheat production in Nigeria due to the shortening of the Harmattan period during which wheat is grown and the high cost of inputs, among other constraints. It is consistent with the findings of (Oche, 1998; Haruna *et al*., 2017; WFAN, 2020) all of which attribute low yields to harsh weather conditions. Limited land area is one of the factors identified, where the discussion pointed out that Nigeria has over a million hectares that can be put under wheat cultivation. According to (Richard, 2019; Ime, 2020), only 85, 000 hectares are being put under productive use despite land availability for the same purpose. Social security issues were one of the factors identified. Similar findings were reported by (Odum, 2015; LCRI, 2017; Donley, 2018) wheat farmers in Nigeria abandoned their farms due to Boko Haram insurgent attacks, and there has been no significant improvement as of yet. Boluwade (2021) predicted a decrease in a wheat farming area of 5,000 hectares due to an increase in banditry and kidnapping activities in Northwest Nigeria. International trade interest was cited as one of the factors. It is reported that the accelerated wheat production programme (AWPP) failed as a result of pressure from wheat-interested nations. According to Ime (2020), American interests are consistently working against wheat production advances in Nigeria. Lack of cohesion in the national strategy in wheat development was clearly seen where government officials pegged $400/MT as the fixed price of wheat grain without involvement of the stakeholders. This supported the

findings of (Victoria, 2018; Dauda, 2019) that most policies in Nigeria were implemented without the involvement of stakeholders and experts.

The role played by milling industries According to Adrae and Beckman (1985), "there is a close link between the international wheat-trading interests and the companies with a stake in the Nigerian milling industry." Further findings revealed that the failure of AWPP was attributed to the millers who reluctantly ignored locally produced wheat (Kolawale, 1993). According to Haruna *et al.* (2017), wheat millers haven't been willing to comply with 10 per cent to 40 per cent of the future cassava flour inclusion policy. USDA (2019) reported that the flour millers also favour imports, citing references of higher protein and gluten content accompanied by low moisture content. This false myth that millers held as an excuse for decades has been overcome since 2014 by LACRI. The discussion pointed out that the farmers' refusal to sell to the millers was sometimes a result of poor yields, which were below the farmer's expectations.

Table 3. List of variety developed by Lake Chad research institute

S/n	Variety name	Old variety name	Potential yield (t/ha)	Released year
1	LACRIWHIT – 4	Atilla Gan Atilla	4.5 to 5.5	2005
2	LACRIWHIT – 5	Norman	5 to 6	2014
3	LACRIWHIT – 6	Reyna-28	5 to 5.5	2014
4	LACRIWHIT – 7	Rayna-15	5 to 6	2015
5	LACRIWHIT – 8	Crow 'S'	5 to 6	2015
6	LACRIWHIT – 9	Pastor	6 to 7	2016
7	LACRIWHIT - 10	Kauz	6.5 to 7.5	2016
8	LACRIWHIT - 11	Imam	6 to 7	2019
9	LACRIWHIT – 12D	MBA-MAJA (Durum)	6.2	December 2021
10	LACRIWHIT – 13D	ALTAR-84 (Durum)	5.6	December 2021

Table 3 shows the list of certified seeds developed by the Lake Chad   research Institute (LACRI) in an attempt to overcome the millers' claim. The findings disputed (Haruna, *et al.* 2017; USDA, 2018;) respectively, that claimed the variety of wheat   in

Nigeria is called "Hard wheat" (Triticum durum). All the available varieties in Nigeria before now (December 2021) were soft wheat (Triticum aestivum). Two durum wheat varieties were released recently by LACRI and will be made available for   usage by farmers.

Figure 19. Factors relationship

Code System	Political factors	External social factors	Internal social factors
Political factors		2	2
External social factors	2		2
Internal social factors	2	2	

Figure 19 shows there was an existing relationship among the identified factors. This means some factors could be categorized as internal social factors as well as external social factors, and they could also be political factors.

4.3.4. Various administration regime commitments to wheat production in Nigeria from 1986 to 2020

Table 4. Nigeria's administration regime and their commitment

S/n	Administration	Regime	Wheat related Policy
1	Military Head of state	1986 – 1993	Accelerated wheat production programme AWPP (SAP era)
2	Military head of state	1993 – 1998	there was no significant agricultural policy initiated
3	Military head of state	1998 – 1999	No policy enacted
4	Civilian administration	1999 – 2007	Less agricultural policy plenty of poverty reduction
5	Civilian administration	2007 – 2015	Agricultural transformation agenda
6	Civilian administration	2015 – 2021	Anchor borrower program, and Agricultural Promotion Policy

4.3.4.1. Impact of each regime on wheat production

4.3.4.11 Accelerated wheat production program (AWPP) 1986 – 1990

The impact of each administration regime on wheat production was assessed through time series data of variables, viz: production, harvested area and import. The results are as follows:

Figure 20. Nigeria's wheat production, harvested area, and import within AWPP period
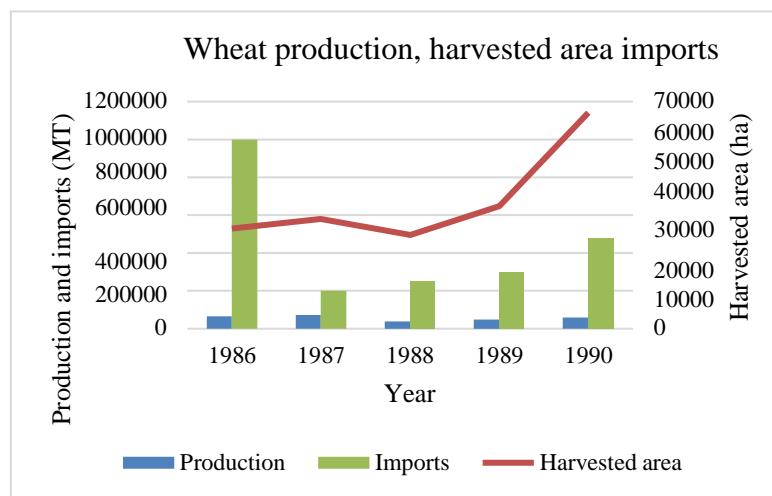
Source: Production, Supply and Distribution of Agricultural Commodities by Market Year, 25 May 2021

Figure 20 demonstrates that Nigeria imported 1 MMT of wheat and produced 67000MT in 1986. AWPP Initiated in the same year where wheat importation was banned outright, the selected farmers were supplied with necessary inputs and wheat production rose to 72000MT in 1987, and instantly the production went down despite working policy from 1988 to 1990. Consequently, wheat imports lost up to 80% in 1987 when compared with 1986, and continued to rise slowly despite the ban. Furthermore, the area under wheat cultivation moved up in 1987 and down in 1988. In 1990, the area under wheat crop production reached a 76.19% increase compared with the land area in 1989.

4.3.4.12 Pre wheat policy era (under military head of states) 1991 – 1999

Figure 21. Nigeria's wheat production, harvested area, and import under **militaries head of states**
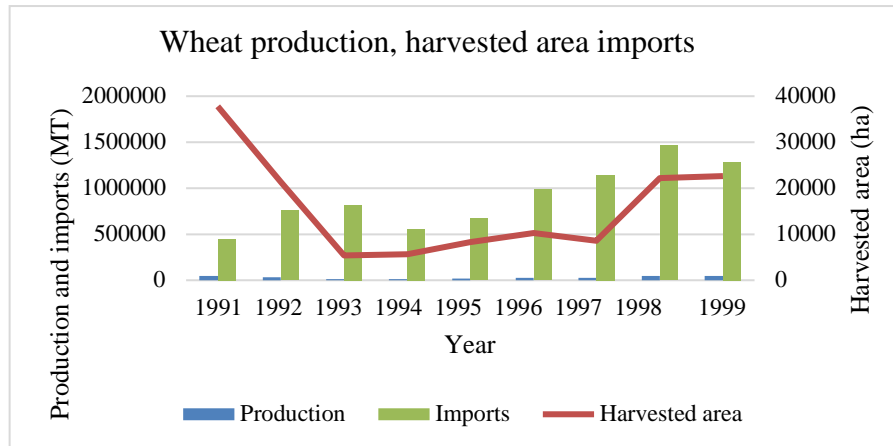
Source: Production, Supply and Distribution of Agricultural Commodities by Market Year, 25 May 2021

Evident from figure 21 It could be seen that, there was no reasonable volume of production recorded during the period as the average production stood at 30,688MT, while importations continued to record success as they kept increasing year by year, although there was mere sway in the importation sector. During this era, there were no significant increases in both production and land area under wheat cultivation.

4.3.4.13 Pre wheat policy era (under civilian administrations) 2000 – 2009

Figure 22. Nigeria's wheat production, harvested area, and import under civilian administrations
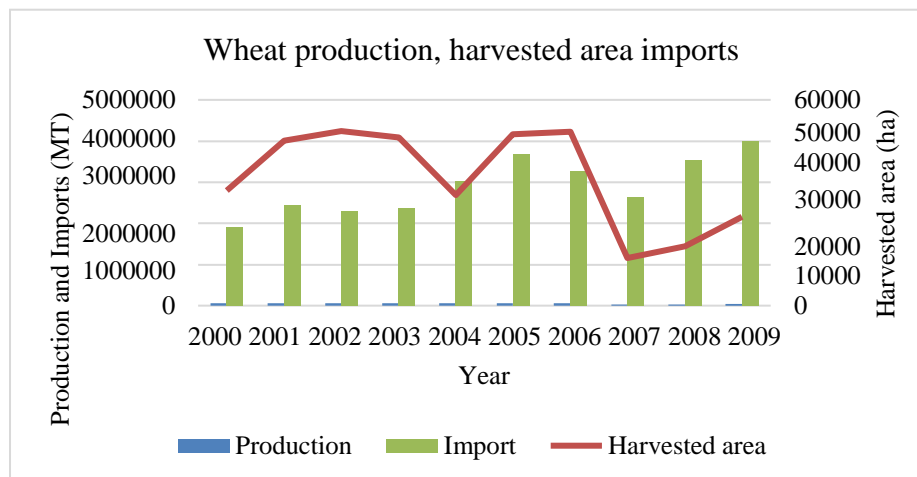
Source: Production, Supply and Distribution of Agricultural Commodities by Market Year, 25 May 2021

It could be seen from Figure 22 that, wheat importers were having a field day to maintain the wheat trap idea, while local production was still suffering.

4.3.4.14 Agricultural transformation agenda (ATA) 2010 – 2015

.**Figure 23. Nigeria's wheat production, harvested area, and import ATA period**
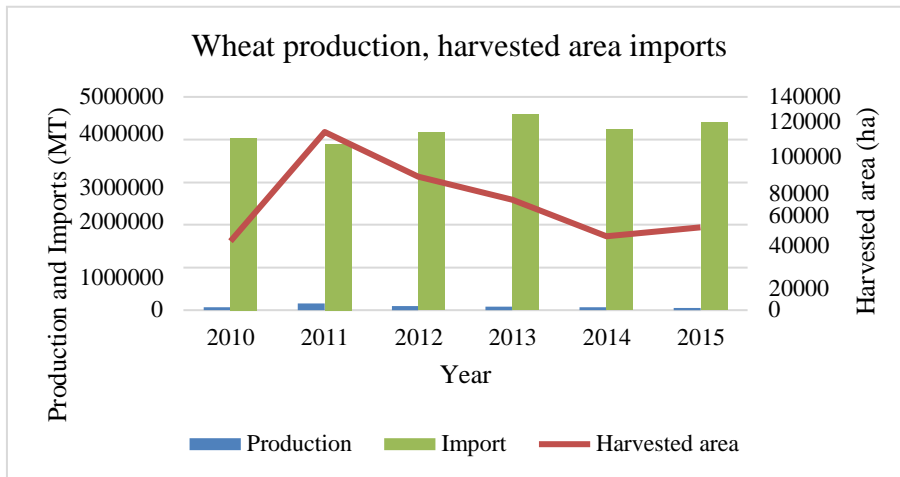
Source: Production, Supply and Distribution of Agricultural Commodities by Market Year, 25 May 2021

Evident from figure 23 ATA played a significant role in the agricultural sector in Nigeria. In 2010, wheat production increased from 48000MT in 2009 to 74399MT in 2010. Nigeria produced 165,000MT of wheat in 2011. Till date, no production has been officially recorded that tallies 2011 production. This is described as a success recorded under the ATA. The wheat transformation agenda was initiated as a scheme toward achieving the stated objectives.

4.3.4.15. Agricultural promotion policy (APP) 2016 – 2020

Figure 24. Nigeria's wheat production, harvested area, and import APP period
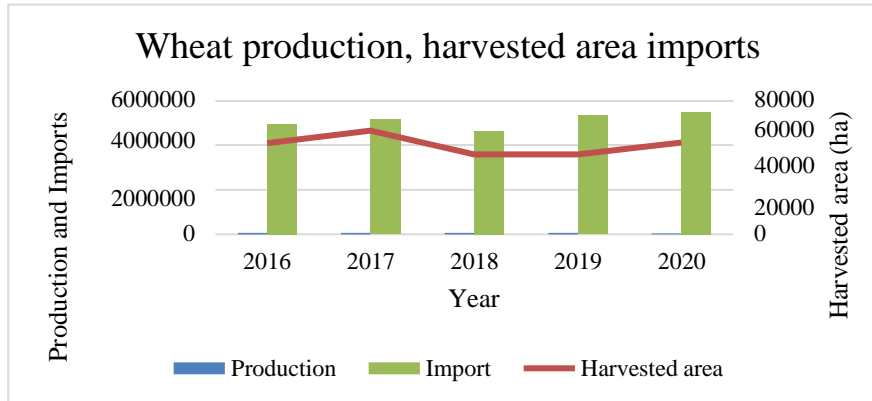
Source: Knoem.com Production, Supply and Distribution of Agricultural Commodities by Market Year, 25 May 2021

Figure 24 shows that wheat importation continued to grow at a rapid pace as demand increased due to population growth, while actors swayed local wheat production in their favor. Under APP, an anchor borrower scheme was initiated to facilitate the achievement of specific crops, and wheat farmers were included in 2020.

4.3.5. Compound growth rate analysis

To determine the average growth rate over three periods, a compound annual growth rate was computed.

Table 5. Compound growth rate analysis

Regime	Period	Production	Harvested area	Import
Accelerated wheat production program period	1986 – 1990	- 0.18	- 0.19	- 0.03
Military administration pre wheat policy period	1991 – 1999	0.27	0.31	0.21
Civilian administration pre wheat policy period	2000 – 2009	-0.07	-0.05	0.08
Agricultural Transformation Agenda period	2010 – 2015	0.08	0.15	0.02
Agricultural Promotion Policy period	2016 – 2020	-0.02	0.00	0.02

The average growth rate results for five periods are shown in table 5. The results show that there was a negative growth rate in all three variables under study from 1986–1990, with values of -18%, -19%, and -3% for production, harvested area, and imports, respectively. Positive growth rates were recorded from 1991–1999, where production increased by 27%, harvested area increased by 31%, and imports increased by 21%. From 2000 to 2009, production and harvested area growth rates were negative at 7% and 5%, respectively, while imports increased by 8%. From 2010–2015, all the variables recorded positive increases of 8%, 15%, and 2% for production, harvested area, and imports, respectively. From 2016 – 2020, production growth rate was negative (-2%), while the harvested area growth rate remained unchanged and the import growth rate recorded a 2% increase. This implies that the highest growth rate of the variables was recorded under the military administration during the pre-wheat policy period. The aims of each policy were to increase wheat production and discourage wheat imports. These results show that the policies failed to achieve the desired results.

Table 6. Overall growth rates for 35 years

S/n	Period	Production	Harvested area	Imports
1	1986 – 2020	-0.01	0.02	0.05

Table 6 shows the overall growth rate of production, harvested area, and imports. This indicated that the total average growth rate of production was negative (-1%) and less positive (2%) growth rate was recorded in the harvested area, while (5%) positive growth was recorded in imports. Where the production growth rate was negative and the harvested area growth rate was positive, it was a clear indication of the low yield of the wheat crop in Nigeria.

Objective 2. Study the perceived effects of climate change on production of wheat and livelihood of the wheat farmers

4.4. Effects of climate change on production of wheat and livelihood of the wheat farmers

Weather time's series data for solar radiation and temperature were considered due to the facts that, the two parameters have direct effect on wheat crop.(Russell *et al.* 2014; Sajjad *et al.* 2017; Mukherjee *et al.* 2019; Daloz *et al.* 2021) indicated that, high temperature adverselyaffects wheat production. Ahmed and Hassan (2011) reveal that yield remained directly proportional to solar radiation and temperature. According to Prasad *et al*. (2018), crop growth and yield significantly affected by changes in temperature and solar radiation. Temperature and solar radiation were having direct effect on wheat production and precipitation has no direct effect on it in Nigeria, because, currently wheat is produce in Nigeria under irrigation system during harmattan period which is outside the raining season (there is no rain fed production ofwheat).

Wheat crop in Nigeria is growing in the northern part of the country. According to NIMET (2020) indicates that, northern states of Bauchi, Borno, Gombe, Katsina, Kano, Kebbi,Jigawa, Sokoto, Yobe, Zamfara and parts of Adamawa, Plateau, Niger recorded 240Wm2/dayand above. Northern Nigeria cold season departure from long term normal. Cooler than normal distribution was observed over parts of Kano, Jigawa and Yobe. Night time temperatures werevery low over Yobe (Nguru) as it was 2.7°C cooler than normal. However, a few locations haddeviations from normal, such areas include Nguru which was noticeably cooler than normal by 1°C.The observed 2020 hot season day-time temperatures showed that more than 95% of Northern Nigeria recorded values higher than 1981 -2010 normal hot-season values. Analysisof the cumulative annual rainfall as recorded in 2020, showed a progressive increase in the annual rainfall amount from north towards the south. Nguru in Kebbi state recorded the least amount of 766mm while the highest amount recorded was in Awka in Anambra state 2,707mm.

Figure 25. Comparison of cold season between 1981-210 and 2020
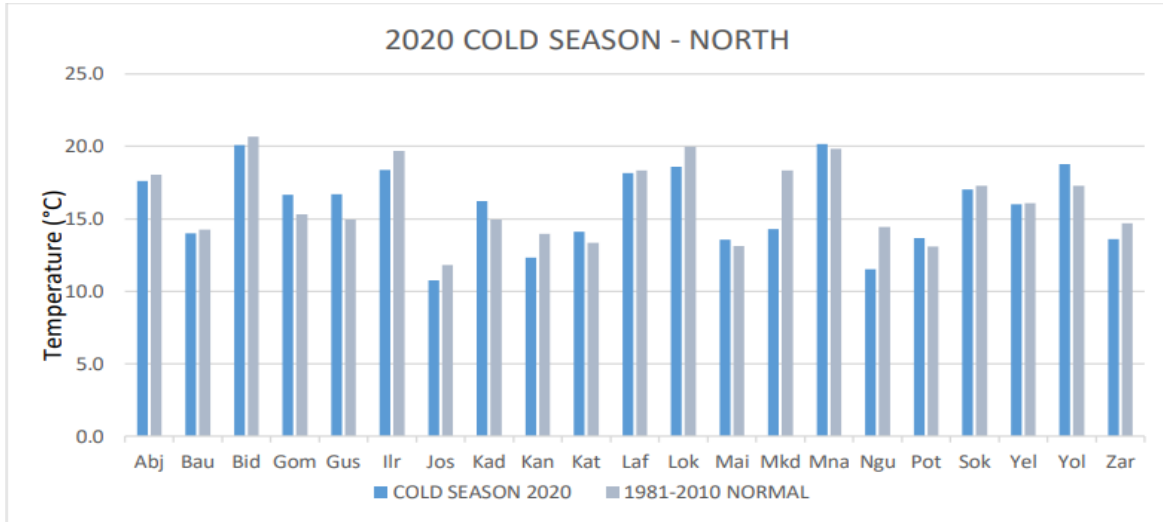
Source: NIMET 2020

From the figure 25, proved that the Nigeria's climate have no or little effect on wheat crop production. The temperature for 20 years remains as well as solar radiation with little variation, while the production continues in sway. However, it may be, the wheat production in Nigeria has been affected largely by human action rather than climatic and environmental factors.

4.4.1. Farmer's awareness about climate change

The battles against climate change in agriculture could be won only if the targeted farmers became aware of it. Awareness of the respondents about the effects of climate change on their livelihood could facilitate a quick response to the adoption of coping strategies when developed. In view of that, the climate change awareness of the respondents and their opinion on the mode of manifestation in their locality were assessed.

Figure 26. Farmer's climate change awareness
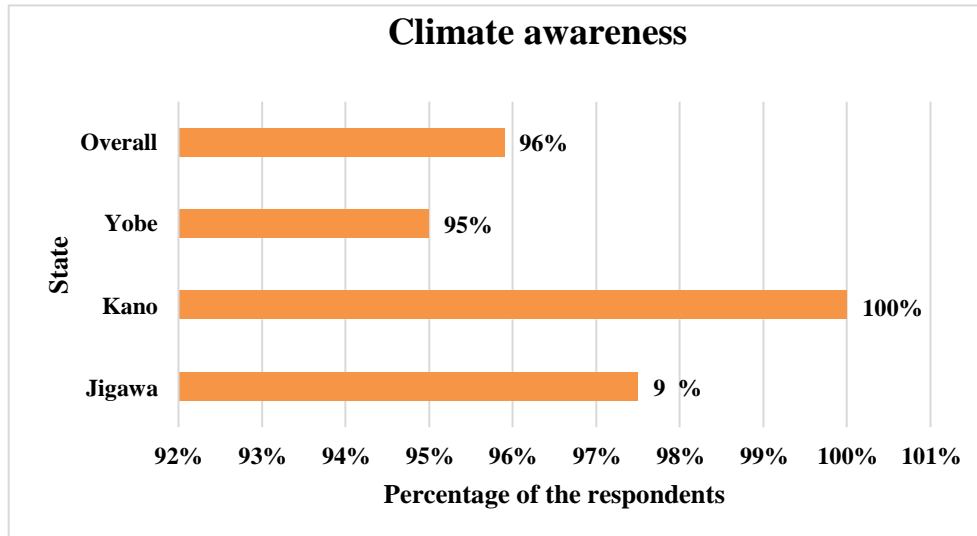
Figure 26 shows that, (100%) of farmers in Kano were aware of the climate change, (98%) of farmers in Jigawa and (95%) of them in Yobe were aware of climate change. While (96%) of the overall of respondents were aware of the climate change. This implies that, the farmers in the study area were aware of climate change. This would be easy for the farmers to adopt a new climate related idea when developed and disseminated.

Table 7. Distribution of the respondents according to the opinion base on mode of climate change manifestation (Jigawa state)   **n = 80**

Variables	Opinion based on mode of climate change manifestation			
	Increases F(P)	Decreases F(P)	Unchanged F(P)	Total F(P)
Duration of rainfall	48(60)	30(37.50)	2(2.50)	80(100)
Amount ofrainfall	42(52.50)	38(47.50)	0(00)	80(100)
Compare with the previous years, the Harmattanperiod?	28(35)	52(65)	0(00)	80(100)
The temperaturee during Harmattan period	46(57.50)	32(40)	2(2.50)	80(100)
Pest and disease effects on wheat crop	66(82.50)	12(15)	2(2.50)	80(100)
Desert encroachment advancement	62(77.50)	14(17.50)	5(5)	80(100)
Soil degradation	56(70)	22(27.50)	2(2.50)	80(100)

Table 7 shows that, in Jigawa the majority (60%) of farmers believed that the duration of rainfall increases as a result of climate change while (37.5%) believed to be decrease and (2.5%) believed to be unchanged. (52.5%) believed that amount of rainfall increased while (47.5%) believed that it has decreased. (35%) of the farmers believed that, the harmattan period increased while (65%) believed that it has decreased. (57.5%) believed that the temperature during harmattan period increased, whereas (40%) and (2.5%) believed that it has decreased and remain unchanged respectively. (85%) believed that, pest and disease effect on wheat crop increased, while (15%) says it has decreased and (2.5%) believed that remain unchanged. The majority (77.5%) believed that desert encroachment advancement increased while (17.5%) said it has decreased and (5%) believed that remain unchanged. Soil degradation the majority (70%) of the farmers believed that it has increased, while (27.5%) said it has decreased and (2.5%) believed that, remain unchanged. This indicate that, the opinion of the majority of the farmers on rainfall during increased was inconsistence with (NiMet, 2020) report where they reported rainy days increase from 30 years normal (1981-2010) the positive changes were recorded in most states. The opinion of the majority of the farmers on increased in the amount of rainfall tally with (NiMet, 2020) report "the cumulative annual rainfall as recorded in 2020, showed a progressive increase in the annual rainfall amount from north towards the south". The opinion of the majority of the farmers on temperature increased during harmattan period went against (NiMet, 2020), reported that, cooler than normal distribution was recorded over parts of Kano, Jigawa and Yobe. The opinions of the majority of the farmers on pest and disease increase were in line with (Prakash *et al.,* 2014) who reported that, the crop pests would be affected directly with increase in temperature and rainfall. The opinion of the majority of the farmers on desert encroachment and soil degradation were in line the findings of (Azare *et al.*, 2020) who revealed that, The heighten problem of desertification is quite reflecting that an approximate figure of between 50 % and 75 % of Adamawa, Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Kebbi, Sokoto, Yobe, and Zamfara states in Nigeria. The findings affirmed that, the majority of wheat farmers in Jigawa were fully aware of the climate change effects on their livelihood

Table 8. Distribution of the respondents according to the opinion base on mode of climatechange manifestation (Kano state)   n = 80

Variables	Opinion based on mode of climate change manifestation			
	Increases F(P)	Decreases F(P)	Unchanged F(P)	Total F(P)
Duration of rainfall	8(10)	56(70)	16(20)	80(100)
Amount ofrainfall	18(22.50)	54(67.50)	8(10)	80(100)
Compare with the previous years, the Harmattanperiod?	13(16.25)	58(67.50)	9(11.25)	80(100)
The temperaturee during Harmattan period	28(35)	43(53.75)	9(11.25)	80(100)
Pest and disease effects on wheat crop	59(73.75)	05(6.25)	16(20)	80(100)
Desert encroachment advancement	2(2.50)	14(17.50)	64(80)	80(100)
Soil degradation	00	3(3.75)	77(96.25)	80(100)

Source: Filed survey 2021

Table 8 shows that, in Kano the majority (70%) of farmers believed that the durationof rainfall decreased as a result of climate change while (10%) believed to be increased and (20%) believed to be unchanged. (67.5%) believed that amount of rainfall decreased while (22.5%) believed that it has increased and (10%) believed to be unchanged. (67.5%) of the farmers believed that, the harmattan period decreased while (16.25%) believed that it has increased while (11.25%) believed to be unchanged. (53.75%) believed that the temperature during harmattan period decreased, whereas (35%) and (11.25%) believed that it has decreased and remain unchanged respectively. (73.75%) believed that, pest and disease effect on wheat crop increased, while (6.25%) says it has decreased and (2.0%) believed that remain unchanged. The majority (64%) believed that desert encroachment advancement remain unchanged while (17.5%) said it has decreased and (2.5%) believed that it has increased. Soil degradation the majority (96.25%) of the farmers believed that remain unchanged, while (3.75%) said it has decreased. This indicates that, the opinion of the majority of the farmers onrainfall during decreased was against the (NiMet 2020) report where they

reported an increasedin most states including Kano. The opinion of the majority of the farmers on decreased in the amount of rainfall was against the (NiMet, 2020) report, where they reported normal rainfall in Kano was observed. The opinion of the majority of the farmers on temperature decreased during harmattan period was in line with (NiMet, 2020), reported that, cooler than normal distribution was recorded over parts of Kano, Jigawa and Yobe. The majority of the farmers on pest and disease increase were in line with (Prakash *et al*., 2014) who reported that, the croppests would be affected directly with increase in temperature and rainfall. The opinion of the majority of the farmers on desert encroachment and soil degradation were against the findings of (Azare *et al.,* 2020) who revealed that, the growing problem of desertification is reflected in the fact that most states, including Kano, have a desertification rate of between 50 and 75 percent.. It may be the areas where desert encroachment affected most in the state were not wheat producing areas. The findings affirmed that, the majority of wheat farmers in Kano were awareof the climate change effects on their livelihood but lack an idea or information on how it manifest.

Table 9. Distribution of the respondents according to the opinion base on mode of climate change manifestation (Yobe state)   n = 80

Variables	Opinion based on mode of climate change manifestation			
	Increases F(P)	Decreases F(P)	Unchanged F(P)	Total F(P)
Duration of rainfall	49(61.25)	31(38.75)	00	80(100)
Amount ofrainfall	39(48.75)	41(51.25)	00	80(100)
Compare with the previous years, the Harmattanperiod?	26(32.50)	50(62.50)	4(05)	80(100)
The temperaturee during Harmattan period	42(52.50)	36(45)	2(2.50)	80(100)
Pest and disease effects on wheat crop	74(92.50)	4(05)	2(2.50)	80(100)
Desert encroachment advancement	63.75	14(17.50)	15(18.75)	80(100)
Soil degradation	78.75	16(20)	1(1.25)	80(100)

Source: Filed survey 2021

Table 9. Shows that, in Yobe the majority (61.25%) of farmers believed that the duration of rainfall increases as a result of climate change while (38.75%) believed to be decrease. Whereas (51.25%) believed that amount of rainfall decreased while (48.75%) believed that it has increased. (32.5%) of the farmers believed that, the harmattan period increased while (62.5%) believed that it has decreased and (5%) believed that remain unchanged. (52.5%) believed that the temperature during harmattan period increased, whereas (45%) and (2.5%) believed that it has decreased and remain unchanged respectively. The majority (92.5%) believed that, pest and disease effect on wheat crop increased, while (5%) believed that it has decreased and (2.5%) believed that remain unchanged. The majority (63.75%) believed that desert encroachment advancement increased while (17.5%) said it has decreased and (18.75%)believed that remain unchanged. Soil degradation the majority of the farmers (78.75%) believed that it has increased; while (20%) said it has decreased and (1.25%) believed that, remain unchanged. This indicate that, the opinion of the majority of the farmers on rainfall during increased was inconsistence with (NiMet 2020) report where they reported rainy days increase from 30 years normal (1981-2010) the positive changes were recorded in most states.The opinion of the larger percentage of the farmers on increased in the amount of rainfall tallywith (NiMet, 2020) report "the cumulative annual rainfall as recorded in 2020, showed a progressive increase in the annual rainfall amount from north to the south". The opinion of the majority of the farmers on temperature increased during harmattan period went against (NiMet, 2020), reported that, the temperatures over Yobe at night were very low as it was 2.7°C. Cooler than normal distribution were recorded over parts of Kano, Jigawa and Yobe. Their opinion on pest and disease increase was in line with (Prakash *et al*., 2014) who reported that, the crop pests would be affected directly with increase in temperature and rainfall. The opinion of the majority of the farmers on desert encroachment and soil degradation were in linethe findings of (Azare *et al.,* 2020) who revealed that, The heighten problem of desertification is quite reflecting that an approximate figure of between 50 % and 75 % of Adamawa, Bauchi, Borno, Gombe, Jigawa, Kano, Katsina, Kebbi, Sokoto, Yobe, and Zamfara states in Nigeria. The findings affirmed that, the majority of wheat farmers in Yobe were fully aware of the climate change effects on their livelihood, but most of the farmers were skeptical

about the climate change way of manifestation in their area may be due to lack of adequate extension personal who would disseminate information to them.

4.4.2. Perception of farmers toward climate change effect to their livelihood

The respondents' perception on climate change and their livelihood were captured to understand the farmers' realization or lack of it about climate change situations.

Figure 27. Perception of farmers toward climate change effects in Jigawa n = 80
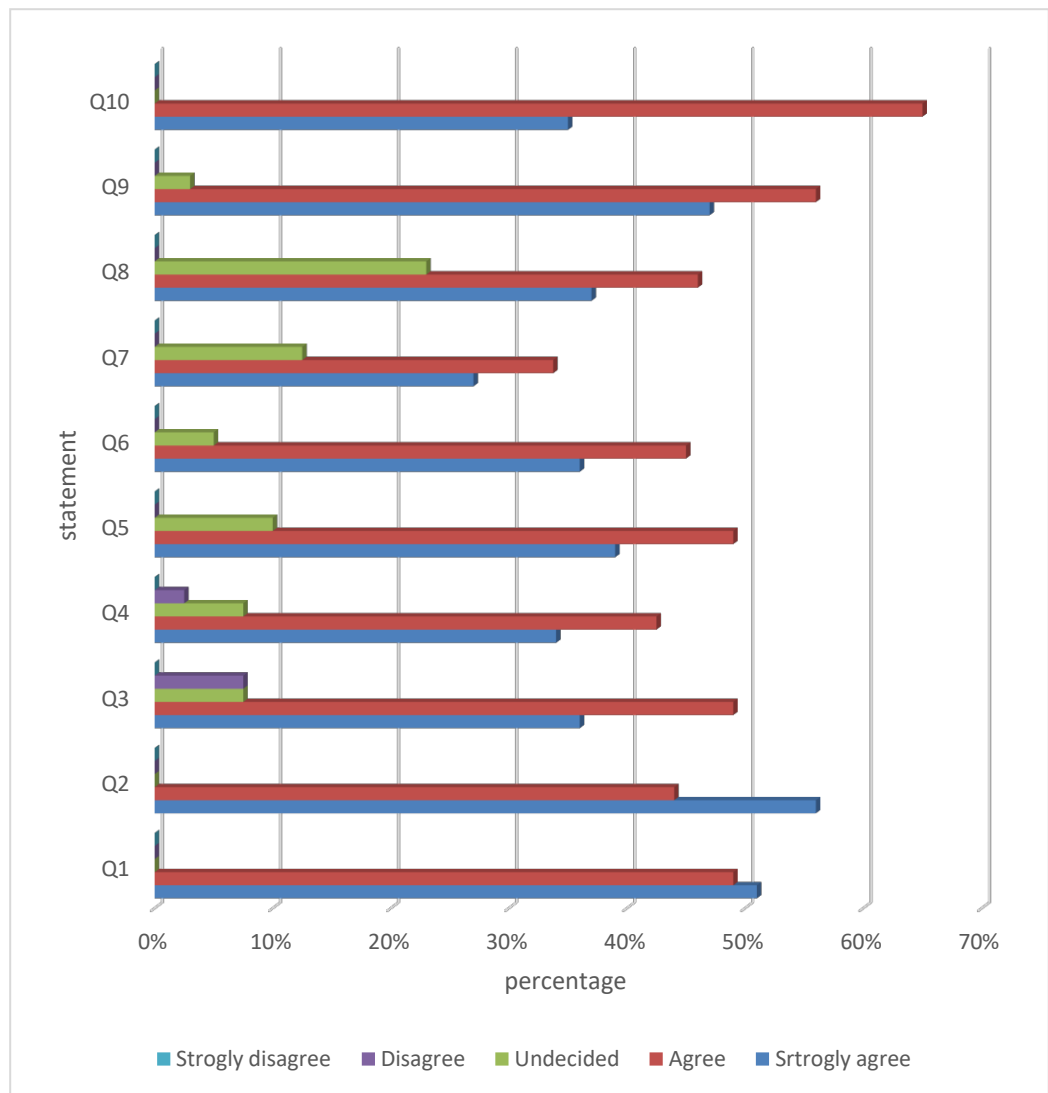
Source: Field survey 2021

The figure 27 shows that in Jigawa the majority (51%) and (49%) of the respondent strongly agree and agree that, climate change is a threat to their production as well as livelihoodrespectively. Whereas (56%) and (44%) strongly agree and agree that climate change may cause a decrease in the size of their farm land or increase as a result of flood or drought. Most (49%) and (36%) of the respondents agree and strongly agree that climate change increase the crop susceptible to disease attack in which yield is reducing respectively, while undecided and disagree respondents were (7.5%) each. The majority (50%) strongly agree that climate changecan cause drying of irrigation channel due to the increase in temperature, followed by (42.5%) agree, and (7.5%) undecided. Most (48.75%) of the respondents agree that, temperature during harmattan period is decreasing in recent years due to climate change, followed by (38.75%) strongly agree, (10%) undecided and (2.5%) were disagree. The majority (50%) of the respondents strongly agree that temperature is increasing due to climate change during summer season, followed by (45%) agree and (5%) were undecided. The majority (53.75%) of the respondents strongly agree that, human activities are the root cause of climate change, followedby (33.75%) and (12.5%) were undecided. The most (46%) of the respondents agree that, climate change means unpredictable weather, followed by (31%) strongly agree and (13%) were undecided. The majority (59%) of the respondents agree that, climate change can cause biotic and abiotic stress to crop plant, followed by (39%) strongly agree and (3%) were undecided. The majority (65%) of the respondents agree that, climate change   is one of the causes of soil degradation which lead to low crop yield, while (35%) were strongly agree.

Figure 28. Perception of farmers toward climate change effects in Kano n = 80
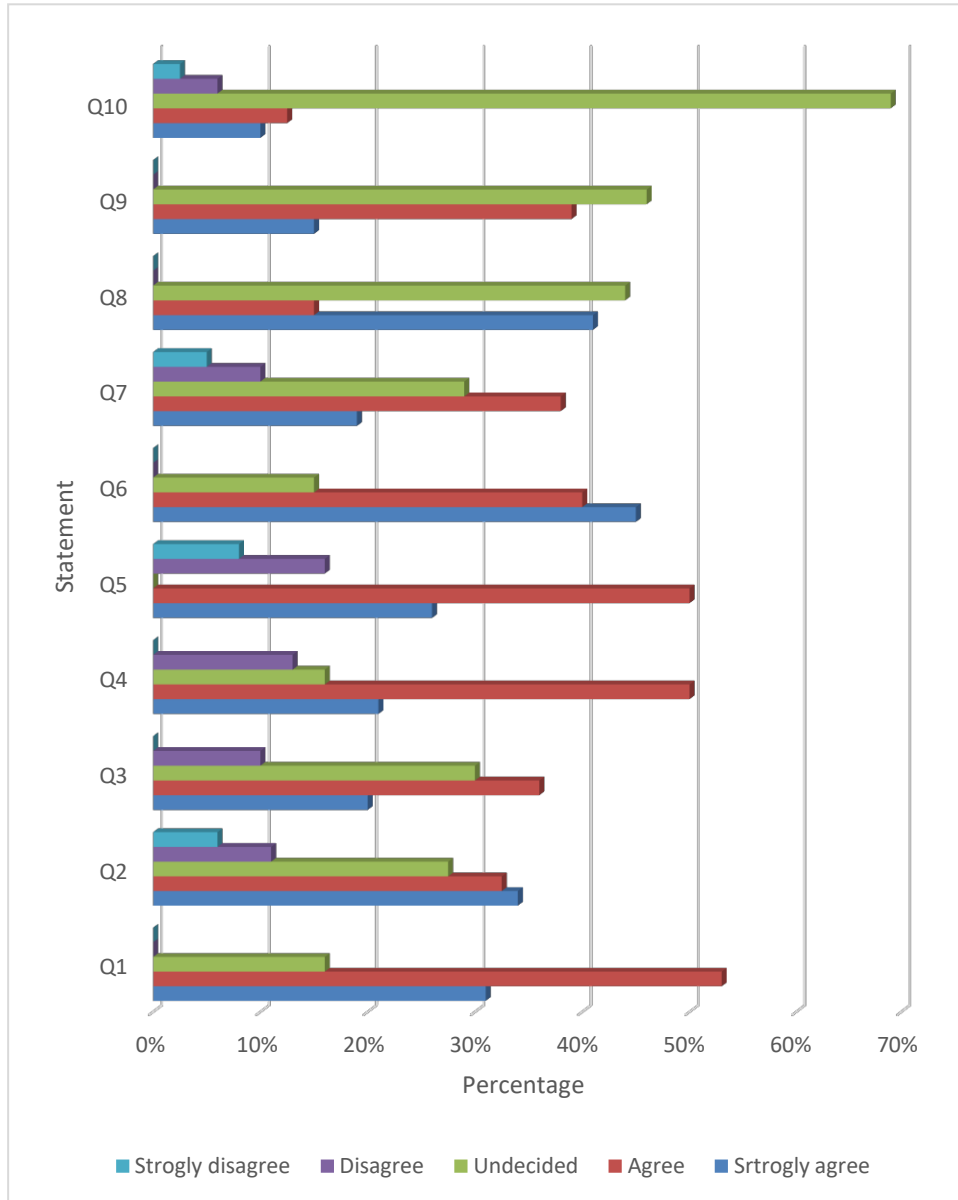
Source: Field survey 2021

The table 28 shows that in Kano the majority (53%) of the respondent strongly agree, and (31%) agree that climate change is a threat to their production as well as livelihood, while(16%) were undecided. The most (34%) and (32.5%) strongly agree and agree that climate change may cause a decrease in the size of their farm land or increase as a result of flood or drought followed by (27.5%) undecided and (6%) were

strongly disagree. The most (36%) and(30%) of the respondents agree and undecided that climate change increase the crop susceptible to disease attack in which yield is reducing respectively, followed by (20%) strongly agree while (14%) were undecided. The majority (50%) of the respondents agree that climate changecan cause drying of irrigation channel due to the increase in temperature, followed by (21%) strongly agree, (16%) undecided and (13%) disagree. The majority (50%) of the respondents agree that, temperature during harmattan period is decreasing in recent years due to climate change, followed by (26%) strongly agree, (16%) undecided and (8%) were disagree. Most (45%) of the respondents strongly agree that temperature is increasing due to climate change during summer season, followed by (40%) agree and (15%) were undecided. Most (37%) of the respondents agree that, human activities are the root cause of climate change, followed by (29.75%) undecided, (19%) strongly agree and (10%) and (5%) were disagree and strongly disagree respectively. Most (44%) of the respondents undecided that, climate change means unpredictable weather, followed by (41%) strongly agree and (15%) were agree. Most (46%) of the respondents undecided that, climate change can cause biotic and abiotic stress to crop plant, followed by (39%) agree and (15%) were strongly agree. The majority (69%) of the respondents undecided that, climate change is one of the causes of soil degradation which leadto low crop yield, while (12.5%) were agree, followed by (10%) strongly agree, (6%) disagree and (2.5%) strongly disagree.

Figure 29. Perception of farmers toward climate change effects in Yobe   n = 80
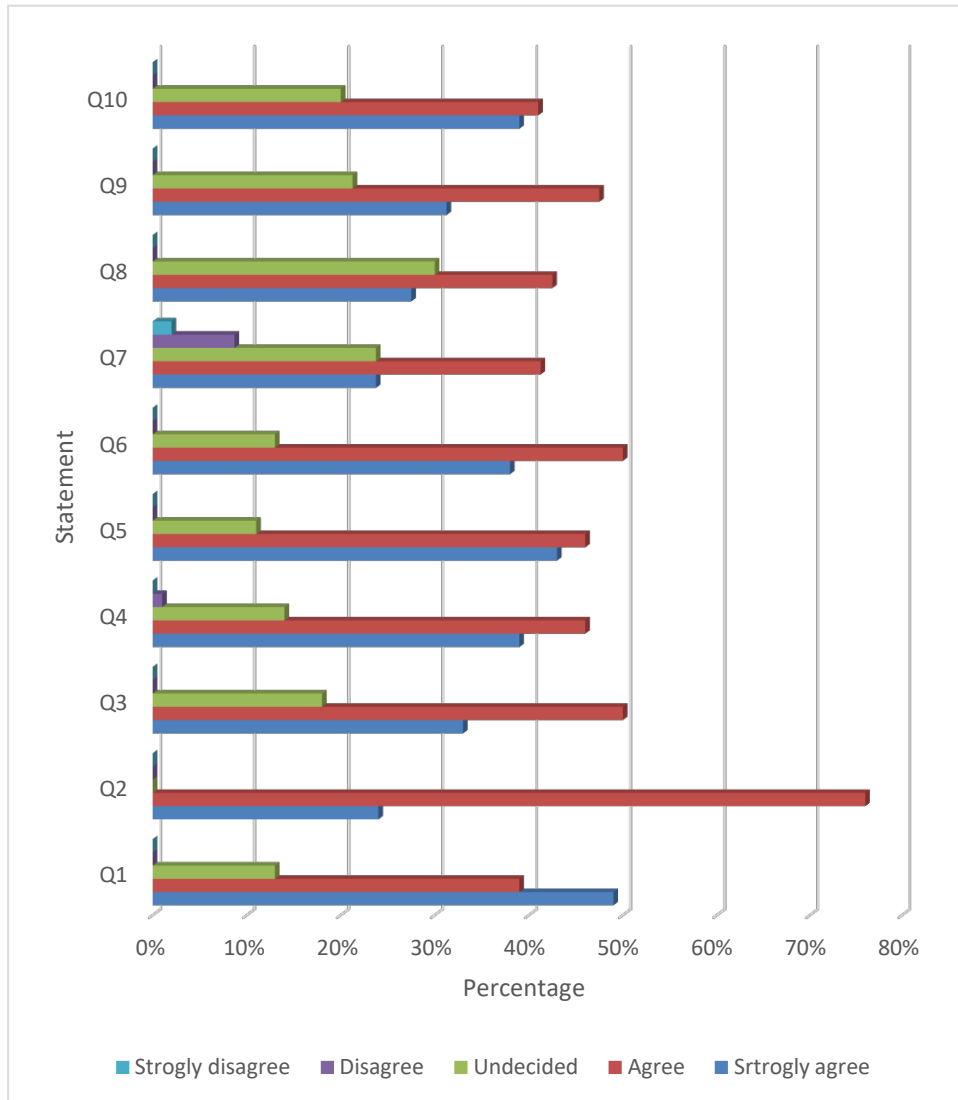
Source: Field survey 2021

The Figure 29 shows that in Yobe most (49%) and (39%) of the respondent strongly agree and agree that Climate change is a threat to their production as well as livelihood respectively, whereas, (13%) undecided. The majority (76%) of the respondents agree that climate change may cause a decrease in the size of their farm land or increase as a result of flood or drought, and (24%) strongly agree. The majority (50%) of the respondents agree that climate change increase the   crop

susceptible to disease attack in which yield is reducing, whileundecided, followed by (33%) strongly agree and (18%) were undecided. Most (46%) agree that climate change can cause drying of irrigation channel due to the increase in temperature, followed by (39%) strongly agree, (14%) undecided and (1%) disagree. The most (46%) of therespondents agree that, temperature during harmattan period is decreasing in recent years due to climate change, followed by (43%) strongly agree and (11%) undecided. The majority (50%)of the respondents agree that temperature is increasing due to climate change during summer season, followed by (37.5%) strongly agree and (12.5%) were undecided. Most (41.25%) of the respondents agree that, human activities are the root cause of climate change, followed by(23.75%) strongly agree, (23.75%) undecided, (8.75%) disagree and (2.5%) were strongly disagree. The most (42.5%) of the respondents agree that, climate change means unpredictable weather, followed by (30%) undecided and (27.5%) were strongly agree. Most (47.5%) of the respondents agree that, climate change can cause biotic and abiotic stress to crop plant, followed by (31.25%) strongly agree and (12.25%) were undecided. Most (41%) of the respondents agree that, climate change is one of the causes of soil degradation which lead to low crop yield, while (39%) and (20%) were strongly agree and undecided respectively.

Table 10: Overall scores of the respondents with regard to the perception of climate change effect on production and livelihood   n = 240

S/N	Dimension	Category	Jigawa	Kano	Yobe	Overall
1	Climate change effects	Low	2(2.50)	36(45)	8(10)	46(19.17)
		Medium	57(71.25)	35(43.75)	58(72.50)	150(62.50)
		High	21(26.25)	9(11.25)	14(17.50)	44(18.33)

Source: Field survey 2021

The table 10 shows that, in Jigawa, the majority (71.25%) of the respondents were having medium level of perception, followed by (26.25%) high and (2.5%) having low. Whereas, in Kano, most (45%) and (43.75%) were having low and medium perception respectively, and (11.25%) high. In Yobe, the majority (72.5%) of the respondents were havingmedium level of perception followed by (17.5%) having high and (10%) low.

The table depicted that, the majority of the respondents were falls in medium perceptioncategory regarding climate change in Jigawa and Yobe, while for Kano most were falls in lowerperception. This inferred that, the majority of the respondents were having medium perceptionon climate change effects on wheat production in Nigeria. This may be interpreted as the respondents does not fully believed in the negative effects of the climate change, but have favourable attitude towards it.

Figure 30. Comparison of climate change perception scores
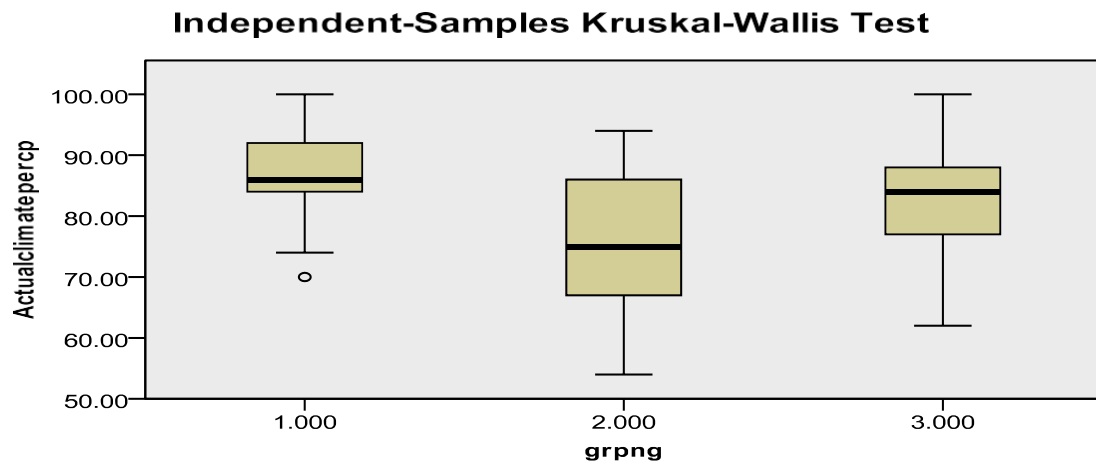
Figure 30 shows that there was a significant variation among the respondents with regards to their perception on climate change effects. This may be as a result of the different in their geographical and occurrence of its effects

Table 11: The influence of socio-economic variable on the climate change perception of therespondents $n = 240$

S/n	Variable	Spearman correlation coefficient
1	Age	0.14[*]
2	Education	0.22[**]
3	Secondary occupation	0.29[**]
4	Years of experience	0.21[**]
5	Contact with extension officer	0.32[**]
6	Farm size	0.08
7	Household size	0.28[**]
8	Monthly income	0.05

[*] Correlation is significant at 0.05 levels. [**] Correlation is significant at 0.01 levels

The table 11 shows that, for the climate change perception education, secondary occupation, years of experience, contact with extension agent and household size were statistically significant at 1% level, while age was significant at 5% level. Farm size and monthly income were found to have no influence on the climate change perception. Therefore, the climate change perception of the wheat farmers was influenced by their level of education, secondary occupation, years of experience, contact with extension agent, household size and age.

Objective 3. Analyze of the government policies and schemes on wheat production

4.5. Analysis of the government policies and schemes on wheat production

The government policies and scheme were analyzed using steps involved in content analysistechniques. The results are as follows:

Table 12: Questions to be answered

1. Whether wheat crop was listed among the priority crops in the program

2. Whether all relevant stakeholder engage with clear role and responsibility

3. Does the public – private partnership engaged in the program plan

4. Is the program consider sustainable production of the listed crops

5. Whether farming communities infrastructural development included in the program plan

6. Does the program link farmers with proper and reliable marketing channel

Table 13: Selected policy

1. Anchor borrower program statement (ABP) – 2015 to date

2. Agricultural promotion policy statement (APP) – 2016 to date

Table 14: Content categories developed for the study

1.   Priority crops and approach
2.   Stakeholders role and responsibility
3.   Public- private partnership engagement
4.   Sustainable production of the listed crops
5.   Communities infrastructural development
6.   Reliable marketing channel

Table 15: Unit of analysis

• Four type of statement: sentence, paragraph, theme, and other as they cover the required information for this study were chosen as unit of analysis.

Figure 31. Documents portrait for Anchor borrower program

Priority crops

Reliable marketing channel

Public-private partnership

Stakeholders' role and responsibility
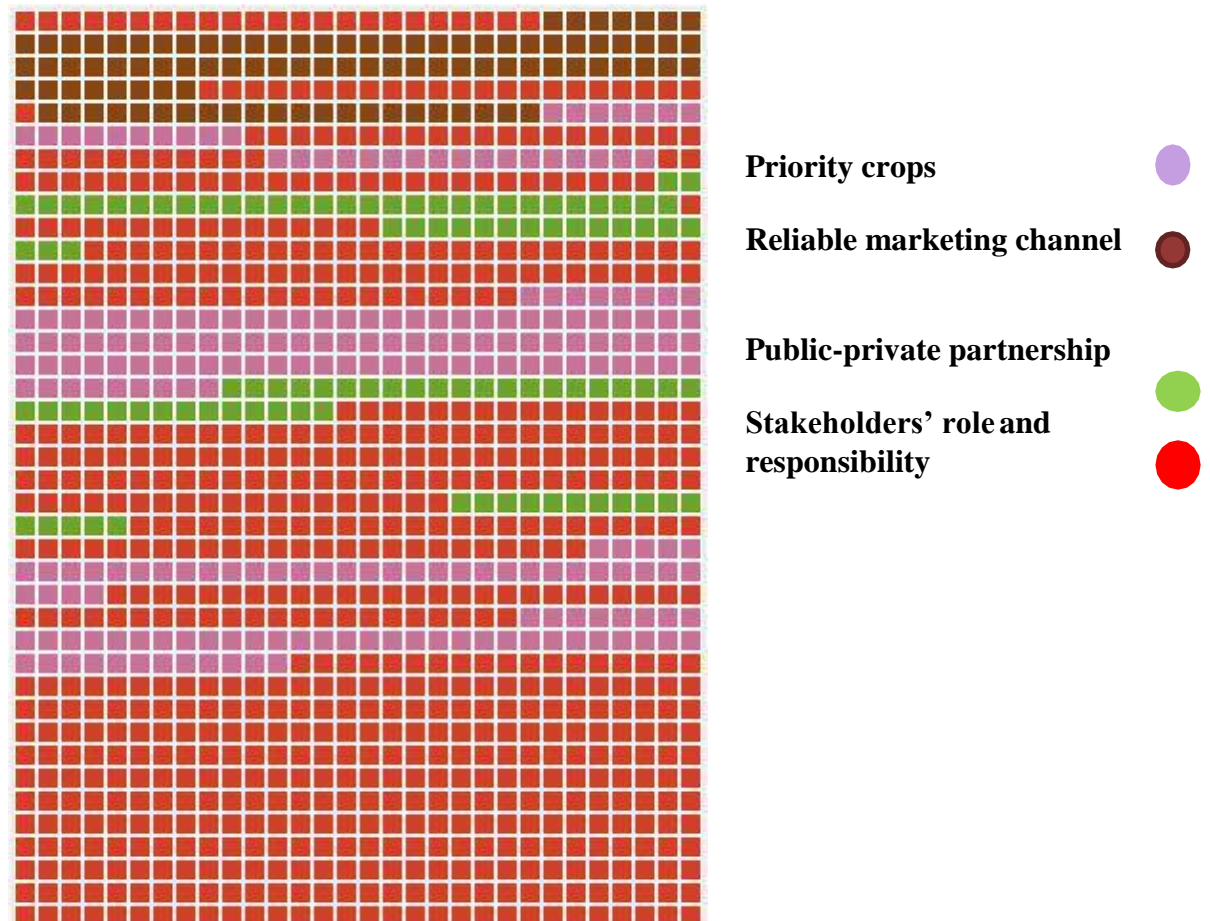
Evident from figure 31 could see that anchor borrower program statement given much priority to the stakeholders 'role and responsibility more than any other category followed by priority crops and approach, public-private partnership engagement and reliable marketing channels . T he pr o gr a m s t a t e me nt d id no t me nt io n sustainable production of the listed crops and community infrastructuraldevelopment.

The ABP established by Central Bank of Nigeria (CBN), launch within the last quarter of 2015 is serving as a form of contract farming. However, the CBN involved the relevant stakeholders to monitor and regulate the agreements in terms of price of inputs and pegging the price of the farmer's produce in order to avoid   farmer exploitation and to boost production of the targeted crops.

Figure 32. Documents portrait for Agricultural promotion policy

Priority crops

Reliable marketing channel

Public-private partnership

Stakeholders' role and responsibility

Community infrastructural development

Sustainability in crop production
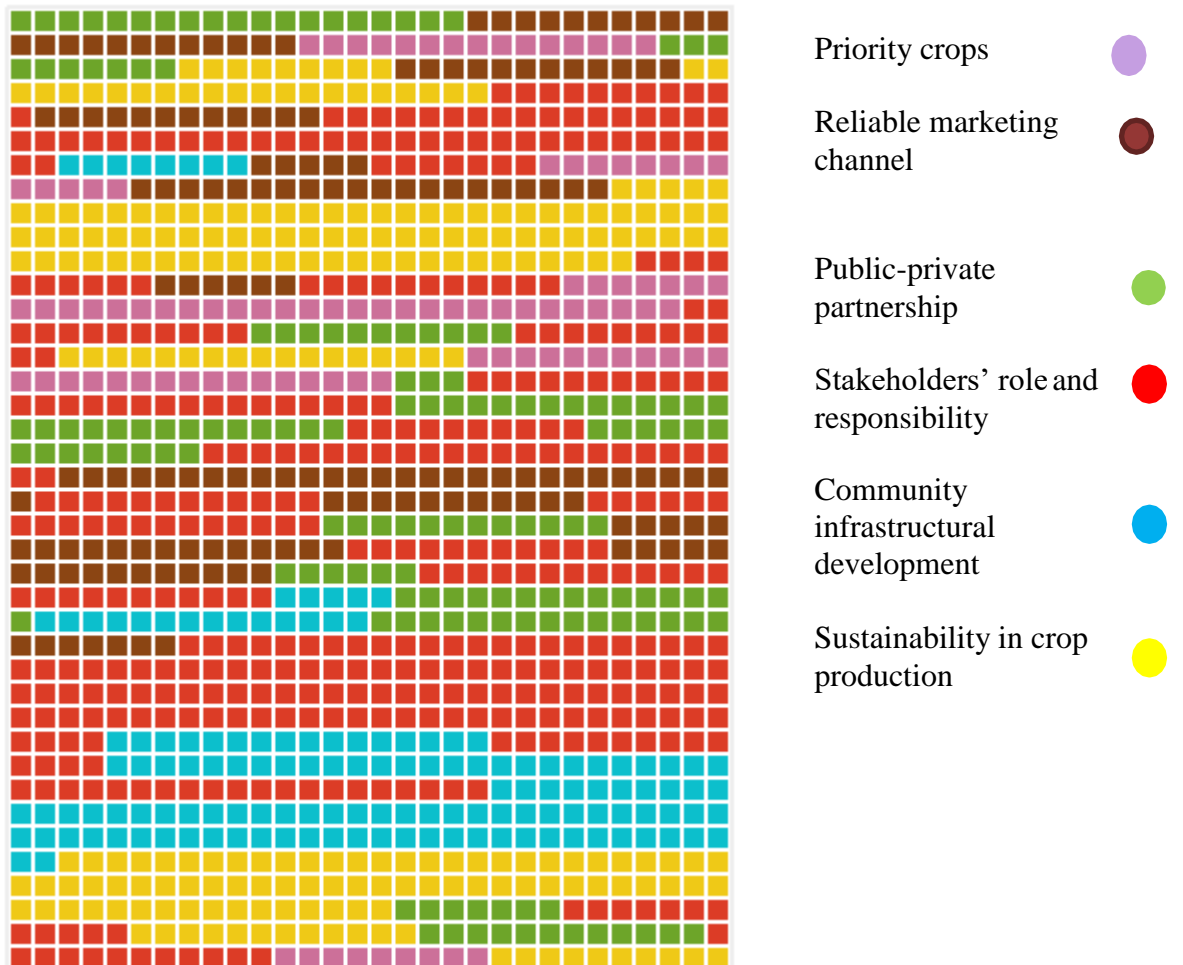
In figure 32, stakeholders role and responsibility was mentioned everywhere on the document. The policy also considered sustainable production of the targeted crops important and reliable marketing channels for economic and employment of rural population. Farming communities' infrastructural development was captured as a means of improving rural livelihood. Furthermore, wheat crop was one of the target crops that the policy would give priority, public-private partnership (PPP) engagement is one of the present sector considered important in the modern day agriculture the policy considered engagement of PPP at different channels from production to the ultimate consumer.

The APP document left no stone unturned, the federal ministry of agriculture and rural development (FMARD) driving the implementation ofthe policy. The policy document gives priority to stakeholder's role and responsibility and concerned more about sustainability in the production of the priority crops as well as reliability in the marketing channels. The document considers the modern day agricultural approach through involvement of private sectors in all areas of agricultural commodity value chain. Forthe improvement of the rural livelihood, the policy considered development of the farming communities' infrastructure.

Figure 33. Policies relationship with respect to stakeholders' role and responsibility and PPP engagements categories

Code System	Anchor borrower program statement	Agricultural promotion policy
Stakeholders role and responsibility		
stakeholders relationship		
state and LGA action		1
LGA stakeholders engagements		1
LGA involvement		1
FMARD action		18
stakeholders action		4
Federal government action		1
synergistic relationship		7
Approach to control		1
focus on stakeholders		1
NIRSAL role	1	
SHF role	1	
DP role	1	
NAIC role	1	
PMT role	1	
PMT composition	1	
state government role	1	
Anchor and state govemnt role	1	
Anchor role	3	
PFI role	2	
program financing	4	
stakeholders responsibility	1	
CBN role	3	
CBN commitment	1	
Public-private partnership engagement		
privatization action		
private involvement		6
private in marketing		
private in processing		1
private in storage		2
private in mechanization		1
privatization of irrigation		1
PPP in infrastructure		1
private and state linkage	1	
private and state	1	
private role	1	
private commitment	1	
privatazation action		1
private sector engagement		1

It is clear from Figure 33 that the stakeholders involved in these policies were completely different. Each of the policies is implemented by different agencies, despite being financed by the same administration, and there was no intersecting among the implementation bodies. This was a signal of a lack of synergy between the policy implementing agencies. The FMARD is a food security coordinating ministry in Nigeria, but has no role to play in the anchor borrower program, which is solely

handled by the CBN. This confirmed the findings of Odum (2015) who reported that during the political launch of the anchor borrower programme in Kebbi state, the CBN and the federal ministry of agriculture were not on the same page. Furthermore, both the policies considered PPP engagement at different levels. In ABP, the public-private partnership agreements were between the CBN, and state governments and anchor institutions with clear profit of 9% to be charge by anchor institutions. While APP engaged PPP across the commodity value chain.

Figure 34. Policies relationship with respect to reliable marketing channels, community infrastructural developments, Sustainable production of the listed crops, and priority crop and approach categories

Code System	Anchor borrower program statement	Agricultural promotion policy
Reliable marketing channel		
market approach		9
market dreaming		1
production value chain	2	2
marketing linkage	2	4
Communities infrastructural developme		
rural infrastructure		9
infrastructure focus		3
infrastructure in policy		1
Sustaible production of the listed crops		1
climate threat to production		1
environmental focus		7
sustainable production focus		12
sustainable uses		2
production sustainability		1
Priority crops and approach		
priority farmer focus		1
production focus		4
crop approach		2
qualification	1	
loan settlement	2	
loan period	1	
focus crop	1	1
focus on shf	2	1

Evident from Figure 34, it can be seen that both the policies considered the provision of reliable marketing of the targeted crops with more consideration in APP. Community infrastructure and sustainable production of the listed crop were not captured anywhere in the ABP statements, while in APP, more of these were involved. Both the policies considered wheat as one of the targeted crops with different foci.

There was no criteria for participation in the APP, whereas qualification and loan settlement period were involved in ABP. This implies that the APP document considered all the relevant areas in modern day agriculture, and when properly implemented, it would yield a positive result for the country. While ABP can only be used for a limited time and is subject to change or disposal at any time because it is a type of contract farming that can be modified by another administration.

4.5.1. Farmer's awareness about government policy/scheme on wheat crop

The awareness of the respondents about the exiting of government policy/scheme with regard to wheat crops will motivates their efforts toward participation.

Figure 35. Farmers' awareness and participation/benefited in policy and scheme
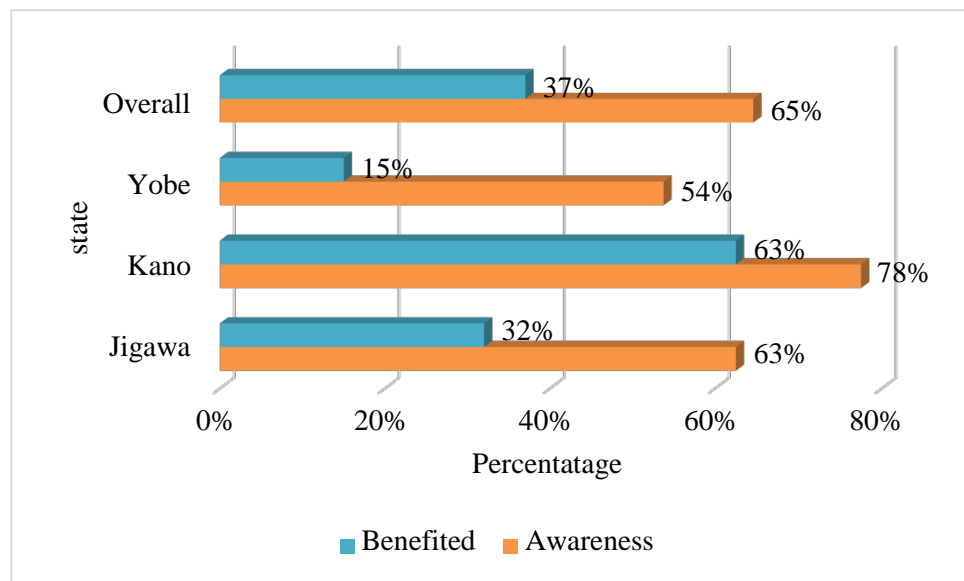
Source: Field survey 2021.

Figure 35 shows that the majority of Jigawa farmers (63%) were aware of the government's wheat crop policy and scheme, but only (32%) benefited. The majority (78%) of the farmers in Kano were aware while (63%) benefited. In Yobe, the majority (54%) were aware, while (15%) benefited. The overall shows that the majority (65%) of the respondents were aware of government policies/schemes on wheat production, while only (37%) benefited. This implies that the farmers in Kano and Jigawa had more information than the farmers in Yobe. It was an indicator that

the information channels in Kano and Jigawa were working more efficiently when compared to those in Yobe. Although the majority of the respondents in Nigeria were aware of policies/schemes, very few had the opportunity to participate and benefit. This indicates that the policies have lower coverage than expected.

4.5.1. Farmers perception on government policies and scheme

The study was tried to have an inside towards farmers understanding upon government's policies and scheme. Their level of perception may be proving their degree of believing towards solving their existing problem.

Figure 36. Farmers' perception on government policies and scheme in Jigawa
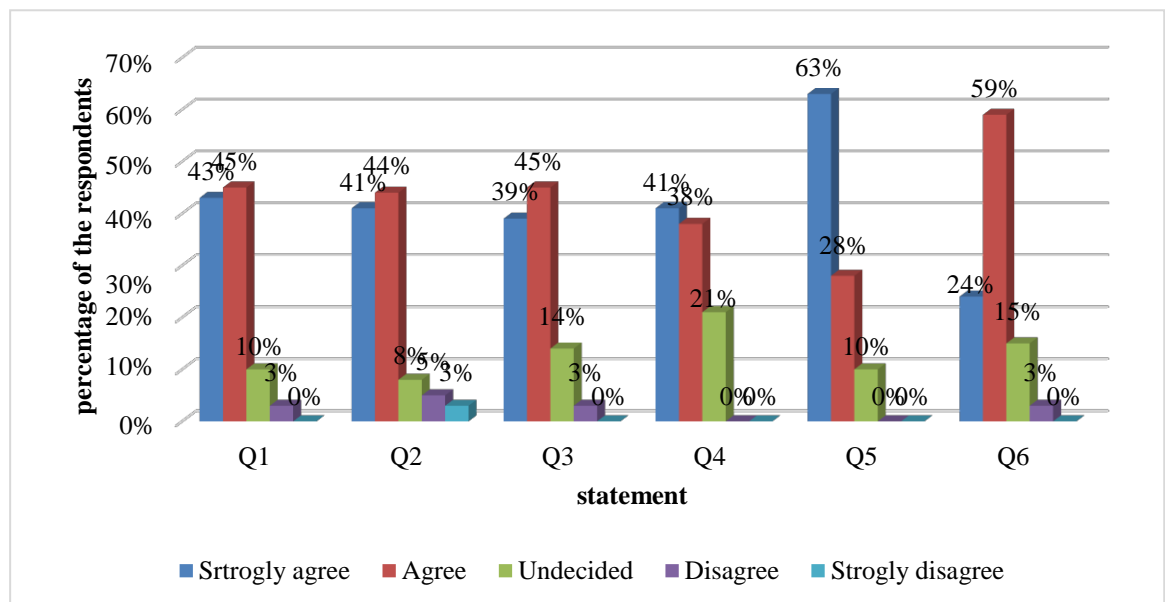
Source: Field survey 2021

The fig. 36 Depicted that, in Jigawa most (45%) of the respondents agree that, the government P&S would solve wheat farming problem, followed by (43%) strongly agree, (10%) undecided, (3%) disagree. (44%) of the respondents agree that government P&S would not solve their problem if millers are not ready to patronize local wheat, followed by (41%) strongly agree, (8%) undecided, (5%) disagree and (3%) strongly disagree. Most (45%) of therespondents agree that, P&S should focus on increasing farmers output and wellbeing, followed by (39%) strongly agree, (14%) undecided, and (3%) disagree. Most (41%) of the respondentsstrongly agree that all the government P&S were good enough to increase the wheat production level when

implemented properly, followed by, (38%) agree, and (21%) undecided. The majority (63%) of the respondents strongly agree that, corruption is the key problem that block the P&S to work effectively, followed by (28%) agree, and (10%) undecided. The majority (59%) of the respondents agree that P&S were full up bureaucracy that always steady their access, followed by (24%) strongly agree, (15%) undecided   and (3%) disagree.

Figure 37. Farmer's perception on government policies and scheme in Kano
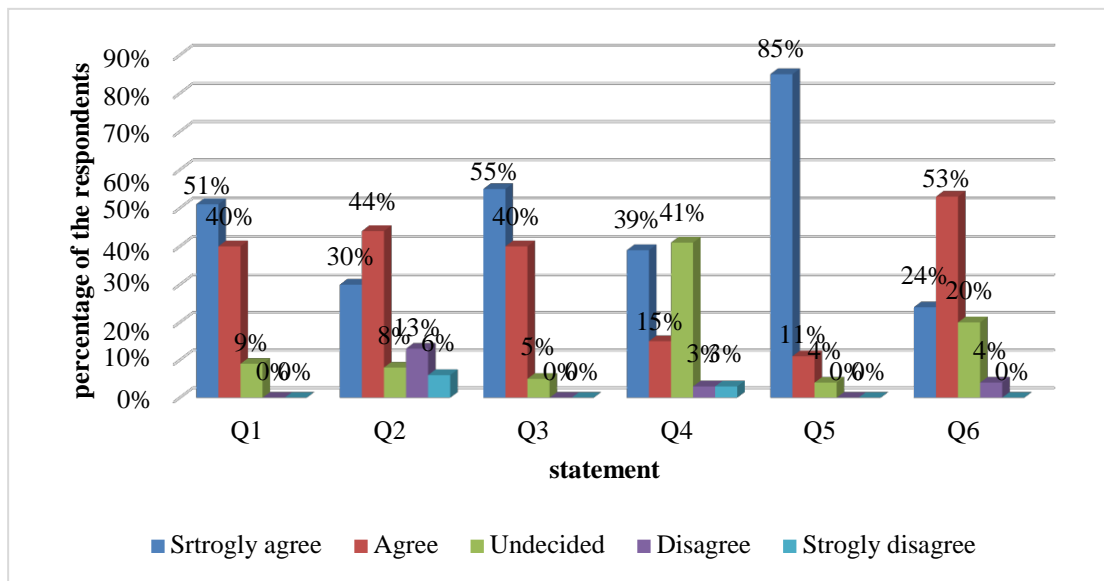
Source: Field survey 2021

The fig. 37 Depicted that, in Kano the majority (51%) of the respondents strongly agreethat, government P&S would solve wheat farming problem, followed by (40%) agree, and (9%)undecided. (44%) of the respondents agree that government P&S would not solve their problem if millers are not ready to patronize local wheat, followed by (30%) strongly agree, (13%) disagree, (8%) undecided, and (6%) strongly disagree. the majority (55%) of the respondents strongly agree that, P&S should focus on increasing farmers output and wellbeing, followed by (40%) agree, and (5%) undecided. Most (41%) of the respondents undecided that all the government P&S were good enough to increase the wheat production level when implementedproperly, followed by, (39%) strongly agree and (15%) agree, (3%) disagree and (3%)   strongly disagree. The majority (85%) of the respondents strongly agree that, corruption is

the key problem that block the P&S to work effectively, followed by (11%) agree, and (4%) undecided. The majority (53%) of the respondents agree that P&S were full up bureaucracy that always steady their access, followed by (24%) strongly agree, (20%) undecided and (4%) disagree.

Figure 38. Farmer's perception on government policies and scheme in Yobe
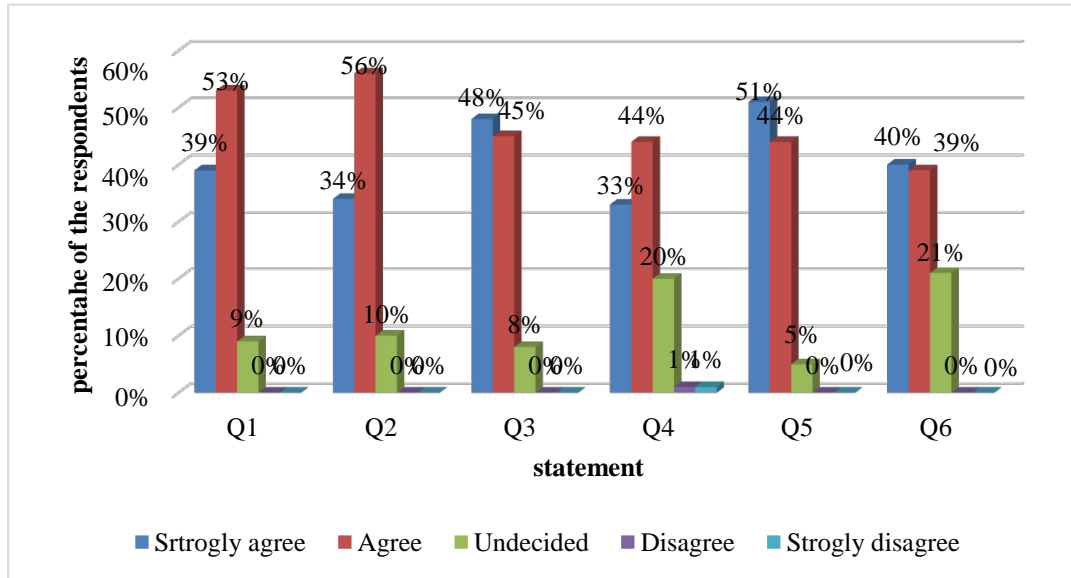
Source: Field survey 2021

The figure 38 Depicted that, in Yobe the majority (53%) of the respondents agree that, government P&S would solve wheat farming problem, followed by (39%) strongly agree, and(9%) undecided. (56%) of the respondents agree that government P&S would not solve their problem if millers are not ready to patronize local wheat, followed by (34%) strongly agree, and (10%) undecided. most (48%) of the respondents strongly agree that, P&S should focus on increasing farmers output and wellbeing, followed by (45%) agree, and (7%) undecided. Most (45%) of the respondents agree that all the government P&S were good enough to increase thewheat production level when implemented properly, followed by, (33%) strongly agree and

(20%) undecided, (1%) disagree and (1%) strongly disagree. The majority (51%) of the respondents strongly agree that, corruption is the key problem that block the P&S to work effectively, followed by (44%) agree, and (5%) undecided. Most (40%) of the respondents strongly agree that P&S were full up bureaucracy that always steady their access, followed by(39%) agree, and (21%) undecided.

Table 16: Overall scores of the respondents with regard to the policy/scheme perception

n = 240

S/N	Dimension	Category	Jigawa	Kano	Yobe	Overall
1	Policy/scheme	Low	16(20)	12(15)	6(7.5)	34(14.17)
		Medium	53(66.25)	56(70)	62(77.5)	171(71.25)
		High	11(13.75)	12 (15)	12(15)	35(14.58)

Source: Field survey 2021

The table 16 shows that, in Jigawa, the majority (66.25%) of the respondents were having medium level of perception, followed by (20%) low and (13.75%) having high. In Kano, the majority (70%) were having medium perception, followed by high and low perception with (15%) each. In Yobe, the majority (71.25%) of the respondents were having medium level of perception followed by (14.58%) having high and (14.17%) low.

The table also depicted that, the majority of the respondents were fall in the medium perception categories on policy/scheme. This inferred that, the majority of the respondents were having medium perception on government policy and scheme on wheat production in Nigeria. The study inferred that, the majority of the respondents do not fully believing in the role of government policy/scheme in solving farmers' problems, but have favourable attitude toward them.

Figure 39 Comparison of policy/scheme perception scores
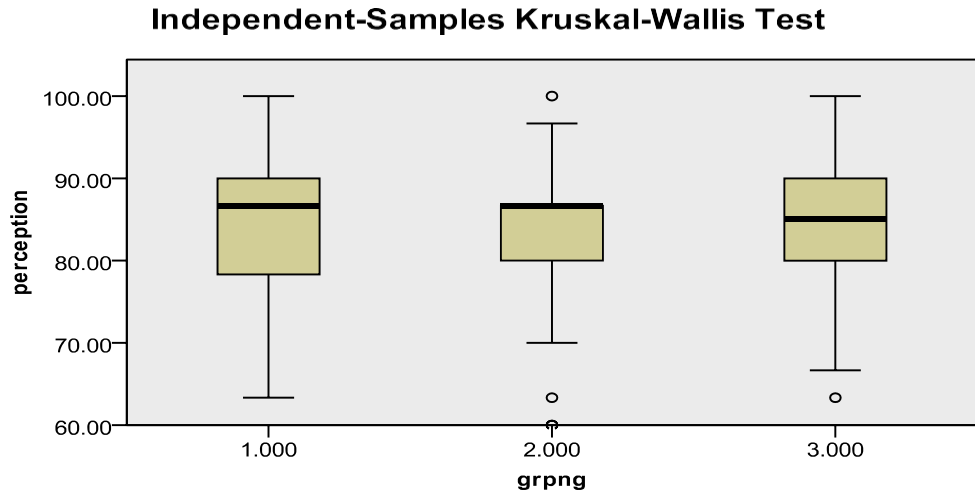
Figure 39. shows that there was no significant difference with respect to the respondents' perception on policy/scheme. This implies that the farmers have similar understanding in this aspect.

Table 17: The influence of socio-economic variable on government policy/scheme perceptionof the respondents n = 240

S/n	Variable	Spearman correlation coefficient
1	Age	0.13[*]
2	Education	0.66[**]
3	Secondary occupation	0.69[**]
4	Years of experience	0.53[**]
5	Contact with extension officer	0.58[**]
6	Farm size	0.42[**]
7	Household size	0.54[**]
8	Monthly income	0.18[**]

[*] Correlation is significant at 0.05 levels

[**] Correlation is significant at 0.01 levels

The table 17 shows that, , education, secondary occupation, years of experience, contact with extension agent, farm size, household size and monthly income were

found to be significant at 1% level in influencing farmers perception on government policy/scheme while age was significant at 5% level. This implies that, perception on policy/scheme was largely influenced by education, secondary occupation, years of experience, contact with extension agent, farm size, household size and monthly income.

Objective 4. Examine the marketing behavior of the wheat farmers
4.6.0. Marketing behavior of the wheat farmers

Marketing behavior of the farmers is defined as the processes, ways,   places, time, period, and conditions that a farmer sells his produce for physical and psychological satisfaction.

Table 18: Distribution of the respondents according to their marketing behavior

n = 240

S/N	Statement	Frequency	Percentage
	For Jigawa state respondents	**n = 80**	
1.	**When do you sell the produce**		
a.	Before harvesting when crop matured	00	00
b.	Immediately after harvest if the price is favourable	53	66.25
c.	Immediately after harvest whatever the price may be	25	31.25
d.	Less price, the grain would be stored until the price is favourable	28	35
2.	**Reason for selling at a particular period**		
a.	Indebtedness to trader/industry	08	10
b.	Lack of storage facilities	16	20
c.	Financial urgency	70	87.5
d.	High price	39	48.75
3.	**Whom do you sell the produce**		
a.	Directly to consumer	02	2.5
b.	To local market retailers	45	56.25

c.	Directly to wholesalers	61	76.25
d.	To millers through agent	02	2.5
4.	**Where do you sell the produce**		
a.	At farm gate	00	00
b.	In my home	08	10
c.	In the local market	34	42.5
d.	In the weekly market	44	55
e.	In the central Market	15	18.75
5.	**Which mode used for transport**		
a.	Trailer	00	00
b.	Bullock cart	00	00
c.	Motorcycle	33	41.25
d.	Truck	51	63.75
e.	Trolley	03	3.75
6.	**Reason for selling at a particular place**		
a.	Proximity	45	56.25
b.	Availability of the transport facilities	24	30
c.	Good market facilities	06	7.5
d.	Premium price	30	37.5
e.	Immediate cash payment	40	50
f.	Previous agreement	00	00
	For Kano state respondents	**n = 80**	
1.	**When do you sell the produce**		
a.	Before harvesting when crop matured	09	11.25
b.	Immediately after harvest if the price is favourable	71	88.75
c.	Immediately after harvest whatever the price may be	66	82.5
d.	Less price, the grain would be stored until the price is favourable	21	26.25
2.	**Reason for selling at a particular period**		
a.	Indebtedness to trader/industry	37	46.25
e.	Financial urgency	77	96.25

f.	High price	46	57.5
3.	**Whom do you sell the produce**		
a.	Directly to consumer	72	90
b.	To local market retailers	80	100
c.	Directly to wholesalers	52	65
d.	To millers through agent	22	27.5
4.	**Where do you sell the produce**		
a.	At farm gate	58	72.5
b.	In my home	42	52.5
c.	In the local market	72	90
d.	In the weekly market	41	51.25
e.	In the central Market	03	3.75
5.	**Which mode used for transport**		
a.	Trailer	57	71.25
b.	Bullock cart	09	11.25
c.	Motorcycle	46	57.5
d.	Truck	50	62.5
e.	Trolley	29	36.25
6.	**Reason for selling at a particular place**		
a.	Proximity	77	96.25
b.	Availability of the transport facilities	33	41.25
c.	Good market facilities	31	38.75
d.	Premium price	02	2.5
e.	Immediate cash payment	65	81.25
f.	Previous agreement	32	40
	For Yobe state respondents	**n = 80**	
1.	**When do you sell the produce**		
a.	Before harvesting when crop matured	00	00
b.	Immediately after harvest if the price is favourable	49	61.25
c.	Immediately after harvest whatever the price may be	27	33.75

d.	Less price, the grain would be stored until the price is favourable	34	42.5
2.	**Reason for selling at a particular period**		
a.	Indebtedness to trader/industry	30	37.5
d.	Lack of storage facilities	14	17.5
e.	Financial urgency	56	70
f.	High price	55	68.75
3.	**Whom do you sell the produce**		
a.	Directly to consumer	06	7.5
b.	To local market retailers	45	56.25
c.	Directly to wholesalers	62	77.5
d.	To millers through agent	02	2.5
4.	**Where do you sell the produce**		
a.	At farm gate	04	5.0
b.	In my home	04	5.0
c.	In the local market	49	61.25
d.	In the weekly market	39	48.75
e.	In the central market	24	30
5.	**Which mode used for transport**		
a.	Trailer	06	7.5
b.	Bullock cart	02	2.5
c.	Motorcycle	37	46.25
d.	Truck	59	73.75
e.	Trolley	05	6.25
6.	**Reason for selling at a particular place**		
a.	Proximity	52	65
b.	Availability of the transport facilities	13	16.25
c.	Good market facilities	07	8.75
d.	Premium price	27	33.75
e.	Immediate cash payment	45	56.25
f.	Previous agreement	01	1.25

Source: filed survey multiple response 2021

Table 18 shows that, in Jigawa the majority (66.25%) of the respondents sell their produce immediately after harvest if the price is favorable, (31.25%), and (35%) selling immediately after harvest whatever the price may be, and if price is less, the grain would be stored until the price is favourable respectively.

The majority (82.5) financial urgency as their main reason for selling their produce followed by (48.75%) due to high price, lack of storage facilities (20%), and indebtedness to trader/industry (10%).

The majority (76.25%) and (56.25%) selling their produce directly to wholesalers and to local market retailers respectively, while those selling directly to consumer and to miller through agent were (2.5%) each.

The majority (55%) selling their produce in the weekly market, while (42.5%) selling in the local market and (18.75%) and (10%) selling in the central market and at their home respectively.

The majority (56.25%) expressed proximity as their main reason for selling at a particular place, while (50%) mentioned immediate cash as their main reason, whereas (37.5%) influenced by premium price followed by (30%) availability of the transport facilities, and (7.5%) good market facilities.

The majority (63.75%) using truck for transportation of their goods, others (41.25%) using motorcycle while (3.75%) using trolley.

This implies that, the majority of the respondents in Jigawa were selling their produce immediately after harvest if the price is favourable due to financial urgency and selling directly to either wholesaler or local market retailer, proximity or immediate cash payment was their main reason for selling either in the weekly market or local market and mostly using truck or motorcycle for transportation of their produce.

Table 18 shows that, in Kano the majority (88.75%) and (82.5%) of the respondents selling their produce immediately after harvest if the price is favourable and immediately after harvest whatever the price may be respectively, followed by (26.25%) if price is less, they stored the grain until the price is favorable and (11.25%) selling before harvesting.

The majority (96.25%) of the respondents selling at a particular period due to financial urgency, followed by (57.5%) selling due to the high price offered to them, (47.5%) selling due to lack of storage facilities, and (46.25%) selling due to indebtedness to trader/industries.

All (100%) of the respondents were selling to local market retailers. The majority (90%) were selling directly to consumer whereas (65%) selling directly to wholesalers and (27.5%) selling to millers through agent.

The majority (90%), (72.5%), (52.5%), and (51.25%) of the respondents selling their produce in the local market, at farm gate, at their home, and in the weekly market respectively,while (3.75%) selling in the central market.

The majority (96.25%) and (81.25%) selling at a particular place due to proximity andimmediate cash payment followed by (41.25%) due to availability of the transport facilities, (40%) selling due to previous agreement, (38.75%) selling at a place due to good market facilities, and (2.5%) due to premium price.

The majority (71.25%), (62.5%), and (57.5%) transporting their produce by using trailer, truck, and motorcycle respectively, while (36.25%) and (11.25%) using trolley and bullock cart respectively.

This revealed that, the majority of the respondents in Kano selling their produce immediately after harvest if the price is favourable or immediately after harvest whatever the price may be, due to financial urgency or high price offered to them mainly by local market retailer, consumer or wholesaler. The majority selling their produce in the local market, at theirfarm, their home or in the weekly market due to proximity and immediate cash payment, they were mostly using trailer, truck or motorcycle for transportation of their produce.

The table 18 shows that, in Yobe the majority (61.25%) of the respondents selling theirproduce immediately after harvest if the price is favourable, followed by (42.5%) if price is less, they stored the produce until the price id favourable, and (33.75%) selling immediately after harvest whatever the price may be.

The majority (70%) and (68.75%) of the respondents mentioned financial urgency andhigh price as their main reason for selling at a particular period followed by (37.5%) indebtedness to traders/industry, and (17.5%) were due to lack   of storage facilities.

The majority (77.5%) of the respondents selling directly to wholesalers and (56.25%) selling directly to local market retailers, followed by (7.5%) selling directly to consumer and (2.5%) selling to millers through agent.

The majority (61.25%) of the respondents selling their produce in the local market, followed by (48.5%) selling in the weekly market, (30%) selling in the central market and thoseselling at farm gate and their home were (5%) each.

The majority (65%) and (56.25%) of the respondents selling at a particular place due to proximity and immediate cash payment respectively, followed by (33.75%) selling due to premium price, (16.25%) due to availability of the market facilities, and (1.25%) due to previous agreement.

The majority (73.75%) of the respondents using truck for transporting of their goods, followed by (46.25%) using motorcycle, (7.5%) using trailer, (6.25%) using trolley, and (2.5%)using bullock cart.

This affirmed that, the majority of the respondents in Yobe selling their produce immediately after harvest if the price is favourable due to financial urgency and high price paidby the wholesaler or local market retailer. The majority selling their produce in the local market due to proximity or immediate cash payment and using mainly truck for transportation of theirproduce.

The findings inferred that, the majority of the respondents selling their produce immediately after harvest if the price is favourable due to financial urgency to both wholesalerand retailer in case of Jigawa and Yobe and consumer in case of Kano. The majority selling in the local market due to proximity and using truck as their main transportation facility. Kano respondents explore many alternatives in terms of marketing of their produce when compare with Jigawa and Yobe respondents.

Table 19 Overall scores of marketing behaviour of the respondents

	n = 80	n = 80	n = 80	n = 240
Category	Jigawa	Kano	Yobe	Overall
Low	11(13.75)	0.0(00)	21(26.25)	32(13.33))
Medium	69(86.25)	52(65)	59(73.75)	180(75)
High	00(00)	28(35)	00(00)	28(11.67)

Table 19 shows that the majority (86.25%) of the respondents in jigawa having medium level of marketing behavior while (13.75%) were having low level. In Kano, the majority (65%) were having medium level of marketing behavior and (35%) having high level of marketing behavior. In Yobe, the majority (73.75%) were having medium level while (26.25%) having low level of marketing behavior. Furthermore, the majority (75%) of the respondents having medium level of marketing behavior followed by (13.33%) low level and (11.67%) having high level of marketing behavior. This implies that the respondents were having medium level of marketing behavior.

Table: 20. Utilization of market information sources distribution of the respondents (Jigawa state)   **n = 80**

Sources of information	Extent of utilization			
	Regular F(P)	Occasionally F(P)	Never F(P)	Total F(P)
Fellow farmers	52(65)	28(35)	00	80(100)
Friends/relatives	52(65)	28(35)	00	80(100)
Radio	18(22.5)	52(65)	(12.5)	80(100)
Television	00	12(15)	(85)	80(100)
Newspaperr	00	4(5)	(95)	80(100)
Extension agent/agency	4(5)	40(50)	(45)	80(100)
WFAN	2(2.5)	18(22.5)	(75)	80(100)
Mobile phone application	0.0	8(10)	(90)	80(100)
Internet source	0.0	6(7.5)	(92.5)	80(100)

Source: Field surveys multiple responses 2021

Table: 20 shows that, in Jigawa the majority (65%) of the respondents were regularly using fellow farmers and friends/relatives as their primary source of market information while (35%) were occasionally using for same purpose. Whereas, (40%) and (5%) were occasionallyand regularly using extension agent as their main source

respectively, while (45%) have never used extension agent as market information source. (2.5%) were regularly using WFAN, whereas (22.5%) were occasionally using, and (75%) have never used WFAN as market information source. (95%) were never used newspaper sources while (5%) were using it occasionally. In case of radio, (65%) were using it occasionally as their source, while (22.5%) and (12.5%) were regular users and never used as their source respectively. For T.V. (15%) were occasionally using while (85%) were never used for same reason. For mobile phone, (90%) have never used it as market information source, while (10%) were using it occasionally. (92.5%) were never used internet source while (7.5%) were using it occasionally. This impliesthat, the majority of the respondents in Jigawa were basically relied on informal source as theirprimary source for market information. The majority does not rely on electronics media, it may be because of their economic status that could not afford it due to lack of regular supply of electricity in their localities. The majority has never used printed media; it may be due to lackof availability of it or their educational level. The majority were never use advanced media forinformation source this may be as a result of lack of awareness on how they could explore theiruses, or lack of availability in their possession or even lack of network at their localities.

Table 21: Utilization of market information sources distribution of the respondents (Kano state)   **n = 80**

Sources of information	Extent of utilization			
	Regular F(P)	Occasionally F(P)	Never F(P)	Total F(P)
Fellow farmers	69(86.25)	11(13.75)	00	80(100)
Friends/relatives	74(92.5)	6(7.5)	00	80(100)
Radio	40(50)	38(47.5)	2(2.5)	80(100)
Television	00	41(51.25)	39(48.75)	80(100)
Newspaperr	00	9(11.25)	71(88.75)	80(100)
Extension agent/agency	20(25)	47(58.75)	13(16.25)	80(100)

WFAN	19(23.75)	32(40)	29(36.25)	80(100)
Mobile phone application	14(17.5)	15(18.75)	51(63.75)	80(100)
Internet source	00	15(18.75)	65(81.25)	80(100)

Table 21: shows that, in Kano the majority (92.5%), and (86.25%) of the respondents were regularly using friends/relatives and fellow farmers respectively, as their primary source of market information. while (7.5%) and (13.75%) were occasionally using for same purpose. Whereas, (58.75%) and (25%) were occasionally and regularly using extension agent as their main source respectively, while (16.25%) have never used extension agent as market information source. (23.75%) were regularly using WFAN, whereas (40%) were occasionally using, and (36.25%) have never used WFAN as market information source. (88.75%) were never used newspaper sources while (11.25%) were using it occasionally. (50%) were regularly using radio as their source, while (47.5%) and (2.5%) were occasional users and never used as their source respectively. For T.V. (58.25%) were occasionally using while (41.75%) were never used for same reason. For mobile phone, (63.75%) have never used it as market information source, while (18.75%) and (17.5%) were occasionally and regularly using it respectively. (81.25%) were never used internet source while (18.75%) were using it occasionally. This revealed that, the majority of the respondents in Kano were basically reliedon informal source as their primary source for market information. The majority does not rely on electronics media, it may be because of their economic status that could not afford it due tolack of regular supply of electricity in their localities. The majority has never used printed media; it may be due to lack of availability of it or their educational level. The majority were never use advanced media for information source this may be as a result of lack of awareness on how they could explore their uses, or lack of availability in their possession or even lack ofnetwork at their localities.

Table 22: Utilization of market information sources distribution of the respondents (Yobe state)   n = 80

Sources of information	Extent of utilization			
	Regular F(P)	Occasionally F(P)	Never F(P)	Total F(P)
Fellow farmers	49(61.25)	25(31.25)	6(7.5)	80(100)
Friends/relatives	50(62.5)	29(36.25)	1(1.25)	80(100)
Radio	43(53.75)	25(31.25)	12(15)	80(100)
Television	6(7.5)	17(21.25)	57(71.25)	80(100)
Newspaperr	2(2.5)	10(12.5)	68(85)	80(100)
Extension agent/agency	6(7.5)	24(30)	50(62.5)	80(100)
WFAN	2(2.5)	18(22.5)	60(75)	80(100)
Mobile phone application	00	4(5)	76(95)	80(100)
Internet source	0.0	9(11.25)	71(88.75)	80(100)

Source: Field surveys multiple responses 2021.

Table: 22 shows that, in Yobe the majority (61.25%) of the respondents were regularlyusing fellow farmers and followed by (31.25%) were using occasionally and (7.5%). (62.5%) were regularly using friends/relatives as their primary source of market information while (36.25%) were occasionally using for same purpose and (1.25%) were never used them. Whereas, (30%) and (7.5%) were occasionally and regularly using extension agent as their main source respectively, while (62.5%) have never used extension agent as market information source. (2.5%) were regularly using WFAN, whereas (22.5%) were occasionally using, and (75%) have never use WFAN as market information source. (85%) were never usednewspaper sources while (12.5%) were using it occasionally and (2.5%) were using regularly. For electronics media (53.75%) were regularly using radio, followed by (31.25%) who were using occasionally as their source, while (15%) were never used as their source. For T.V. (21.25%) were occasionally using, while (7.5%) and (71.25%) were regular users and never used for same reason respectively. For mobile phone, (95%) have never used it

as market information source, while (5%) were using it occasionally. (88.75%) were never used internet source while (11.25%) were using it occasionally. This implies that, the majority of the respondents in Yobe were basically relied on informal source as their primary source for market information. The majority rely on radio as one of the available and accessible electronic medium within their localities. The majority has never used printed media; it may be due to lack of availability of it or their educational level. The majority were never use advanced mediafor information source this may be as a result of lack of awareness on how they could explore their uses, or lack of availability in their possession or even lack ofnetwork at their localities.

The study inferred that, the majority of the respondents relied on informal sources of market information and utilizing them regularly. This revealed the kind of trust the respondentsgiven to that sources, and affirmed the weak of extension system in the study areas more especially in Yobe state.

4.6.2. Most important activity of promotion

This refers to the activities employed by a farmer in order to promote selling of his produce. The farmers who adopt any form of sales promotional activity may sell their produce earlier than those that do not. It also serves as indicator of one's marketing exposure.

Table 23. Most important source of promotion activity distribution of the respondents   n = 240

Source	Response per cent			
	Jigawa F(P)	Kano F(P)	Yobe F(P)	Overall F(P)
Personal word of mouth	62(77.5)	73(91.25)	62(77.5)	197(82.08)
Advertising	8(10)	9(11.25)	00	17(7.08)
Social media	6(7.5)	8(10)	1(1.25)	15(6.25)
Using neighborhood groups	18(22.5)	53(66.25)	8(10)	79(32.92)
None of theabove	4(5)	6(7.5)	16(20)	26(10.83)

Source: Field survey multiple response 2021

Table 23 shows that, in Jigawa the majority (77.5%) of the respondents using personal word of mouth as their most important source of promotion of their goods followed by (22.5%) using neighborhood group, (10%) advertising, (7.5%) social media, and (5%) were not using any activity for promotion. In Kano the majority (91.25%) of the respondents using personal word of mouth as their most important source of promotion of their goods followed by (66.25%) using neighborhood group, (11.25%) advertising, (10%) social media, and (7.5%) were not using any activity for promotion. In Yobe the majority (77.5%) of the respondents using personal word of mouth as their most important source of promotion of their goods followed by (10%) using neighborhood group, (1.25%) social media, and (20%) were not using any activity for promotion. Furthermore, the majority (82.08%) of the respondents in Nigeria using personal word of mouth as their main source of sales promotion followed by (32.92%) using neighborhood groups, (7.08%) by advertising and (6.25%) using social media, while (10.83%) have not employ any source of sales promotion. These indicates that the majority of the respondents using their personal word of mouth as main source for sales promotion activity very of the respondents using social media for same activities which proves a lack of respondents' awareness with regard to effectiveness of using social network in promotional activities.

4.7. Price spread analysis

The price spread analysis of the present study refers to the difference between price paid by the consumer and the net price received by the farmer for an equivalent quantity of wheat grain.

In this study four major marketing channel were identified as shown in the table below

Table 24: Marketing channels identified

1	Channel I	Producer – Consumer
2	Channel II	Producer – retailer – consumer
3	Channel III	Producer – wholesaler – retailer – consumer
4	Channel IV	Producer – millers

Source: Filed survey 2021

Table 25: Price spread, marketing cost   and marketing margin of different channels in Jigawa

Price (NGN)/100kg	Channel			
	I	II	III	IV
Produce's price	16,000	18,000	17,000	17,000
Total marketing cost	-	500	250	-
Marketing margin	-	4,500	5,750	-
Consumer price	16,000	23,000	23,000	-
Price spread	0.0 (0.0)	5,000 (21.74)	6,000 (26.09)	-
Producer's share in consumer's price (%)	100	78.26	73.91	-

Table 25 shows that, in Jigawa four basic marketing channels were presence. In channel I, the producer received 100% of the share, because he sold directly to the consumer, there was no marketing cost involve, this means the consumer purchased the produce at farm gate price. In channel – II, the producer received 78.26% from the marketing share. In Channel – III, the producer received 73.91% from the total marketing share while in channel – IV there was no clear information available for verification because it involved an industrial process. This implies that, in Jigawa producer received highest share in channel – I and higher amountin channel – II.

Table 26: Price spread, marketing cost and marketing margin of different channels in Kano

Price (NGN)/100kg	Channel			
	I	II	III	IV
Produce's price	23,000	25,000	23,000	21,000
Total marketing cost	-	4,00	3,80	-
Marketing margin	-	5,700	7,620	-
Consumer price	23,000	31,000	31,000	-
Price spread	0.0 (0.0)	6,000 (19.35)	8,000 (25.81)	-
Producer's share in consumer's price (%)	100	80.65	74.19	-

118

Table 26 shows that, in Kano four basic marketing channels were presence. In channel I, the producer received 100% of the share, because he sold directly to the consumer, there was no marketing cost involve, this means the consumer purchased the produce at farm gate price. In channel – II, the producer received 80.65% from the marketing share. In Channel – III, the producer received 74.19% from the total marketing share while in channel – IV the producer received the least amount when compare with other marketing channels, and there was no clear information available for verification of the producer's share, because it involve an industrial process. This implies that, in Kano producer received highest share in channel – Iand higher amount in channel – II.

Table 27: Price spread, marketing cost and marketing margin of different channels in Yobe

Price (NGN)/100kg	Channel		
	I	II	III
Produce's price	32,000	32,000	30,000
Total marketing cost	-	500	350
Marketing margin	-	2,500	4,650
Consumer price	32,000	35,000	35,000
Price spread	0.0 (0.0)	3,000 (8.57)	5,000 (14.29)
Producer's share in consumer's price (%)	100	91.42	85.71

Source: Filed survey 2021

Table 27 shows that, in Yobe three basic marketing channels were presence. In channel I, the producer received 100% of the share, because he sold directly to the consumer, there was no marketing cost involve, this means the consumer purchased the produce at farm gate price. In channel – II, the producer received 91.42% from the marketing share. In Channel – III, the producer received 85.71% from the total marketing share This implies that, in Yobe producer received highest share in channel – I and equal to the amount in channel – II.

Table 28: Price spread, marketing cost and marketing margin of different channels in Nigeria

Price (NGN)/100kg	Channel			
	I	II	III	IV
Produce's price	23667	25000	23333	19000
Total marketing cost	-	466.67	326.67	-
Marketing margin	-	4200	6007	-
Consumer price	23667	29666.67	29666.67	-
Price spread	0.0 (0.0)	4666.67 (15.73)	6333.67 (21.35)	-
Producer's share in consumer's price (%)	100	84.27	78.65	-

The finding in table 28 inferred that, there were four marketing channels in Jigawa and Kano, whilethree were identified in Yobe. The producers received highest per cent from the marketing share in channel I (producer – consumer) and higher amount in channel II (producer – retailer – consumer). The marketing margin was higher in channel III (producer wholesaler– retailer – consumer) and producer received lower amount when compared with channel I and II, this indicates that the more the actors the less the producers share. There was no additional information obtained from channel IV as it involved industrial process.

4.8. States comparison in terms of respondents' personal profile, inputs applicationoutput and consumption

Comparative study was considered to know the variation among the respondents between the states. Kruskal-Wallis test and discriminant function analysis were employed for identifying the variability and the most important variables with discriminant power between the states.

4.8.1. Testing variability among the respondents between the states

The variability of inputs application, output and consumption of wheat grains by farmers between the states were found out through Kruskal-Wallis test by taking

mean ranks of the variables under study. The null hypothesis of the Kruskal-Wallis test is that the mean ranks of the groups are the same. If null hypothesis is rejected means, there is a significant different between the states.

Table 29. Testing variability between the states

S/n	Variable	States Mean rank			Null hypothesis
		Jigawa	Kano	Yobe	
1	Area under wheat farming	136.68	150.24^a	74.58	Rejected
2	Farm size	143.95^a	130.65	86.90	Rejected
3	Total quantity of seed	84.16	178.38^a	96.69	Rejected
4	NPK fertilizer	96.14	167.01^a	98.36	Rejected
5	Urea fertilizer	99.06	170.13^a	88.54	Rejected
6	Total quantity of pesticide	95.05	138.80^a	127.65	Rejected
7	Total quantity of herbicide	102.18	160.65^a	98.68	Rejected
8	Number of irrigation	89.24	95.41	176.86^a	Rejected
9	Total output/ha	85.78	188.68^a	87.04	Rejected
10	Total individual consumption	121.49	87.53	152.49^a	Rejected
11	Total marketed	88.06	189.76^a	82.44	Rejected
12	Marketing bahaviour	81.58	194.11^a	84.44	Rejected

Asymptotic significances are displayed. The 'a' indicate significance level at .05

The table 29 shows that there was significant variation between the states with regard to the variable under study. Kano state ranks high with regard to all variables under study except Farm size, total individual consumption and number of irrigation. It may be due to the production quantity was higher in Kano more than what the farmer could consume. The number of irrigation was less compare with Yobe, this may be as a result of the environmental factors as well as lack of certified seed within the purview of the farmers.

4.8.2. Discriminant function analysis

Discriminant function analysis is a statistical technique used for classifying observations (Klecka, 1980). In a research this technique may be used to identify variables that best discriminate two or more groups with respect to a criterion under study. In this study the interest is to distinguish three states (Jigawa Kano and Yobe) with regard to the variables under investigation such as age, education, total cost of production, secondary occupation, experience, contact with extension agent, farm size, family size, monthly income and marketing behavior. It was also intended to identify which independent variable is more powerful in discriminating a state from the other. The maximum number of discriminant functions that can be defined is one less than the number of groups. The functions first seek to distinguish the first group from the other, then the second group from the rest, and so on. Theseare identified by the Eigen value on the output. The Eigen values also show what percent of variance is accounted for with each function. In addition, Wilks's lambda tests the significanceof each function.

In the present study two states were taken at a time to perform discriminant analysis. Therefore, one discriminant function has been extracted by SPSS 22. The function given the projection of the data that best discriminates between the states.

4.8.2.1. Eigen Values

The Eigen values describe how best discriminating ability the function possess. The percentage of variances is the discriminating ability of the two group.

4.8.2.2. Discriminant analysis for Jigawa and Kano

Jigawa and Kano were taken at a time to perform discriminant analysis. Total number of observations was 80. Discriminant analysis was done to identify the most significant variable that discriminates the two states under study with respect to variables viz; age, education, total cost of production, secondary occupation, experience, contact with extension agent, farm size, family size, monthly income and marketing behavior.

Table 30. Mean and S.D of variables included in discriminant analysis – Jigawa and Kano

States	Variable	Mean	Std. deviation
Jigawa	Age	43.1	10.78
	Education	2.3	1.32
	Total production cost	229064.1	63993.95
	Secondary occupation	2.1	0.58
	Experience	1.6	0.74
	Contact with extension agent	3.2	1.06
	Farm size	1.9	0.67
	Family size	11.3	7.91
	Monthly income	57712.5	50253.84
	Marketing behaviour	32.3	5.55
Kano	Age	40.1	6.04
	Education	2.0	1.04
	Total production cost	333543.2	134243.57
	Secondary occupation	2.1	0.50
	Experience	1.7	0.77
	Contact with extension agent	2.975	1.12
	Farm size	1.9	0.96
	Family size	11.1	6.02
	Monthly income	60975.3	30589.20
	Marketing behaviour	50.96	7.19

It could be seen from the table 30 that, there was no variation with regard to education, secondary occupation, experience, farm size and family size of the respondents between the states. The respondents highly varied with regard to their marketing behavior, and total production cost. Variation were also observed in age, contact with extension agent, and monthly income of the respondents between the states.

Table 31. Eigen value Jigawa and Kano

Function	Eigen Value	% of Variance	Cumulative %	Canonical correlation
1	3.131	100	100	0.871

From the table 31 Eigen value gives the proportion of variance explained. A larger Eigen value explains a strong function. The canonical correlation is a correlation between the discriminant scores and the level of the dependent variables. The higher the correlation value, the better the function that discriminates the values. One is considered as perfect. Thecorrelation of 0.871 is comparatively very high.

Table 32. Wilks' Lambda – Jigawa and Kano

Test function	Wilks' Lambda	Chi-square	df	Sig.
1	.242	218.44	10	0.000

From the table 32 the Wilks' lambda showed that the function was statistically significant, so it helped to distinguish between states or there was a statistically significant discriminating power in the variables included in the model. It is good to have low value of Wilk's lambda. In the present case the value is 0.24.Tthe chi-square was 218.44 with 10 degreeof freedom, which was based on the groups present in the categorical variables. A wilk's lambda of 1.00 is realized when the observed states means are equal, while a small wilk's lambda is obtained when the within-group variability is small when compared to the total variability. From the above result it can be concluded that between state means differ significantly.

4.8.2.3. Checking for relative importance of each independent variable (Jigawa and Kano)

The standardized canonical discriminant function coefficient is used to calculate the discriminant score. In discriminant analysis, it is possible to identify which independent variable has more impact in discriminating one group from the other by comparing the standardized discriminant coefficients reveal higher discriminating power.

Table 33 Standardized canonical discriminant function coefficients

Variables	Coefficient
Age	-0.25
Education	0.08
Production cost	0.47
Secondary occupation	0.08
Experience	0.21
Contact with extension agent	-0.15
Farm size	-0.30
Family size	0.19
Monthly income	-0.23
Marketing behaviour	1.00

The standardized weights show the relative importance of each variable compared to each other which is given in table 33. The relative importance of each component variables is interpreted using the absolute value of the discriminant function coefficients. The variable, marketing behaviour had the most prominent effect for predicting membership into the group.

4.8.2.4. Discriminant analysis for Kano and Yobe

Kano and Yobe were taken at a time to perform discriminant analysis. Total number ofobservations was 80. Discriminant analysis was done to identify the most significant variable that discriminates the two states under study with respect to variables viz; age, education, total cost of production, secondary occupation, experience, contact with extension agent, farm size, family size, monthly income and marketing behavior.

Table 34. Mean and S.D of variables included in discriminant analysis – Kano and Yobe

States	Variable	Mean	Std. deviation
Kano	Age	40.1	6.04
	Education	2.0	1.04
	Total production cost	333543.2	134243.57
	Secondary occupation	2.1	0.50
	Experience	1.7	0.77
	Contact with extension agent	2.975	1.12
	Farm size	1.9	0.96
	Family size	11.1	6.02
	Monthly income	60975.3	30589.20
	Marketing behaviour	50.96	7.19
Yobe	Age	43.5	10.73
	Education	2.8	1.13
	Total production cost	282860.7	86481.54
	Secondary occupation	1.9	0.46
	Experience	1.1	0.43
	Contact with extension agent	3.2	1.16
	Farm size	1.3	0.56
	Family size	11.2	5.55
	Monthly income	66215.2	45696.23
	Marketing behaviour	32.9	7.55

It could be seen from the table 34 that, all the variable included in the study regarding Kano and Yobe were highly varied.

Table 35. Eigen value Kano and Yobe

Function	Eigen Value	% of Variance	Cumulative %	Canonical correlation
1	2.505[a]	100.0	100.0	0.845

From the table 35 Eigen value gives the proportion of variance explained. A larger Eigen value explains a strong function. The canonical correlation is a correlation between the discriminant scores and the level of the dependent variables. The higher the correlation value, the better the function that discriminates the values. One is considered as perfect. The correlation of 0.845 is comparatively very high.

Table 36. Table of Wilks' Lambda – Kano and Yobe

Test function	Wilks' Lambda	Chi-square	df	Sig.
1	.285	191.908	10	0.000

From the table 36 the Wilks' lambda showed that the function was statistically significant, so it helped to distinguish between states or there was a statistically significant discriminating power in the variables included in the model. It is good to have low value of wilk's lambda. In the present case the value is 0.285. The chi-square was 191.908 with 10 degree of freedom, which was based on the groups present in the categorical variables. A wilk's lambda of 1.00 is realized when the observed states means, are equal, while a small wilk's lambda is obtained when the within-group variability is small when compared to the total variability. From the above result it can be concluded that between state means differ significantly.

4.8.2.5. Checking for relative importance of each independent variable (Kano and Yobe)

The standardized canonical discriminant function coefficient is used to calculate the discriminant score. In discriminant analysis, it is possible to identify which independent variable has more impact in discriminating one group from the other by comparing the standardized discriminant coefficients reveal higher discriminating power.

Table 37: Standardized canonical discriminant function coefficients

Variables	Coefficient
Age	-0.49
Education	-0.07
Total production cost	0.21
Secondary occupation	0.19
Experience	0.59
Contact with extension agent	0.19
Farm size	-0.04
Family size	0.12
Monthly income	0.02
Marketing behaviour	0.89

The standardized weights show the relative importance of each variable compared to each other which is given in table 37 the relative importance of each component variables is interpreted using the absolute value of the discriminant function coefficients. The variable, marketing behaviour had the most prominent effect for predicting membership into the group, followed by years of experience, age, total production cost, etc.

4.8.2.6. Discriminant analysis for Jigawa and Yobe

Jigawa and Kano were taken at a time to perform discriminant analysis. Total number of observations was 80. Discriminant analysis was done to identify the most significant variable that discriminates the two states under study with respect to variables viz; age, education, total cost of production, secondary occupation, experience, contact with extension agent, farm size, family size, monthly income and marketing behavior.

Table 38. Mean and S.D of variables included in discriminant analysis – Jigawa and Yobe

States	Variable	Mean	Std. deviation
Jigawa	Age	43.1	10.78
	Education	2.3	1.34
	Total production cost	229064.1	63993.95
	Secondary occupation	2.1	0.58
	Experience	1.6	0.74
	Contact with extension agent	3.2	1.06
	Farm size	1.9	0.67
	Family size	11.3	7.91
	Monthly income	57712.5	50253.83
	Marketing behaviour	32.3	5.55
Yobe	Age	43.5	10.73
	Education	2.8	1.12
	Total production cost	282860.7	86481.54
	Secondary occupation	1.9	0.46
	Experience	1.1	0.43
	Contact with extension agent	3.2	1.16
	Farm size	1.3	0.52
	Family size	11.2	5.55
	Monthly income	66215.2	45696.20
	Marketing behaviour	32.9	7.55

It could be seen from the table 38 that, there was no variation with regard to age, contact with extension agent, family size and marketing behaviour of the respondents between the states. The variation was also observed in education, total production cost, secondary occupation, experience, farm size and monthly income.

Table 39 Eigen value Jigawa and Yobe

Function	Eigen Value	% of Variance	Cumulative %	Canonical correlation
1	.743[a]	100.0	100.0	0.65

From the table 39 Eigen value gives the proportion of variance explained. A larger Eigen value explains a strong function. The canonical correlation is a correlation between the discriminant scores and the level of the dependent variables. The higher the correlation value, the better the function that discriminates the values. One is considered as perfect. The correlation of 0.653 is comparatively very high.

Table 40 table of Wilks' Lambda – Jigawa and Yobe

Test function	Wilks' Lambda	Chi-square	df	Sig.
1	.574	84.436	10	0.000

From the table 40 the Wilks' lambda showed that the function was statistically significant, so it helped to distinguish between states or there was a statistically significant discriminating power in the variables included in the model. It is good to have low value of wilk's lambda. In the present case the value is 0.574. The chi-square was 84.436 with 10 degreeof freedom, which was based on the groups present in the categorical variables. A wilk's lambda of 1.00 is realized when the observed states means are equal, while a small wilk's lambda is obtained when the within-group variability is small when compared to the total variability. From the above result it can be concluded that between state means differ significantly.

4.8.2.7. Checking for relative importance of each independent variable (Jigawa and Yobe)

The standardized canonical discriminant function coefficient is used to calculate the discriminant score. In discriminant analysis, it is possible to identify which independent variable has more impact in discriminating one group from the other by comparing the standardized discriminant coefficients reveal higher discriminating power.

Table 41. Standardized canonical discriminant function coefficients

Variables	Coefficient
Age	0.34
Education	0.34
Total production cost	0.43
Secondary occupation	-0.08
Experience	-0.49
Contact with extension agent	0.019
Farm size	-0.82
Family size	0.06
Monthly income	0.16
Marketing behaviour	0.05

The standardized weights show the relative importance of each variable compared to each other which is given in table 41. The relative importance of each component variables is interpreted using the absolute value of the discriminant function coefficients. The variable, farm size had the most prominent effect for predicting membership into the group followed by years of experience, total production cost, education, age, and others.

4.8.3 Multiple linear regression of net income of wheat farmers on independent variables

Multi linear regression was conducted to find out the most important variables leading to the net income of wheat farmers.

Table 42. Multiple linear regression of net income

S/n	Predictor variable	Standardized coefficients	T value	Sig.	VIF
1	Age	-.028	-4.683	.000	1.063
2	Total output	.278	38.398	.000	1.575
3	Selling price	.957	158.790	.000	1.089
4	Straw price	.-012	-1.777	.077	1.364
5	Quantity of seed used	-.007	-1.036	.301	1.333
6	Quantity of NPK used	.000	.061	.951	1.083
7	Quantity of urea used	-.003	-.415	.679	1.304

8	Quantity of pesticide used	.018	2.523	.012	1.474
9	Quantity of herbicide used	.002	.357	.721	1.309
10	frequency of irrigation	-.014	-2.251	.025	1.129
11	Total cost of production	-.198	-27.774	.000	1.529

a. R = 997ª, R sq. = .993. R sq. adj. = .993

Table 42 shows that age, total output, selling price, straw price, quantity of pesticide used, frequency of irrigation and total cost of production were the most significant variables predicting the net income of a wheat farmer in Nigeria. The R square adjusted was .993. This means, 99.3% of the variability in net income can be predicted using these variables.

4.9. Constraints face by wheat farmers in the study area

The study was aims to identify the basic constraints affecting wheat farmers in the study area. The figures below display the responses captured from the wheat farmers.

Figure 40 Constraints faced by the wheat farmers
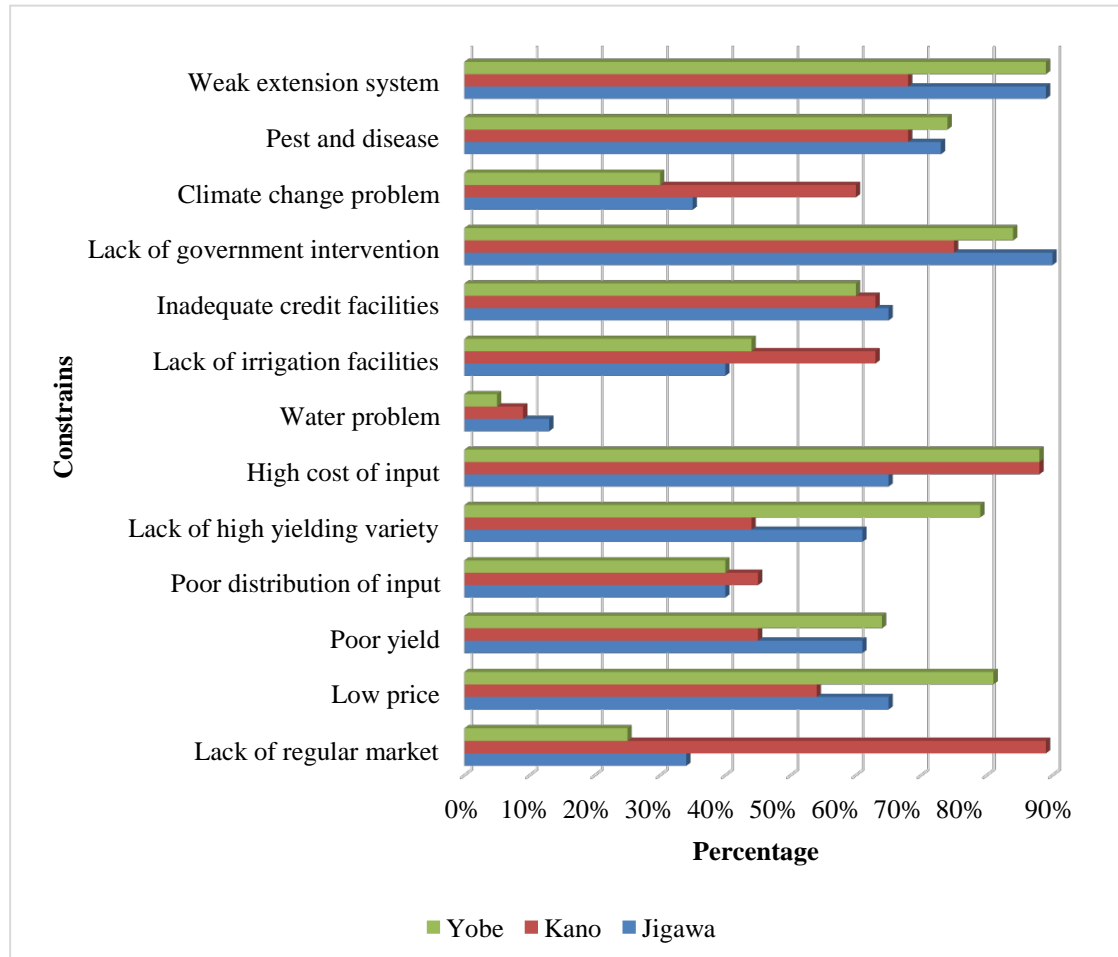
Source: Field survey multiple response 2021

Figure 40. Shows that, in Jigawa, the majority (90%), (89%), (73%), (65%), (65%), (65%), (61%), and (61%) of the respondents pointed out lack of government intervention, weak extension system, pest and disease, inadequate credit facilities, high cost of inputs, low price of the produce, poor yield and lack of high yielding variety as their major constraints affecting wheat farmers respectively. Followed by (40%) poor input distribution, (40%) lack of irrigation facilities, (35%) climate change effect, (34%) lack of regular market and (13%) water scarcityproblem. This implies that, most of the listed constraints were really disturbing the wheat farmers in Jigawa.

In Kano, the majority (88%), (89%), (75%), (68%), (68%), (63%), (63%), (60%) and (54%) of the respondents mentioned high cost of inputs, lack of regular

market, lack of government intervention, weak extension system, pest and disease, inadequatecredit facilities, lack of irrigation facilities, climate change effect, and low price of the produce as their major constraints affecting wheat farmers respectively. Followed by (45%) poor yield, (45%) poor distribution of inputs, (44%) lack of high yielding variety and (9%) water scarcity problem. This revealed that, most of the constraints listed were really affecting wheat farmersin the study area.

In Yobe, the majority (89%), (88%), (84%), (81%), (79%), (74%), (64%), and (60%) of the respondents revealed weak extension system, high cost of inputs, lackof government intervention, low price of the produce, lack of high yielding variety, pest and disease, poor yield and inadequate credit facilities, as their major constraints affecting wheat farmers respectively. Followed by (44%) lack of irrigation facilities, (40%), poor input distribution, (30%) climate change effect, (25%) lack of regular market and (5%) water scarcityproblem. This implies that, majority of the constraints listed in the scheduled questions affecting wheat farmers in Yobe.

4.9.1. Kendall coefficient of concordance on mean rank of the constraints in the different states

The study tried to find out whether there were common agreements among the respondents within the state and between the states. Kendall coefficient of concordance was employed to find out the agreement among the respondents.

In Jigawa state the Kendall coefficient of concordance was 0.220 which was at 1% level. Therefore there was strong agreement among the farmers to rank the constraints as follows:

Table 43. Constraints mean rank of Jigawa respondents

S/n	Constraint	Mean	Rank	Kendall's W
1	Lack of government intervention	9.20	I	0.220**
2	Weak extension system	9.12	II	
3	Pest and disease	8.06	III	
4	Low price	7.58	IV	
5	High cost of inputs	7.58	V	

6	Inadequate credit facilities	7.58	VI
7	Poor yield	7.33	VII
8	Lack of high yielding variety	7.33	VIII
9	Poor distribution input	5.95	IX
10	Lack of irrigation facilities	5.95	X
11	Climate change problem	5.63	XI
12	Lack of regular market	5.54	XII

In Kano state the Kendall coefficient of concordance was 0.180 which was at 1% level. Therefore there was strong agreement among the farmers to rank the constraints as follows:

Table 44. Constraints mean rank for Kano respondents

S/n	Constraint	Mean	Rank	Kendall's W
1	Lack of regular market	8.93	I	0.180[**]
2	High cost of inputs	8.85	II	
3	Lack of government intervention	8.04	III	
4	Pest and disease	7.55	IV	
5	Weak extension system	7.55	V	
6	Lack of irrigation facilities	7.23	VI	
7	Inadequate credit facilities	7.23	VII	
8	Climate change problem	7.06	VIII	
9	Low price of output	6.66	IX	
10	Poor yield	6.09	X	
11	Poor inputs distribution	6.09	XI	
12	Lack of high yielding variety	6.01	XII	

In Yobe state the Kendall coefficient of concordance was 0.314 which was at 1% level. Therefore there was strong agreement among the farmers to rank the constraints as follows:

Table 45. Constraints mean rank for Yobe respondents

S/n	Constraint	Mean	Rank	Kendall's W
1	Weak extension system	8.96	I	0.314[**]
2	High cost of inputs	8.88	II	
3	Lack of government intervention	8.64	III	
4	Low price of output	8.48	IV	
5	Lack of high yielding variety	8.31	V	
6	Pest and disease	7.99	VI	
7	Poor yield	7.34	VII	
8	Inadequate credit facilities	7.09	VIII	
9	Lack of irrigation facilities	6.04	IX	
10	Poor inputs distribution input	5.79	X	
11	Climate change problem	5.14	XI	
12	Lack of regular market	4.82	XII	

Table 46: Comparison of the agreement of the respondents from different states on mostimportant constraints

S/n	Constraint	Mean	Rank	Kendall's W
1	Lack of government intervention	8.63	I	0.177[**]
2	Weak extension system	8.54	II	
3	High cost of inputs	8.44	III	
4	Pest and disease	7.87	IV	
5	Low price of output	7.57	V	
6	Inadequate credit facilities	7.30	VI	
7	Lack of high yielding variety	7.22	VII	
8	Poor yield	6.92	VIII	
9	Lack of regular market	6.43	IX	
10	Lack of irrigation facilities	6.40	X	
11	Poor inputs distribution input	5.94	XI	
12	Climate change problem	5.94	XII	

Kendall's W test was employed to assess the agreement on the major constraints affecting wheat farmers in the states. The Kendall coefficient was found to be significant at 1% showing that, there was strong agreement on the most important

constraints among the respondents of different state.

The study inferred that, lack of government intervention, weak extension system, highcost of inputs, and pest and disease, low price of output, inadequate credit facilities, lack high yielding variety, poor yield and lack of regular market were the major constraints affecting wheat farmers in Nigeria. Kano farmers proved that, the extension system in Kano was more efficient when compare with other states by identifying lack of regular market as one of their major problem which was undisputable in Nigeria's wheat situations. Furthermore, respondents proved that water scarcity problem was not part of their major constraints may be because wheat produce outside raining season in Nigeria.

Objective 5. To Suggest policy interventions for resilient wheat farming in Nigeria

4.10. Policy suggestions for resilient wheat farming in Nigeria

It is clear from the findings that, the government policies put in place to convert wheat production failed to yield fruitful results. The country is left behind her mates, the farmers stick to the traditional method of farming, mechanized farming is yet to be fully adopted due lack of machine availability. There is no regular input supply chain, most of the farmers were not fully aware of their problems. For Nigeria to achieve the desired outcome, focused commitments is needed and adoption of a multi-dimensional approach toward solving wheat production problems.

The following points should be taken into consideration:

1. The political issues were the major surrounding wheat production sector and would be overcome through yearly stakeholder's round table meeting to review the situations

2. The external social factors issues would be solved by given wider awareness and establishment of commodity board for ensuring remunerative price for the farmers and reasonable price for the consumers as well as for ensuring regular supply of raw material to the milling industries

3. Extension should be introduced to enhance the knowledge level of the farmer for better understanding and increased adoption of new varieties, this could help to

overcome internal social issues

4. Climate change has little effect on wheat crop production in Nigeria when compare with human action. This mean corruption is overwhelming the production policies and could only be solve through legistlation

5. Wheat crop solely needs a policy that would work throughout the crop value-chain like accelerated wheat production programme and to be implemented gradually and in phased programs manner

6. Equal distribution of resources to the farmers of different states should be considered important to avoid the present status of domination by one state

7. Mechanized farming should be given priority, this will bring production cost down as well as help increasing production per unit area

8. Promotion of farmer collectives for better marketing efficiency by farmers and development of farmer inclusive value chains

9. Legislation that will compel millers to take locally produced wheat before embarking for importation is highly needed for sustaining wheat cultivation in Nigeria

SUMMARY AND CONCLUSION

5. SUMMARY AND CONCLUSION

5.1. Summary

Resilience is understood as the ability of the system to embrace change with the capacity to accommodate largely exogenous events. The definition in a social and economic context differs due to the nature of constant change in the discipline because of scientific, governance, financial, lifestyle, and resource management changes (McManus et al., 2012). Wheat growing has been the most difficult aspect of Nigerian agriculture for decades, owing to unfavourable high temperatures for the crop. Certain issues remain unresolved, posing a threat to the country's goal of diversifying revenue and lowering its growing reliance on imported wheat. Low wheat production, insecurity in Nigeria's wheat region, a lack of mechanised and updated farming techniques, and uncompetitive pricing are among the issues. But if is able to improve its wheat output to a level of self-sufficiency, Nigeria can achieve non-dependency on imported wheat and reduce its trade deficit by approximately 3.06% (Oirere, 2018).

Despite many policies initiated by different administrative regimes for decades that gulped huge amounts of money, still, wheat production remains merely a dream.

In view of the above, the present "exploratory study for resilient wheat farming in Nigeria" was conducted with the following specific objectives:

- Explore the sociopolitical situation affecting wheat farming
- Study the perceived effects of climate change on production of wheat and livelihood of the wheat farmers
- Analyze the government policies and schemes on wheat production
- Examine the marketing behavior of wheat farmers and
- Arrive at policy options for resilient wheat farming in Nigeria.

Keeping in view the major research objectives, the ex-post facto method research design was employed.

Multi-stage sampling technique was adopted for this study. Wheat crop is basically produced in northern Nigeria. There are nineteen states in the northern part of the country out of which eleven states were known as wheat producing states.

In stage one; Jigawa, Kano and Yobe states were purposively selected based

on the highest number of registered wheat farmers as well as safety of the researcher due to the raisinglevel of insecurity.

In stage two; a total of six local government areas were selected based on the higher number of registered wheat farmers within the state, where two local government areas were selected from each state. Kafin Hausa and Ringim were selected from Jigawa state, Ajingi andGarin Malam were selected from Kano state and Bade and Nguru were selected from Yobe.

In stage three; forty respondents were randomly selected from each local government making the total sample of size of 240.

The primary data were collected by the used of mixed method of both qualitative and quantitative. To ensure the validity of the instruments pre-test was conducted. The semi- structured interview schedule was used to collect quantitative data as well as part of the qualitative data. Stakeholder's focus group discussion with specified question was considered for part of qualitative data collection. The secondary data were gathered from policies documents, consultation of pass relevant literatures, government reports, newspapers.

The elicited data was tabulated, analyzed and interpreted by the used of descriptive statistics, percentage analysis, inferential statistics, Likert scale of summated rating, content analyses techniques, Kruskall-walis test, discriminant function analysis, multi linear regression, and price spread analysis.

The profile of the respondents required scores and the obtainable (average) scores shows that the average age was 42.23 and the average monthly income was NGN61612.5. The average scores with respect to the other variables were educational level (2.39), secondary occupation (2.04), year of experience (11.64), size of the farm land (1.69), farmland acquisition method (1.48), seed type (1.5), seed procurement sources (2), contact with extension agent (3.13), livelihood activities (2.1), household size (11.19), and earning household member (1.22). These implies that the farmers were within their active age, married, and living below poverty line, have low levels of education, mostly explored additional away of income, and have enough years of experience in wheat farming. The farmers have marginal land size and acquired it through one method, using mostly certified and non-certified seeds and sourcing it mostly from two places while in contact with an extension agent most of the time. The

respondents also participated in other activities for livelihood earning and have a larger number of household members with mostly one earnings member. The study revealed that, the most common biotic, abiotic, social and political stress affecting wheat crop and farmers differs with regards to location. Pest and diseases, wild bird, marketing of their produce, rodents and domestic animals attack were the major stresses affecting wheat farmers in Nigeria.

The findings of social and political factors affecting wheat production were categorizedbased on (Archer *et al.* 2008) classification

a. Internal social factors

b. External social factors

c. Political factors

The study find out that, the most important internal social, external social   and politicalfactors affecting wheat production in Nigeria were:

Internal social factor	External social factor	Political factors
Poor cultivation condition	Consumer food habits	Social security issues
Knowledge level of the farmers	Consumer demand for convenience	Role of publication media
Adoption of the recommended agronomic practices	Low price of the produce	Inconsistent government policies
Low yield of the crop	High cost of input.	Intricacies in policy implementation
	Lack of adequate extension personnel	Role playing by the milling industries
	Low yield of the crop	International trade interest
	Lack of availability of certified seed	Lack of political will
	Rapid population growth	Limited land area
		Lack of irrigation infrastructure
		Persistence of corruption
		Lack of wheat value chain

		policy.
		Insufficient funding
		Lack of cohesion among the national strategy in wheat development.

The results also indicated that the extent to which political factors affecting wheat production in Nigeria were more than any other factor. The degree to which external social factors affected the sector was lower when compared with political factors and higher than internal social factors. Furthermore, the total average growth rate of production was negative (-1%) and less positive (2%) growth rate was recorded in the harvested area, while (5%) positive growth was recorded in imports. Where the production growth rate was negative and the harvested area growth rate was positive, it was a clear indication of the low yield of the wheat crop in Nigeria.

The study of effects of climate change on wheat production and livelihood of the farmers revealed that, the Nigeria's climate has no or little effect on wheat crop production. The temperature for 20 years remains as well as solar radiation with little variation, while the production continues in sway. However, it may be, the wheat production in Nigeria has been affected largely by human action rather than climatic and environmental factors. Hundred per cent of farmers in Kano were aware of the climate change, (97.5%) of farmers in Jigawa and (95%) ofthem in Yobe were aware of climate change. While (96%) of the overall of respondents were aware of the climate change. This implies that, the farmers in the study area were aware of climate change. This would be easy for the farmers to adopt a new climate related idea when developed and disseminated. In Jigawa the majority (60%) of farmers believed that the duration of rainfall increases as a result of climate change. (52.5%) believed that amount of rainfall increased. (65%) believed that harmattan period decreased. (57.5%) believedthat the temperature during harmattan period increased. (85%) believed that, pest and disease effect on wheat crop increased. The majority (77.5%) believed that desert encroachment advancement increased. Soil degradation majority (70%)   of the farmers believed that it has increased. In Kano the majority (70%) of farmers believed

that the duration of rainfall decreased as a result of climate change. (67.5%) believed that amount of rainfall decreased. (67.5%) of the farmers believed that, the harmattan period decreased. (53.75%) believed that the temperature during harmattan period decreased. (73.75%) believed that, pest and disease effect on wheat crop increased. The majority (64%) believed that desert encroachment advancement remain unchanged. Soil degradation the majority (96.25%) of the farmers believed that remain unchanged. In Yobe, the majority (61.25%) of farmers believed that the duration of rainfall increases as a result of climate change. (51.25%) believed that amount of rainfall decreased. (62.5%) believed that the harmattan period decreased. (52.5%) believed thatthe temperature during harmattan period increased. The majority (92.5%) believed that, pest and disease effect on wheat crop increased. The majority (63.75%) believed that desert encroachment advancement increased. Soil degradation the majority of the farmers (78.75%) believed that it has increased. The study shows that, the majority of the respondents were falls in the medium perception category regarding climate change in Jigawa and Yobe, while for Kano most were falls in lower perception. Furthermore, it shows that the climate change perception of individual farmer was influenced by education, secondary occupation, years of experience, contact with extension agents, and household size. The said variables were statistically significant at 1% level, while age was significant at 5% level. Farm size and monthly income were found to have no influence on the perception of climate change.

The study of government policy/scheme on wheat production, inferred that anchor borrower program statement given much priority to the stakeholders' role and responsibility more than any other category followed by priority crops and approach, public-private partnership engagement and reliable marketing channels . The program statement did not mention sustainable production of the listed crops and community infrastructuraldevelopment. The ABP established by CBN, launch within the last quarter of 2015 is serving as a form of contract farming. However, the CBN involved the relevant stakeholders to monitor and regulate the agreements in terms of price of inputs and pegging the price of the farmer's produce in order to avoid farmer exploitation and to boost production of the targeted crops. The federal ministry of agriculture and rural development (FMARD) despite its national role was not

provided with any role or mentioned anywhere in the document, as well as no any of the non-governmental organization (NGO) was involved in the program. Wheat crop was being mentioned among the priority crops to be focused. The public-private partnership agreements were between the CBN, and state governments and anchor institutions with clear profit of 9% to be charge by anchor institutions. Marketing of the farmer's produced was channel to anchor institutions. Based on the criteria listed, it is easy for the farmer to participate in the program where the political will is there. In Agricultural Promotion Policy (APP), stakeholders role and responsibility was mentioned everywhere on the document. The policy also considered sustainable production of the targeted crops important and reliable marketing channels for economic and employment of rural population. Farming communities' infrastructural development was captured as a means of improving rural livelihood. Furthermore, wheat crop was one of the target crops that the policy would give priority, public-private partnership (PPP) engagement is one of the present sector considered important in the modern day agriculture the policy considered engagement of PPP at different channels from production to the ultimate consumer. Additionally, the study shows that the majority (63%) of Jigawa farmers were aware of the government's wheat crop policy and scheme, but only (32%) benefited. The majority (78%) of the farmers in Kano were aware while (63%) benefited. In Yobe, the majority (54%) were aware, while (15%) benefited. The overall shows that the majority (65%) of the respondents were aware of government policies/schemes on wheat production, while only (37%) benefited. This implies that the farmers in Kano and Jigawa had more information than the farmers in Yobe. Although, the majority of the respondents in Nigeria were aware of policies/schemes, very few had the opportunity to participate and benefit. This indicates that the policies have lower coverage than expected. The majority of the respondents were fall in the medium perception category on policy/scheme. It inferred that the majority of the respondents were having medium perception on government policy and scheme on wheat production in Nigeria. This may be the respondents do not fully believing in the role of government policy/scheme in solving farmers problems, but having favorable attitude toward it. Furthermore, education, secondary occupation, years of experience, contact with extension agent, farm size, household size and monthly income were found to be

statistically significant at 1% level in influencing farmers perception on government policy/scheme while age was significant at 5% level. This implies that, perception on policy/scheme was largely influenced by education, secondary occupation, years of experience, contact with extension agent, farm size, household size and monthly income.

The study of marketing behavior of the respondents, shows that, the majority of the respondents in Jigawa were selling their produce immediately after harvest if the price is favourable due to financial urgency and selling directly to either wholesaler or local market retailer, proximity or immediate cash payment was their main reason for selling either in the weekly market or local market and mostly using truck or motorcycle for transportation of their produce. The majority of the respondents in Kano selling their produce immediately after harvest if the price is favourable or immediately after harvest whatever the price may be, due to financial urgency or high price offered to them mainly by local market retailer, consumer or wholesaler. The majority selling their produce in the local market, at their farm, their home or in the weekly market due to proximity and immediate cash payment, they were mostly using trailer, truck or motorcycle for transportation of their produce. The majority of the respondentsin Yobe selling their produce immediately after harvest if the price is favourable due to financial urgency and high price paid by the wholesaler or local market retailer. The majority sell their produce in the local market due to proximity or immediate cash payment and using mainly trucks for transportation of their produce. Additionally, the overall majority (75%) of the respondents having medium level of marketing behavior followed by (13.33%) low level and (11.67%) having high level of marketing behavior. This implies that the respondents were having medium level of marketing behavior. The study inferred that, the majority of the respondents relied on informal sources of market information and utilizing them regularly. This revealed the kind of trust the respondents given to that sources, and affirmed the weak of extension system in the study areas more especially in Yobe state. Moreover, the majority (82.08%) of the respondents in Nigeria using personal word of mouth as their main source of sales promotion followed by (32.92%) using neighborhood groups, (7.08%) by advertising and (6.25%) using social media, while (10.83%) have not employ any source of sales promotion. These indicates that the

majority of the respondents using their personal word of mouth as main source for sales promotion activity very of the respondents using social media for same activities which proves a lack of respondents' awareness with regard to effectiveness of using social network in marketing activities. In this study four major marketing channel were identified as follows:

1   Channel I   Producer – Consumer

2   Channel II   Producer – retailer – consumer

3   Channel III   Producer – wholesaler – retailer –consumer

4   Channel IV   Producer – millers

The finding inferred that, there were four marketing channel in Jigawa and Kano, while three were identified in Yobe. The producers received highest per cent from the marketing share in channel I (producer – consumer) and higher amount in channel II (producer – retailer – consumer). The marketing margin was higher in channel III (producer wholesaler– retailer – consumer) and producer received lower amount when compared with channel I and II, this indicates that the more the actors the less the producers share. There was no additional information obtained from channel IV as it involved industrial process.

Comparative study was considered to know the variation among the respondents between the states. It shows that there was significant variation between the states with regard to the variables under study. Kano state ranks high with regard to all variables under study except Farm size, total individual consumption, and number of irrigation. It may be due to the production quantity was higher in Kano more than what the farmer could consume. The number of irrigation was less compare with Yobe, this may be a result of the environmental factors as well as a lack of certified seed within the purview of the farmers in Yobe. The discriminant function analysis findings proved that the variable, marketing behaviour had the most prominent effect for predicting membership into the group between Kano and other states while farm size was the most prominent effect between Jigawa and Yobe. Multiple linear regression of net income shows that age, total output, selling price, straw price,

quantity of pesticide used, frequency of irrigation, and total cost of production were the most significant variables predicting the net income of a wheat farmer in Nigeria. The R square adjusted was .993. This means, 99.3% of the variability in net income can be predicted using these variables.

The constraints affecting wheat farmers, the study inferred that, lack of government intervention, weak extension system, high cost of inputs, and, , pest and disease, low price of output, inadequate credit facilities, lack high yielding variety, poor yield and lack of regular market were the major constraints affecting wheat farmers in Nigeria. Kano farmers proved that, the extension system in Kano was more efficient when compare with other states by identifying lack of regular market as one of their major problem which was undisputable in Nigeria's wheat situations. Furthermore, respondents proved that water scarcity problem was not part of their major constraints may be because wheat produce outside raining season in Nigeria. The Kendall coefficient was found to be significant at 1% showing that, this means that, there was strong agreement on the most important constraints among the respondents in different states.

5.2. Conclusion

The conclusion was that the farmers were within their active age, married, and living below the poverty line, have low levels of education, mostly explored additional sources of income, and have enough years of experience in wheat farming. The farmers have marginal land size and acquired it through one method, using mostly certified and non-certified seeds and sourcing it mostly from two places while in contact with an extension agent most of the time. The respondents also participated in other activities for livelihood earning and have a larger number of household members, mostly with one earning member. The study revealed that the most common biotic, abiotic, social and political stress affecting wheat crops and farmers differ with regard to location. The major stresses affecting wheat farmers in Nigeria were pests and diseases, wild birds, marketing of their produce, rodents and domestic animal attacks. The social and political situations affecting wheat production were identified as internal social factors, external social factors, and political factors. Lack of good cultivation practices and the knowledge level of the farmers were the   major internal social factors. These, among others, prevented the farmer from fully adopting the

recommended agronomic practices. While the major external social factors were consumer food habits, consumer demand for convenience, lower produce prices, and high input costs, The political factors identified were social security issues, inconsistent government policies, intricacies in implementation, the role of the media in publication, role-playing by the milling industries, international trade interests, and lack of political will. No doubt, wheat millers imported more than required in 1986. It may have been a means for them to sabotage AWPP's success. The present approach employed by the milling industry, if sustained, will surely boost the wheat crop production in the country. Further findings indicated that the overall growth rate during the study period was -1% for production and only a minimal growth rate of 2% for harvested area, while a 5% positive growth rate was recorded in imports. It was a clear indication of the low yield of the wheat crop in Nigeria. The findings affirmed that the respondents were aware of climate change, with the majority of them having a medium perception of its effects on wheat production in Nigeria. Furthermore, Nigeria's climate has no or little effect on wheat crop production. However, it may be that wheat production in Nigeria has been affected largely by human action rather than climatic and environmental factors. The findings inferred that the wheat production policies were domiciled in Kano state and that there was no equal distribution and allocation of resources among the states. The ABP is the only program having participants across the study areas. This may be because there is advancement in policy handling among the implementing agencies. The ABP failed to capture sustainability in production as well as rural infrastructural development in the program statement. The APP document left no stone unturned, the FMARD is driving the implementation of the policy. The policy document gives priority to stakeholders' roles and responsibilities and is more concerned about sustainability in the production of the priority crops as well as reliability in the marketing channels. The document considers modern day agricultural approaches through the involvement of private sectors in all areas of the agricultural commodity value chain. For the improvement of rural livelihoods, the policy considered the development of the farming communities' infrastructure. However, the respondents have a medium perception of government policy and scheme on wheat production in Nigeria. The majority of the respondents sell their produce immediately after harvest if the price is favourable due to financial

urgency for both wholesalers and retailers in the case of Jigawa and Yobe, and consumers in the case of Kano. The majority sell in the local market due to proximity and using trucks as their main transportation facility. The study also inferred that the majority of the respondents relied on informal sources of market information and utilized them regularly. This revealed the kind of trust the respondents gave to those sources and affirmed the weakness of the extension system in the study areas, especially in Yobe state. There were four marketing channels in Jigawa and Kano, while three were identified in Yobe. The producers received the highest percent of the marketing share in channel I (producer –consumer) and a higher amount in channel II (producer–retailer–consumer). The marketing margin was higher in channel III (producer wholesaler–retailer– consumer) and the producers received a lower amount when compared with channels I and II. This indicates that the more the actors, the less the producers share. There was no additional information obtained from channel IV as it involved industrial processes. Moreover, the study shows that there was significant variation between the states with regard to the variables under study among the respondents between the states. The variable marketing behaviour had the most prominent effect in predicting membership in the group between Kano and other states, while farm size was the most prominent effect between Jigawa and Yobe. The variability in net income of a wheat farmer in Nigeria could be predicted with 99.3% accuracy using age, total output, selling price, straw price, quantity of pesticide used, frequency of irrigation, and total cost of production. The study confirmed that the major constraints affecting wheat farmers in Nigeria were a lack of government intervention, a weak extension system, high input and pest and disease costs, a low output price, insufficient credit facilities, a lack of high-yielding varieties, poor yield, and a lack of a regular market. There was strong agreement on the most important constraints among the respondents of different states. For Nigeria to achieve the desired outcome, focused commitments and the adoption of a multi-dimensional approach are required. Political factors were the major concerns surrounding the wheat production sector and would be overcome through a yearly stakeholders' round table meeting to review the situation. External social factor issues would be addressed by raising awareness and establishing a commodity board to ensure remunerative prices for farmers and reasonable prices for consumers, as well as a consistent supply

of raw materials to milling industries. Extension should be intensified to enhance the knowledge level of the farmer for better understanding and increased adoption of new varieties. This could help to overcome internal social issues. More young people need to be persuaded to work in wheat farming in order to increase production and sustainability.

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APPENDIX

Appendix i

Exploratory study for resilient wheat farming Nigeria

Interview schedule

Basic detail of wheat farmer

Name of the farmer……………………………………… Contact no…………………..

State…………. Local government area……………… Farmer village………………….

Demographic:

1. Age   2. Sex

  a) 18 - 30   a) Male

  b) 31 – 43   b) Female

  c) 44 – 56

  d) Above 56

Sociological

1. Educational level   2. Marital status   3. Another occupation

  a) Can't read and write   a) Single   a) Civil service

  b) No formal type   b) Married   b) Trader

  c) Primary   c) Craftsman

  d) Secondary   d) Marketing middleman

  e) Tertiary

  4. Monthly income   #…………………… 5.   Household size……   6. Earning members…….

Psychological

    1. Years of experience…….

  Other variables

  1. Contact with extension agent

- Very frequent
- Frequently
- Some times
- Rarely
- Never

2. How do you acquire your farm land?

(a) Family land ( )   (b) Gift land ( ) (c) Purchase land ( )

(d) Rented land ( )   (e) Inherited land ( )

Wheat production variable

1. Actual number of hectares under wheat cultivation………

2. Size of the farm land under wheat cultivation

    a. Marginal (<1ha)

    b. Small (1 – 2 ha)

    c. Semi Medium (2 – 4 ha)

    d. Medium (4 – 10 ha)

    e. Large (> 10 ha)

3. Land preparation cost (per ha)

4. Cost of seed (Naira/kg)

5. Cost of fertilizer used (Naira/bag)

6. Cost of herbicide used (Naira/ltr)

7. Cost of pesticide used (Naira/ltr)

7. Cost of seed sowing (per/ha)

9. Cost of labour for chemical spraying (Naira/ha)

10. Irrigation labour cost (Naira/ irrigation)

11. Machine hiring cost (Naira)

12. Labour cost for harvesting and threshing (Naira/bag)

13. Cost of packaging (Naira/bag)

14. Cost of packaging bag (Naira)

15. Water source, a. Own water well ( )   b. Irrigation channel ( )

16a. If a in the Q15 is yes, Cost of fuel per irrigation (Naira/irrigation):_____

16b. If b in the Q15 is yes, water charges (Naira/ ha)

17. Marketing cost (Naira/bag): _____

18. Total quantity produced (bag/ha): _____

19. Total quantity for zakat (bag): _____

20. Total quantity for household consumption (bag): _____

21. Total quantity marketed (bag): _____

22. Selling price of wheat grain (Naira/bag): _____

23. Straw yield (Kg/ha): _____

24. Selling price of straw (Naira/ha): _____

25. Type of seed: a. Certified ( ), b. Non-certified ( )

26. Seed variety name: _____

27. Seed procurement source: a. Market ( ), b. Own save ( ), c. Friend/family ( ), d. ADP ( ),

    e. Seed company ( ), f. Government agency ( ), g. NGOs ( ).

28. Quantity of seed used (Kg/ha): _____

29. Quantity of fertilizer used (bag/ha): a. NPK 20 10 10 ____, b. Urea _____

30. Quantity of pesticide used (ltr/ha): _____

31. Quantity of herbicide used (ltr/ha): _____

32. Type of labour used: a. Mechanised ( ), b. Manual ( ), c. Mechanised and manual ( )

33. How many times do you irrigate your crop? (number): _____

    a. Market ( ), b. Own save ( ), c. Friend/family ( ), d. ADP ( ), e. Seed company

Marketing Behaviour of wheat farmers in Nigeria

S/n	Statements	Yes/no
1.	**When do you sell the produce**	
a	Before harvesting when crop matured	
b	Immediately after the harvest if price is favourable	
c	Immediately after the harvest whatever the price may be	
d	If the price is less, the grain would be stored until the price is favourable	
2.	**Reasons for selling at a particular period/ time**	
a	Indebtedness to trader/industry	
b	Lack of storage facilities	
C	Financial urgency	
d	High price	
3.	**Whom do you sale the produce**	
a	Directly to the consumer	

b	To the local market retailers	
c	Directly to wholesalers	
d	To the millers through agents	
e	To the millers through WFAN	
4.	**Where do you sell the produce**	
a	At the farm	
b	In my home	
c	In the local market	
d	In the weekly market	
e	In the central market	
5.	**Which mode is used for transport**	
a	Trailer	
b	Bullock cart	
c	Motorcycle	
d	Trunk	
e	Trolley	
6.	**Reasons for selling at a particular place**	
a	Proximity	
b	Availability of the transport facilities for the place	
c	Good market facilities available in that market	
d	Premium price	
e	Immediate cash payment	
g	Previous agreement	

7	Market information sources	Response		
		Regular	Occasionally	Never
1	Fellow farmers			
2	Friend/relatives			
3	WFAN			
4	Radio			
5	Television			
6	Newspaper			
7	Extension agent/agency			
8	Mobile application			
9	Internet source			

Some of the most important Forms of promotion activities

S/n	Factors	Tick as appropriate
1	Personal word of mouth	
2	Advertising	

3	Social media	
4	Using neighbourhood group	
5	Non f the above	

Livelihood activities of the respondents

S/N	Livelihood activities	Response	
		Yes	**No**
1	Production of other crop		
2	Off farm		
3	Non-farm		

Study the perceived effects of climate change on production of wheat and livelihood of the wheat farmers

Farmer's awareness and mode of climate change (CC) manifestation in their area

S/N	Statements	Yes	No	
1	Are you aware of CC			
2	Mode of CC manifestation	Response		
		Increase	Decrease	Unchanged
a	Does the duration of rainfall period:			
b	Does the amount of rainfall:			
c	Compare with the previous years, is the Harmattan period:			
d	What do you notice about the temperature during Harmattan period:			
e	Pest and disease effects on wheat crop			
f	Desert encroachment advancement			
g	Soil degradation			

Perception of wheat farmers on the effect of climate change on production and their livelihood

S/N	Statements	Response				
		Strongly Agree	**Agree**	**Undecided**	**Not agree**	**Strongly not agree**

1	As a farmer, CC is a threat to your production as well as livelihood					
2	CC may cause a decrease in the size of your farmland or increase as a result of flood or drought					
3	CC increase the crop susceptible to disease attack in which yield is reducing					
4	CC can cause drying of irrigation channel due to the increase in temperature					
5	Temperature during Harmattan period is decreasing in recent years due to CC					
6	Do you agree that CC caused increases in temperature during summer season					
7	Do you agree that human activities are the root cause of CC					
8	CC means unpredictable weather					
9	CC can cause biotic and abiotic stress to crop plant					
10	CC is one of the causes of soil degradation which lead to low crop yield					

What are the most common type of stress affecting the wheat crop in your farm?

S/N	Type stress	Yes	No
1	Moisture		
2	Cold		
3	Waterlogging		
4	Heat		
5	Salinity/ Alkaline		
6	Pest and disease		
7	Drought		
8	Animal (Cattle/goat/ sheep)		
9	Chicken/ Guinea fowl		
10	Wild bird		
11	Rodent		

What are most common type of social stress affecting wheat farmers?

S/N	Type of social stress	Yes	No

1	Marketing		
2	Herdsmen		
3	Terrorists		
4	Bureaucratic bottlenecks		
5	Family problems		

Government policies and scheme implementation gap

S/N	Statement	Response	
1	**Which of the following policy/scheme were you aware?**	**Yes**	**No**
	a) AWPP (1986)		
	b) ATA (2011)		
	c) Wheat composite flour (2012)		
	d) Wheat transformation agenda (2013)		
	e) GESS (2013)		
	f) Anchor borrower (2015)		
	g) APP (2016)		
	h) Presidential task force on rice and wheat (2016)		
2	**If yes, from where do you get information of new P&S**		
	Radio?		
	Fellow farmers?		
	Friends?		
	Extension agent?		
	WFAN		
	Mobile phone		
	Other (specify)		
3	**Are you part of the beneficiaries?**		
4	**If no, do you know anybody who benefited?**		

5	**If yes, what have you benefited from it?**
	a) Services
	    I. Land clearing and preparation
	    II. Technology demonstration
	    III. Free /subsidise equipment's hiring
	    IV. Free consultation
	    V. Free farm income tax
	    VI. Information on market		

	b) Subsidise Input		
	I. Hybrid Seed		
	II. Fertilizer		
	III. Herbicide/ pesticide		
	IV. Irrigation facilities		
	c) Conditional credit facilities/cash		

Farmer's perception on policy and scheme (P&S)

S/N	Statements	Response				
		Strongly Agree	Agree	Undecided	Not agree	Strongly not agree
1	Do you agree that government P&S would solve wheat farming problems					
2	Government P&S would not solve wheat farming problems if millers are not ready to patronized local wheat					
3	The P&S should focus on increasing farmers output and wellbeing					
4	All the government P&S are good enough to increase the wheat production level but they are not implemented properly					
5	Corruption is the key problem that block the P&S to work effectively					
9	P&S are full up bureaucracy that always steady our access					

Price spread

Marketing channel

To whom are you selling your produce?

a) Consumers ( ) b) Retailer ( ) c) Wholesalers ( )
d) Exporter ( ) e) Cooperative society (WFAN) ( )
e) Millers ( ) g) Agent ( )

Categories of Market Actors	Price paid/50kg	Marketing cost	Price received/50kg
Producers	----		
Agent			
Wholesalers			
Retailers			
Millers			
Consumer			

Constraint face by the wheat farmer

S/N	Constrains	Tick	Rank
1	Lack of regular market		
2	Low output price		
3	Poor yield		
4	Poor distribution of input		
5	Lack of high yielding variety		
6	High cost of input		
7	Lack of transportation		
8	Water problem		
9	Lack of irrigation facilities		
10	Inadequate credit facilities		
11	Lack of government intervention		
12	Climate change problem		
13	Pest and disease		
14	Weak extension system		
15	Adoption of new variety		
16	Any other(s) please specified		

APPENDIX ii

Stakeholders panel questions for focus group discussion as per Ph.D. research objective

"Social and Political situation affecting wheat production in Nigeria" in a research topic

"Exploratory study for resilient wheat farming Nigeria"

1. The issues for or against sufficient wheat production in Nigeria? E.g. low yield, agro-ecological factors, pest and disease problems, lack of certified seed, limited land area, etc.

2. The social factors for or against wheat production in Nigeria, e.g. Food habit, fear of attack, the level of knowledge etc.

3. What are the political factors for or against wheat production in Nigeria? E.g. Political will, foreign interest, trade liberalization, etc.

4. Nigeria's policy programmes, and schemes failed to achieve the desired goal in wheat farming areas.

5. Any idea on (the strength and weakness of) these policy implementation?

6. Do synergistic commitments exist among the agricultural policy implementation agencies?

7. Wheat Millers are one of the most important market intermediary value chain actors in the wheat value chain and are termed as the major players ruling out Nigeria's dream of wheat self-sufficiency. Do you agree with this? And why?

8. Are the wheat Millers involved in wheat policy, plan, design, and implementation in Nigeria?

9. Wheat Millers claimed that Nigeria's wheat has higher gluten content and lower moisture content; these make it ill-suited for bread making. Do these problems still exist?

10. Wheat crop suffering set back in the agricultural marketing in Nigeria?

11. How can Nigeria attain self-sufficiency in the production of wheat and wheat products? Discussion:

Content analysis techniques
APPENDIX iii
Analysis of Anchor Borrowers' Program

Meaning of unit (condensation)
• The Central Bank of Nigeria (CBN) in line with its developmental function established the Anchor Borrowers' Programme (ABP). (CBN and developmental functions
• The Programme which was launched by President Muhammad Buhari (GCFR) on November 17, 2015 (implementation phase started last quarter of 2015)
• Intended to create a linkage between anchor companies involved in the processing and small holder farmers (SHFs) of the required key agricultural commodities. (linkage between farmers and companies)
• ABP is provision of farm inputs in kind and cash (for farm labour) to small holder farmers to boost production of these commodities (farm input supply in kind and cash)
• At harvest, the SHF supplies his/her produce to the Agro-processor (Anchor) who pays the cash equivalent to the farmer's account (supplying produce and receive cash)
• The Programme evolved from the consultations with stakeholders comprising Federal Ministry of Agriculture & Rural Development, State Governors, millers of agricultural produce, and smallholder farmers (consultation with stakeholders)
• The broad objective of the ABP is to create economic linkage between smallholder farmers and reputable large-scale processors (linkage between SHF and processors)
• The financing shall be targeted at smallholder farmers engaged in the production of identified commodities across the country. (targeted SHF production)
• The Farmers should be in groups/cooperative(s) of between 5 and 20 for ease of administration. (farmers group/cooperatives between 5 and 20)

- Cereals (Rice, Maize, wheat etc.)Cotton, Roots and Tubers, Sugarcane, Tree crops, Legumes, Tomato, Livestock (target crops and areas)

- The financing shall be disbursed through any of these Non-Interest Financial Institutions (financing channel non-interest institutions)

- This shall be private large-scale integrated processors, aggregators, commodity associations etc. who have entered into an agreement with the SHFs to off-take the harvested produce at the agreed prices (private anchor companies agreement with SHF)

- State Governments may act as Anchor upon meeting the prescribed conditions (state government anchor)

- The input suppliers shall submit expression of interest letter to the office of the PMT for consideration and issuance of local purchase orders by the Anchor (private input suppliers)

- Financing amount for each SHF shall be arrived upon from the economics of production agreed with stakeholders (financing agreement between stakeholders)

- The fund shall be provided from the Micro, Small and Medium Enterprises Development Fund (source of finance for beneficiaries)

- Rate of return under the ABP shall be guided by the rate on the MSMEDF, which is currently at 9% p.a (all inclusive, pre and post disbursement). (interest under ABP is 9% per annum)

- The tenor of financing under the ABP shall be the gestation period of the identified commodities or as agreed with stakeholders not exceeding 60 months (gestation period for financing)

- Financing granted to the SHFs shall be settled with the harvested produce that shall be mandatorily delivered to the Anchor at designated collection center in line with the provisions of the Agreement signed (settlement should be with harvested produce)

- The value of the produce to be delivered must cover the financing principal and return (quantity of the produce must to be equal to the amount of money or service received)

- There shall be two models of administration of ABP based on the anchor arrangement namely: Private Sector-led and State windows. Under each model, a Project Management Team (PMT) shall be established to coordinate the

implementation of the programme (two administration model private and state window)

- Ratifies the Economics of Production (EoP), validate farmers' list for participation, carries out monitoring of project to ensure compliance, bears 50% credit risk on outstanding amount in default, etc. (ratifies the economic production)

- Processes financing request based on number of farmers/Hectares, validated and the ratified EoP, PFI Management approves financing to Anchor as primary obligor, receives collateral from Anchor to cover 70% of total financing amount, ratifies the supply of input as requested by the Anchor, manages the project through its life cycle, bears 50% credit risk on outstanding amount in default (processing finance request based on number of farmers)

- Anchor: provides list of farmers for participation in the project, provides collateral cover to the Bank for financing amount requested, primarily responsible for supply of quality inputs and Services through LPO issuance, manages the project through its life cycle (anchor provided list of farmers for participation in the project)

- CBN: Ratifies the Economics of Production (EoP), validate farmers' list for participation, carries out monitoring of project to ensure compliance, bears 50% credit risk on outstanding amount in default (private model CBN role)

- The PMT under the State Window shall be constituted with representatives of stakeholders as follows (PMT state window shall be constituted with stakeholders representative)

- A mandatory training programme shall apply for farmers that will participate under the ABP covering; Farming as a business, proved agricultural practices, group management dynamics, (mandatory training programme shall apply for farmers)

- The cost of such training shall be borne by the participating anchor. However, partnerships with Development Partners are encouraged on the training of the farmers (cost of such training shall be borne by the participating anchor)

- Certificates issued at the end of the training shall constitute a requirement for farmers to access the facility in kind and cash under the programme(certificate issued served as requirement for the access the facility)

- The Anchor/State Governments shall be required to provide extension services to complement the training, ensure adherence to good agricultural practices and

mitigate side selling (Anchor/State Governments shall be required to provide extension services)

- Central Bank of Nigeria Shall: Provide the funds through the MSMEDF, coordinate the entire Programme, serve as Secretariat, chair/Co-chair the PMT, and review the provisions of the guidelines as deemed necessary (CBN shall provide the fund through the MSMEDF)

- Nigerian Agricultural Insurance Corporation (NAIC) Shall: provide insurance cover to the projects under the Programme in line with the non-interest banking principle, ensure timely processing and settlement of claims, serve as member of the PMT (NAIC shall provide insurance cover)

- Development Partners(DP) Shall: Provide technical assistance to farmers, extension workers and banks, may serve as member of the PMT in partner States (DP Shall: Provide technical assistance to farmers, extension workers and banks)

- Participating Financing Institutions: Shall: Verify eligible farmers and their farmlands, and open account for the farmers (Participating Financing Institutions: Shall: Verify eligible farmers and their farmlands)

- Small Holder Farmers Shall: Organize themselves into groups/cooperatives, Cross guarantee one another etc. (SHF shall organized themselves into groups)

- State Government/FCT Shall: Co-Chair the public sector ABP PMT, Submit Expression of Interest to participate under the ABP etc. (State Government/FCT Shall: Co-Chair the public sector ABP PMT)

- Anchor Company Shall: Co-Chair the PMT of the private sector ABP, Identify and organize farmers into groups/co-operatives etc. (Anchor Company Shall: Co-Chair the PMT of the private sector ABP)

- Project management team (PMT) Shall: Coordinate project implementation, coordinate discussions on cost of production per hectare etc. (Project management team (PMT) Shall: Coordinate project implementation)

- Nigerian Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL) Shall: collaborate on Technical Assistance, provide CRG for projects that meet pre-conditions etc. (NIRSAL) Shall: collaborate on Technical Assistance)

Coding of condensed meaning units

Meaning units condensations	Coding
• CBN and developmental functions	• CBN commitment
• linkage between farmers and companies	• Marketing linkage
	• Production value chain
• farm input supply in kind and cash	• Marketing linkage
• supplying produce and receive cash	• CBN commitment
	• Commodity value chain
• consultation with stakeholders	• Focus on SHF
• linkage between SHF and processors	• Focus on SHF
• targeted SHF production	• Focus crops
• farmers group/cooperatives between 5 and 20	• Program financing
	• private commitments
• target crops and areas	
• financing channel non-interest institutions	• Stakeholder responsibility
	• Private role
• private anchor companies agreement with SHF	• Program financing
• state government anchor	• Program financing
• private input suppliers	• Anchor profit
• financing agreement between stakeholders	• Loan period
	• Loan settlement
• source of financing for beneficiaries	
• interest under ABP is 9% per annum	• Loan settlement
• gestation period for financing	• Private and state
• settlement should be with harvested produce	• CBN role
• quantity of the produce must to be equal to the amount of money or service received	• PFI role

• two administration model private and state window	• Anchor role
• CBN role ratifies the economic production	• Private, CBN linkage
• PFI role processing finance request based on number of farmers	• PMT composition
• anchor provided list of farmers for participation in the project	• Focus on SHF
• private model CBN role	• Anchor role
• PMT state window shall be constituted with stakeholders representative	• Qualification
• mandatory training programme shall apply for farmers	• Anchor and state role
• cost of such training shall be borne by the participating anchor	• CBN role
• certificate issued served as requirement for the access the facility	• NAIC role
	• DP role
• Anchor/State Governments shall be required to provide extension services	• PFI role
• CBN shall provide the fund through the MSMEDF	
• NAIC shall provide insurance cover	• SHF role
• DP Shall: Provide technical assistance to farmers, extension workers and banks	• State role
• PFI Shall: Verify eligible farmers and their farmlands	• Anchor role
• SHF shall organized themselves into groups	• PMT role
• State Government/FCT Shall: Co-Chair the public sector ABP PMT	• NIRSAL role

• Anchor Company Shall: Co-Chair the PMT of the private sector ABP • PMT Shall: Coordinate project implementation • NIRSAL Shall: collaborate on	

Coding categorization

Coding	Categorization
Focus on SHF	Priority crops and approaches
Focus on SHF	
Focus on SHF	
Focus crops	
Loan period	
Loan settlement	
Loan settlement	
Qualification	
CBN commitment	Stakeholders role and responsibility
CBN commitment	
CBN role	
CBN role	
Stakeholders responsibility	
Program financing	
Program financing	
Program financing	
PFI role	
PFI role	
Anchor role	
Anchor role	
Anchor role	
Anchor and state government role	
State government role	
PMT composition	

PMT role	
NAIC role	
DP role	
SHF role	
NIRSAL role	
Private commitment	Public – private partnership
Private role	
Private and state	
Private and CBN linkage	
Marketing linkage	Reliable marketing channel
Marketing linkage	
Production value chain	
Commodity value chain	

Distribution of the categories

Categories	per cent
Priority crops and approach	21.62
Stakeholders role and responsibility	56.76
Public- private partnership engagement	10.81
Sustainable production of the listed crops	0.00
Communities infrastructural development	0.00
Reliable marketing channel	10.81
n = 37	100

APPENDIX iv

Analysis of Agricultural Promotion Policy

Condensation of meaning unit
• focusing the policy instruments on a government-enabled, private sector-led engagement as the main growth driver of the sector (enabled, private sector-led engagement)
• focusing policy instruments to ensure that the commercialization of agriculture (commercialization of agricultural activities)
• focusing the policy instruments for enterprise development across successive stages of the commodity value chains for the development of crop (focusing on commodity value chain)
• focusing policy on achieving improved domestic food security and boosting export earnings requires a measure of prioritization (focusing on domestic food security and boosting export earnings)

- Therefore, for domestic crops, the initial focus in 2016 – 2018 will be expanding the production of rice, wheat, maize, soya beans and tomatoes (focus on rice, wheat, maize, soya beans and tomatoes production)

- Investments in closing infrastructure gaps to accelerate productivity and investment (investments in closing infrastructure gaps)

- focusing policy instruments on stimulating agricultural production on a sustainable basis (focusing on sustainable production basis)

- focusing on stimulating supply and demand for agricultural produce by facilitating linkages between producers and off takers (facilitating linkages between producers and off takers)

- focusing policy instruments on the sustainability of the use of natural resources (focusing on sustainable use of resources)

- with the future generation in mind while increasing agricultural production, marketing and other human activities in the agricultural sector (future generation in mine while increasing production)

- focusing instruments on measures to maximize the full participation of stakeholders including farmer's associations, cooperatives and other groups, as well as NGOs, CBOs, CSOs, development partners and the private sector (focusing on full participation of stakeholders)

- this places a premium on the role of these organizations or groups as agents of economic change in general and agricultural economy in particular (premium role for organization or group as agents)

- thereby drawing benefits from their policy advocacy roles as partners to and watchdog of government (watchdog of government activity)

- focusing policy instruments on the connected relationship between agriculture and other sectors at federal and state levels, particularly industry, environment, power, energy, works and water sectors (connected relationship between agriculture and other sectors at federal and state levels, particularly industry)

- the Federal Government will concentrate on providing an enabling environment for stakeholders at federal and state level to play their distinctive roles (FG will concentrate on provide enabling environment for stakeholders)

- focusing on security enhancing physical infrastructure (enhancing physical infrastructure)

- focusing on agricultural services and markets (focusing on markets)

- Preparation of reports by the ten multi-stakeholder working groups on key policy areas (reports by multi-stakeholders)

- The discussions that follow are designed to boost system productivity, reduce post-harvest losses (boost system productivity, reduce post-harvest losses)

- the discussions that follow are designed expand market access related activities (market access related activities)

- increase share of agricultural input used in Nigeria by consumer goods companies, and (share of Nigerians fresh goods sold in formal markets)

- Soil fertility requires attention in view of the need to maintain adequate levels of macro and micro soil nutrients under intensive production systems that remove nutrients from agriculture areas (soil fertility need to maintain)

- Soil erosion in South eastern Nigeria and desertification in the North due to deforestation wash away topsoil with the nutrient layers and pose a threat to soil fertility (Soil erosion in South eastern Nigeria and desertification in the North)

- Climate change, with temperature increase, speeds up the breakdown of soil organic matter which is essential for water retention and root development (Climate change, with temperature increase)

- Fertility through soil mapping and testing (soil mapping and testing)

- crop rotation to improve nitrogen fixation (crop rotation to improve nitrogen fixation)

- soil fertility reconstruction and formal fallow periods (fertility reconstruction)

- fertilizer quality control (fertilizer quality control)

- use of organic fertilizer (use of organic fertilizer)

- erosion control measures e.g. tree planting (erosion control measures)

- soil/crop specific fertilizer formulation (specific fertilizer formulation)

- improved conservation, reforestation and green belt policies (improved conservation)

- This is relevant to all stakeholders in the sector, including farmers, input suppliers, processors, traders, policy makers, development partners, and researchers (stakeholder right to information access)

- appropriate information can sharpen opportunities, clarify market access (information for market access)

- developing agricultural information systems; standards and institutional mechanisms for content generation, policy support, stakeholder dialogue, innovation and learning agricultural information system for stakeholders dialogue)

- Focus on disseminating information designed to help farmers make best choices with respect to input costs, equipment leases, agronomic practices, crop prices, and weather (access to information on agronomic practices and input prices)

- Promoting the emergence of specialized agricultural information and knowledge from targeted research to address farmer priorities (access to information for priority farmers)

- Enhancing reach, effectiveness and efficiency of the extension delivery system (information dissemination to farmers channel)

- Revitalizing existing, and development of new, small (earth) dams, tube wells and wash bores (revitalizing existing and development of new dams)

- Facilitating optimization of the utilization of existing large dams for irrigation (optimization of the utilization of existing dams)

- private sector investment in irrigation and irrigation systems, including fee for service providers (private sector investment in irrigation system)

- Promoting water conservation by harvesting run-off water (conservation of water by harvesting run-off water)

- reducing desertification by tree planting (reducing desertification)

- Revitalizing the River Basin Authorities and transforming their role in water availability and pricing (transforming the role of river basin authorities)

- enhancing regulation, inspection and enforcement of safe use of agrochemicals (enhancing proper usage of agrochemicals)

- enhancing access to information about safe use of agrochemicals (enhancing information access about agrochemical)

- promoting safe alternatives where available e.g. organic pesticides (promoting usage of organic pesticides)

- integrated pest management and control mechanisms (pest management and control mechanisms

- facilitate inter-ministerial co-ordination for disease control (facilitate inter-ministerial co-ordination)

- Policy to promote information, finance and availability of relevant equipment along the value chain of key commodities (information, finances and equipment availability along the value chain)

- promoting private-sector-led mechanization services as well as cooperative solutions for private sector-led tractor hiring system (promoting private-sector-led mechanization services)

- stimulating domestic production of equipment linked with complementary targeted import and standardization of agro-technology (stimulating domestic production of equipment)

- Crowd in private investments into the sector to deepen overall logistics and infrastructure footprint, creating options for farmers and other value chain actors (private investments into storage to deepen overall logistics)

- policy to facilitate public-private partnerships to rapidly expand storage and related logistics support infrastructure (facilitate public-private partnership in storage sector)

- policy to ensure that government maintains a safe storage that can guarantee national food security for a minimum of 1 year (ensure that government maintains a safe storage)

- crowd in private investments into the sector to deepen value addition and reduce waste (private investments into processing to deepen value addition)

- enhance access to finance and information about innovative processing methods (enhance access to information about innovative processing methods)

- facilitate out-grower schemes to secure supply of quality inputs from high production areas and improving access to value chain finance (facilitate out-grower schemes to secure supply of inputs)

- enforce quality standards, food safety for markets that ensure emergence of modernized, safe processing zones (enforce quality standards, food safety for markets)

- enhance capacity of the NAQS of FMARD and Produce Inspection Department of FMITI as well foster policy synergy between FMARD and FMITI on agricultural commodity trade (enhance capacity of the NAQS of FMARD)

- intensify awareness of public and farmer understanding of food safety protocols (intensify awareness of public and farmer)

- crowd in private investments into the sector to deepen private service provision required to enable markets function effective (crowd in private investments into the market sector)

- policy to enhance access to domestic and international markets (enhance access to domestic and international markets)

- enhancing access to market information (market information enhancement)

- establishment of inter-ministerial working group to address the challenges of agricultural business (establishment of inter-ministerial working group)

- Policy to improve infrastructure to reach markets (improve infrastructure to reach markets)

- create export market support teams to work with other key agencies in MITI (export market support teams)

- crowding in Private Investment (private sector involvement)

- stimulating cooperative banking and affordable loans through commercial banks (stimulating cooperative banking)

- increase in capacity and size of market-driven guarantee and risk schemes (market-driven guarantee and risk schemes)

- deepening of FMARD's capacity to facilitate agribusiness investment agreements (FMARD's capacity to facilitate agribusiness investment)

- present Government is prioritization of private sector as an engine to drive growth of Agricultural sector (prioritization of private sector as an engine to drive growth)

- promotion of access to agro-processing through both public intervention (access to agro-processing through both public intervention)

- facilitation of private sector investment (promotion of private sector investment)

- safeguards for small holders, rapid collateralization of land, and focused infrastructure access (rapid collateralization of land, and focused infrastructure access)

- Provision of rural infrastructure, roads, water, electricity and others (provision of rural amenities)

- Facilitation of provision of modern paddy handling equipment in key clusters (provision of modern paddy handling equipment)

- FMARD's Institutional Realignment (FMARD's Institutional Realignment)

- Though the two tiers of government: Federal and State, have authority over agriculture, collaboration has not always been smooth, nor desirable results generated (Federal and State collaboration has not always been smooth)

- both parties have to focus on greater collaboration, implementing policies jointly approved at the National Council on Agriculture (implementing policies jointly approved at the National Council on Agriculture)

- Both parties have to set-up mechanisms to remove conflict and focus squarely on implementation (parties have to set-up mechanisms to remove conflict)

- LGAs are truly the field operators with whom investors often deal with, and therefore cannot be a footnote in economic reform discussions (LGAs are truly the field operators with whom investors often deal with)

- important that ALGON be consulted and actively engaged to improve operational effectiveness of agriculture (ALGON to be consulted and actively engaged to improve operation)

- identify ways of boosting cooperation and accountability at the State level to ensure reform is carried out consistently

- identify ways of boosting cooperation and accountability at the State level to ensure reform is carried out consistently (to boosting cooperation and accountability at the State level)

- create explicit partnership with LGAs with a focus on operation (partnership with LGAs with a focus on operational)

- focus on investment execution issues from infrastructure to community relations to access to high quality talent (investment execution issues from infrastructure to community relations)

- Leverage improved federal-state dialogue to engage other investors and improve levels of communication in the agribusiness economy further (improved federal-state dialogue to engage other investors)

- Infrastructure (Infrastructure)

- The policy recognition for rural development relates to the need (policy recognition for rural development)

- the systematic provision of individual infrastructural facilities and also through the integrated approach to rural development (systematic provision of individual infrastructural facilities)

- Government will ensure that all stakeholders play their roles in the provision of rural infrastructure (ensure that all stakeholders play their roles in the provision of rural infrastructure)

- As approved by NCA already, government will resuscitate and review the Rural Infrastructure Survey project of FMARD (government will resuscitate and review the Rural Infrastructure)

- with a view re-establishing the old database for rural infrastructure planning (the old database for rural infrastructure planning)

- Aggressive promotion of rural infrastructure buildup will be embarked upon (aggressive promotion of rural infrastructure)

- Economic activities will be promoted in rural areas (economic activities will be promoted in rural areas)

- Aggressive promotion of rural infrastructure will be undertaken (rural infrastructure will be undertaken)

- Improve the enabling environment for investment opportunities (enabling environment for investment opportunities in rural)

- Climate Smart Agriculture (Climate Smart Agriculture)

- policy and investment conditions to achieve sustainable agricultural development for food security under climate change (investment conditions to achieve sustainable agricultural development)

- sustainably increasing agricultural productivity and incomes (sustainably increasing agricultural productivity)

- adapting and building resilience to climate change (building resilience to climate change)

- reducing and/or removing greenhouse gases emissions, where possible (removing greenhouse gases emissions)

- Boosting public awareness through advertising of importance of climate smart agriculture (importance of climate smart agriculture)

- The management of land, water, soil and other natural resources will be improved (land, water, soil and other natural resources will be improved)

- Institutional linkages and partnerships will be strengthened (PPP for   strengthening CSA)

- ensuring climate smart agricultural governance, policies, legislations and financial mechanisms (ensuring climate smart agricultural governance, policies)
- Environmental impact assessment will be carried out on major agricultural projects (environmental impact assessment will be carried out)
- The use of renewable energy will be promoted with the involvement of private sector (use of renewable energy will be promoted with ppp)
- Broad public and stakeholder awareness on Climate Smart Agriculture will be created (stakeholder awareness on Climate Smart Agriculture)
- Government will facilitate soil map to improve land use and management practices (improve land use and management practices)
- Government will increase the adoption of global best practices on climate change (adoption of global best practices on climate change)

Table 27: Coding of condensed meaning units

Meaning unit	Code
- enabled, private sector-led engagement	- Private sector engagement
- commercialization of agricultural activities	- Privatization action
- focusing on commodity value chain	- Commodity value chain
- focusing on domestic food security and boosting export earnings)	- Market dreaming
- focus on rice, wheat, maize, soya beans and tomatoes production	- Focus crops
- investments in closing infrastructure gaps	- PPP in infrastructure
- focusing on sustainable production basis	- Production sustainability
- facilitating linkages between producers and off takers	- Marketing linkage
- focusing on sustainable use of resources	- Sustainable uses
- future generation in mine while increasing production	- Sustainable uses
- focusing on full participation of stakeholders	- Focus on stakeholders
	- Market approach

• premium role for organization or group as agents	• Approach to control
• watchdog of government activity	• Synergistic relationship
• connected relationship between agriculture and other sectors at federal and state levels, particularly industry	• Federal government action
• FG will concentrate on provide enabling environment for stakeholders	• Infrastructure in policy
• enhancing physical infrastructure	• Market focus
• focusing on markets	• Stakeholders action
• reports by multi-stakeholders	• Crop productivity approach
• boost system productivity, and reduce post-harvest losses	• Market focus
• market access related activities	• Market focus
• share of Nigerians fresh goods sold in formal markets	• Sustainable production focus
• soil fertility need to maintain	• Environmental focus
• soil erosion in South eastern Nigeria and desertification in the North	• Climate threat to production
• climate change, with temperature increase	• Production focus
• soil mapping and testing	• Sustainable production focus
• crop rotation to improve nitrogen fixation	• Sustainable production focus
• fertility reconstruction	• Production focus
• fertilizer quality control	• Sustainability focus
• use of organic fertilizer	• Environmental focus
• erosion control measures	• Production focus
• specific fertilizer formulation	• Production focus
• improved conservation	• FMARD action
• stakeholder right to information access	• Market access
• information for market access	• Stakeholders action
• institutional mechanism for stakeholders dialogue	• Crop approach

• access to information on agronomic practices and input prices	• Focus on priority farmers
• access to information for priority farmers	• Focus on priority farmers
• information dissemination to farmers channel	• Production focus
• revitalizing existing and development of new dams	• FMARD action
• optimization of the utilization of existing dams	
• private sector investment in irrigation system	• Privatization of irrigation
• conservation of water by harvesting run-off water	• FMARD action
• reducing desertification	• Environmental focus
• transforming the role of river basin authorities	• FMARD action
• enhancing proper usage of agrochemicals	• environmental focus
	• Priority farmers focus
• enhancing information access about agrochemical	• Production focus
• promoting usage of organic pesticides	• Production focus
• pest management and control mechanisms	• FMARD action
• facilitate inter-ministerial co-ordination	• FMARD action
• information, finances and equipment availability along the value chain	• Private in mechanization
• promoting private-sector-led mechanization services	• FMARD action
• stimulating domestic production of equipment	• Private in storage
• private investments into storage to deepen overall logistics	• PPP in storage
• facilitate public-private partnership in storage sector	• FMARD action
• ensure that government maintains a safe storage	• Private in processing
	• FMARD action

• private investments into processing to deepen value addition	• Commodity value chain
• enhance access to information about innovative processing methods	• Market focus
• facilitate out-grower schemes to secure supply of inputs	• FMARD action
• enforce quality standards, food safety for markets	• FMARD action
	• Private sector in marketing
• enhance capacity of the NAQS of FMARD	
• intensify awareness of public and farmer	• Market focus
• crowd in private investments into the market sector	• Market focus
• enhance access to domestic and international markets	• Synergy relationship
• market information enhancement	• Market focus
• establishment of inter-ministerial working group	• Market focus
	• Private involvement
• improve infrastructure to reach markets	• FMARD action
• export market support teams	• FMARD action
• private sector involvement	• FMARD action
• stimulating cooperative banking	
• market-driven guarantee and risk schemes	• Private involvement
• FMARD's capacity to facilitate agribusiness investment	
• prioritization of private sector as an engine to drive growth	• Market focus
	• Private involvement
• access to agro-processing through both public intervention	• Infrastructure focus
• promotion of private sector investment)	• Rural infrastructure
• rapid collateralization of land, and focused infrastructure access	• Market focus
• provision of rural amenities	• FMARD action

• provision of modern paddy handling equipment	• Synergy relationship
• FMARD's Institutional Realignment	• Synergy relationship
• Federal and State collaboration has not always been smooth	• Synergy relationship
• implementing policies jointly approved at the National Council on Agriculture	• LGA involvement
• parties have to set-up mechanisms to remove conflict	• LGA stakeholders engagement
• LGAs are truly the field operators with whom investors often deal with	• Synergy relationship
• ALGON to be consulted and actively engaged to improve operation	• State and LGA action
• to boosting cooperation and accountability at the State level	• Infrastructure focus
• partnership with LGAs with a focus on operational	• Stakeholders relationship
• investment execution issues from infrastructure to community relations	• Infrastructure focus
• improved federal-state dialogue to engage other investors	• Rural infrastructure • Rural infrastructure
• Infrastructure	
• policy recognition for rural development	• Stakeholders action
• systematic provision of individual infrastructural facilities	• Rural infrastructure
• ensure that all stakeholders play their roles in the provision of rural infrastructure	• Rural infrastructure
• government will resuscitate and review the Rural Infrastructure	• Rural infrastructure
• the old database for rural infrastructure planning	• Rural infrastructure
• aggressive promotion of rural infrastructure	• Rural infrastructure

• economic activities will be promoted in rural areas	• Rural focus
• rural infrastructure will be undertaken	• Sustainability
• enabling environment for investment opportunities in rural	• Sustainability focus
• Climate Smart Agriculture	• Sustainability focus
• investment conditions to achieve sustainable agricultural development	• Sustainability focus
• sustainably increasing agricultural productivity	• Environmental focus • Sustainability focus
• building resilience to climate change	• Environmental focus
• removing greenhouse gases emissions	
• importance of climate smart agriculture	• Private involvement
• land, water, soil and other natural resources will be improved	
• PPP for strengthening climate smart agriculture	• FMARD action
• ensuring climate smart agricultural governance, policies	• Environmental focus
• environmental impact assessment will be carried out	• Private involvement
• use of renewable energy will be promoted with ppp	• Stakeholders action
• stakeholder awareness on Climate Smart Agriculture	• Production focus • Environmental focus
• improve land use and management practices	
• adoption of global best practices on CC	

Table 28: Code and the category

Code	Category
• Focus crops • Crop productivity approach • Production focus • Production focus • Production focus • Production focus • Crop approach • Focus on priority farmers • Focus on priority farmers • Production focus • Priority farmers focus • Production focus • Production focus • Production focus	• Priority crops and approach
• Focus on stakeholders • Approach to control • Synergistic relationship • Federal government action • Stakeholders action • FMARD action • Stakeholders action • FMARD action • FMARD action • FMARD action • FMARD action • FMARD action • FMARD action • FMARD action • FMARD action	• Stakeholders role and responsibility

• FMARD action • FMARD action • Synergy relationship • FMARD action • FMARD action • FMARD action • FMARD action • Synergy relationship • Synergy relationship • Synergy relationship • LGA involvement • LGA stakeholders engagement • Synergy relationship • State and LGA action • Stakeholders relationship • Stakeholders action • FMARD action • Stakeholders action	
• Private sector engagement • Privatization action • PPP in infrastructure • Privatization of irrigation • Private in mechanization • Private in storage • PPP in storage • Private in processing • Private sector in marketing • Private involvement • Private involvement • Private involvement • Private involvement	• Public- private partnership engagement

• Private involvement	
• Production sustainability • Sustainable uses • Sustainable uses • Sustainable production focus • Environmental focus • Climate threat to production • Sustainable production focus • Sustainable production focus • Sustainability focus • Environmental focus • Environmental focus • environmental focus • Sustainability • Sustainability focus • Sustainability focus • Sustainability focus • Environmental focus • Sustainability focus • Environmental focus • Environmental focus • Environmental focus	• Sustainable production of the listed crops
• Infrastructure in policy • Infrastructure focus • Rural infrastructure • Infrastructure focus • Infrastructure focus • Rural infrastructure • Rural infrastructure • Rural infrastructure • Rural infrastructure • Rural infrastructure	• Communities infrastructural development

• Rural infrastructure • Rural infrastructure • Rural focus	
• Commodity value chain • Market dreaming • Marketing linkage • Market approach • Market focus • Market focus • Market focus • Market access • Commodity value chain • Market focus • Market focus • Market focus • Market focus • Market focus • Market focus • Market focus	• Reliable marketing channel

Table 29: Distribution of the categories

CHAPTER ONE

1.1. BACKGROUND

The Central Bank of Nigeria (CBN) in line with its developmental function established the Anchor Borrowers' Programme (ABP). The Programme which was launched by President Muhammadu Buhari (GCFR) on November 17, 2015 is intended to create a linkage between anchor companies involved in the processing and small holder farmers (SHFs) of the required key agricultural commodities. The programme thrust of the ABP is provision of farm inputs in kind and cash (for farm labour) to small holder farmers to boost production of these commodities, stabilize inputs supply to agro processors and address the country's negative balance of payments on food. At harvest, the SHF supplies his/her produce to the Agro-processor (Anchor) who pays the cash equivalent to the farmer's account.

The Programme evolved from the consultations with stakeholders comprising Federal Ministry of Agriculture & Rural Development, State Governors, millers of agricultural produce, and smallholder farmers to boost agricultural production and non-oil exports in the face of unpredictable crude oil prices and its resultant effect on the revenue profile of Nigeria.

1.2. Objective

The broad objective of the ABP is to create economic linkage between smallholder farmers and reputable large-scale processors with a view to increasing agricultural output and significantly improving capacity utilization of processors. Other objectives include:

- Increase banks' financing to the agricultural sector
- Reduce agricultural commodity importation and conserve external reserves
- Increase capacity utilization of agricultural firms
- Create new generation of farmers/entrepreneurs and employment
- Deepen the cashless policy and financial inclusion

- Reduce the level of poverty among smallholder farmers
- Assist rural smallholder farmers to grow from subsistence to commercial production levels.

1.3. **Targeted Beneficiaries**

The financing shall be targeted at smallholder farmers engaged in the production of identified commodities across the country. The Farmers should be in groups/cooperative(s) of between 5 and 20 for ease of administration.

1.4. **Identified Agricultural Commodities**

The targeted commodities of comparative advantage to the State shall include but not limited to:

- Cereals (Rice, Maize, wheat etc.)
- Cotton
- Roots and Tubers (Cassava, Potatoes, Yam, Ginger etc.)
- Sugarcane
- Tree crops (Oil palm, Cocoa, Rubber etc.)
- Legumes (Soybean, Sesame seed, Cowpea etc.)
- Tomato
- Livestock (Fish, Poultry, Ruminants etc.)

Any other agricultural commodity as requested by off-taker and approved based on viability by the CBN from time to time.

1.5. **Eligible Participating Financial Institutions (PFIs)**

The financing shall be disbursed through any of these Non-Interest Financial Institutions (NIFIs):

- Non-Interest Deposit Money Banks
- Non-Interest Windows of Deposit Money Banks;
- Development Finance Institutions (DFIs) through a non- interest window;
- Non-Interest Microfinance Banks (NIMFBs).

1.6. **The Anchor**

This shall be private large-scale integrated processors, aggregators, commodity associations etc who have entered into an agreement with the SHFs to off-take the harvested produce at the agreed prices or as may be reviewed by the PMT. State Governments may act as Anchor upon meeting the prescribed conditions.

1

1.7. Inputs Suppliers

The input suppliers shall submit **expression of interest letter** to the office of the PMT for consideration and issuance of local purchase orders by the Anchor which shall be ratified by the PFI.

1.8. The Facility Amount

Financing amount for each SHF shall be arrived upon from the economics of production agreed with stakeholders. The fund shall be provided from the Micro, Small and Medium Enterprises Development Fund (MSMEDF).

1.9. Rate of Return

Rate of return under the ABP shall be guided by the rate on the MSMEDF, which is currently at 9% p.a (all inclusive, pre and post disbursement). The PFIs shall access based on a structure compliant with non-interest banking principles at 2% from the CBN, and finance at a maximum of 9% p.a (all inclusive).

1.10. Tenor

The tenor of financing under the ABP shall be the gestation period of the identified commodities or as agreed with stakeholders not exceeding 60 months.

1.11. Settlement

Financing granted to the SHFs shall be settled with the harvested produce that shall be mandatorily delivered to the Anchor at designated collection center in line with the provisions of the Agreement signed. The value of the produce to be delivered must cover the financing principal and return.

CHAPTER TWO

2.0   Management and Administration of the ABP

There shall be two models of administration of ABP based on the anchor arrangement namely: **Private Sector-led** and **State windows**. Under each model, a Project Management Team (PMT) shall be established to coordinate the implementation   of the programme.

2.1   Private Sector-led Window

The PMT under the Private Sector-led Window shall be constituted as follows:

● Head DFO, CBN – Chairman

● Representatives of Anchor Firms – Co-Chairman

● Programme Manager, State Agricultural Development   Programme (ADP)

● Representatives of participating Banks

● Representatives of farmers associations

● Nigerian Agricultural Insurance Corporation (NAIC)

2.1.1   Operating Models under the Private Sector Window

The following models are operated under the private-sector window

1)   Prime Anchor Model

2)   Private Sector Model

3)   NIRSAL Guarantee Model

The models vary operationally in the roles and responsibilities of the stakeholders as follows:

2.1.2 STAKEHOLDERS OPERATIONAL ROLES AND RESPONSIBILITIES -PRIME ANCHOR MODEL

-    **CBN:**

a.   Ratifies the Economics of Production (EoP)

b.   Validate farmers' list for participation

c.   Carries out monitoring of project to ensure compliance

d.   Bears 50% credit risk on outstanding amount in default

-    **PFI:**

a.   Processes financing request based on number of   farmers/Hectares validated and the ratified EoP.

b.   PFI Management approves financing to Anchor as primary obligor

c.   Receives collateral from Anchor to cover 70% of total financing amount

d.   Ratifies the supply of input as requested by the Anchor

e.   Manages the project through its life cycle

f.   Bears 50% credit risk on outstanding amount in default

- **Anchor:**
a. Provides list of farmers for participation in the project
b. Provides collateral cover to the Bank for financing amount requested
c. Primarily responsible for supply of quality inputs and Services through LPO issuance
d. Manages the project through its life cycle

-PRIVATE SECTOR MODEL
- **CBN:**
a. Ratifies the Economics of Production (EoP)
b. Validate farmers' list for participation
c. Carries out monitoring of project to ensure compliance
d. Bears 50% credit risk on outstanding amount in default

- **PFI:**
a. Processes facility request based on number of farmers/Hectares validated and ratified EoP.
b. PFI Management approves financing to farmers as primary obligor
c. Receives collateral from   Anchor/Aggregator/Commodity Association to cover 20% of total financing amount
d. Ratifies the supply of input as agreed by the PMT and requested by the Anchor
e. Manages the project through its life cycle
f. Bears 50% credit risk on outstanding amount in default

- **Anchor:**
a. Provides list of farmers for participation in the project
b. Provides collateral cover to the Bank for financing amount requested
c. Issues LPO for input supply and service provided as agreed by PMT
d. Manages the project through its life cycle

-NIRSAL GUARANTEE MODEL
This model involves the collaboration with NIRSAL and deployment of its Credit Risk Guarantee (CRG) Instrument to participating PFIs. It is expected that the CRG will effectively reduce the risks of the PFIs further and enhance more participation under the Programme.
Under this model,
- NIRSAL will provide a maximum guarantee of 75% of the financing to the PFI at cost of 1% CRG fee.
- CBN shall bears 50% credit risk on outstanding amount in default
NIRSAL's participation will include both the Private sector led and the State Government Windows of the ABP in addition to the requirements under each window.

2.2   Public Sector (State) Window

The PMT under the State Window shall be constituted with representatives of stakeholders as follows:

- Head DFO, CBN as Chairman to be co-chaired by the person appointed by the State Government.
- A representative of State Governments/Ministry of Agriculture and Rural Development/Agricultural Development Programme (ADP)
- Participating Banks
- Anchor Firms
- Nigerian Agricultural Insurance Corporation (NAIC)
- Representatives of farmers associations

Under the window, the roles and responsibilities of stakeholders shall include;

- **CBN:**
a. Ratifies the Economics of Production (EoP)
b. Validate farmers' list for participation
c. Carries out monitoring of project to ensure compliance

- **STATE GOVERNMENT:**
a. Provides ISPO to the PFI to cover 100% of Principal and return to be applied for equal monthly repayments through the facility tenor
b. Provide list of farmers to the PFI for BVN validation and farmland mapping by appointed service providers
c. Recover funds from the farmers

- **PFI:**
a. Processes financing request based on number of farmers, Hectares and ratified EoP.
b. PFI Management approves financing to State Government as primary obligor
c. Receives ISPO from State for 100% principal plus return
d. Effects monthly repayment to the CBN
e. Manages the project through its life cycle

2.3 Process Flow of The Anchor Borrowers' Programme (ABP)

The activities shall include:

- Expression of Interest Letter to the CBN by the Anchor/State Government indicating the targeted agricultural commodities, proposed number of farmers, the hectares to be covered and the PFI(s) etc.

5

- Formation of the PMT
- Verification of the farmers and farm sizes by the PMT
- Confirmation of participation by the Head Offices of the   PFI(s)
- Identification of reputable agricultural inputs suppliers by   the PMT
- Organization of Town Hall Meeting to agree on the economics of production per hectare, offtake price, signing of Agreement, and any other relevant issues. The meeting shall have in attendance all the stakeholders including the inputs suppliers.
- Signing of Multipartite Agreement by the, CBN, PFI,   Anchor and the farmers under the following:

○ A Master Agreement between the CBN and the PFI,   which shall include the following:

i. Individual Salam agreements that will be effected at the point of disbursement of funds to the PFI for a total amount of agricultural produce that will sell at 1.02% per annum of the total disbursed amount, based on the unit selling price agreed between the Anchor and the farmers. The time of delivery of the Salam produce and sale of same to the Anchor is at harvest time.

ii. An undertaking by the PFI to sell the Salam produce to the Anchor at the agreed unit price and credit the amount to the CBN.

Iii. All collaterals and guarantees as specified in the section on collaterals.

○ Master Agreement between the PFI and the farmers consisting of individual Salam Agreements that will be effected at the point of disbursement to the farmers by the PFI for a total amount of agricultural produce that will sell at 1.09% per annum of the total disbursed amount, based on the unit selling price agreed between the Anchor and the farmers.

○ Irrevocable Undertaking by the Anchor to purchase the agricultural produce from the PFI and the farmers as and when due.

○ Irrevocable Undertaking by the farmers to sell the agricultural produce to the Anchor.

○ Sale Agreement between the PFI and the Anchor for the procured produce at the agreed selling price. From the delivery of the produce at the collection center by the farmers to the signing of the sale agreement, the produce is at the risk of the PFI.

○ Sale Agreement between the Anchor and the farmer for the remaining

6

amount of his agricultural produce at the agreed selling price and payment into the farmer's account with the PFI.

● Submission of applications from Head Offices of PFIs with the list of farmers in the prescribed format with accounts numbers, gender, farm size, BVN, Telephone numbers, cooperative name and LGA

● Registration of farmers on the National Collateral Registry (NCR).

2.4 Capacity Building of the Farmers

A mandatory training programme shall apply for farmers that will participate under the ABP covering;

● Farming as a business

● Improved agricultural practices

● Group management dynamics

The cost of such training shall be borne by the participating anchor. However, partnerships with Development Partners are encouraged on the training of the farmers.

Certificates issued at the end of the training shall constitute a requirement for farmers to access the facility in kind and cash under the programme.

2.5 Provision of Extension Services

The Anchor/State Governments shall be required to provide extension services to complement the training, ensure adherence to good agricultural practices and mitigate side selling.

2.6 Collateral Under the ABP

The following shall be collateral to be pledged by SHFs under the programme:

● Cross and several guarantee by farmers in cooperatives

● Multipartite Agreement signed by the parties

● Cross and several guarantee by farmers in cooperatives registered on the National Collateral Registry (NCR)

● Commitment deposit by each farmer of a minimum of 5% to secure his commitment to sell the produce to the Anchor as per the terms of the MoU.

Note:

○ Participating farmers under the Programme must deposit the minimum commitment deposit in their accounts with the PFI before loan disbursement

o   No input would be distributed to any farmer that has not provided   the commitment deposit

o   Any PFI that contravenes this basic risk requirement would be sanctioned.

The Prime Anchor provides collateral to the PFI covering 70% of the financing amount to guarantee his undertaking under the MoU.

The Private Sector Anchor provides collateral to the PFI covering 20% of the financing amount to guarantee his undertaking under the MoU.

The Public Sector Anchor provides an ISPO covering 100% of the financing amount to guarantee its undertaking under the MoU.

2.7   Determination of Planting Season

The planting season to be adopted shall be advised by the Ministry of Agriculture/ State Agricultural Development Programme (ADP) from the state planting calendars and reputable Agricultural Research Institutes.

2.8   Side Selling

Side-Selling by the farmers is prohibited and shall attract applicable sanctions as indicated in Section 4.3

2.9   Risk Sharing

In order to engender participation of PFIs in the programme, the CBN shall absorb 50% of the amount in default after satisfactory evidence that every means of settlement have been exhausted by the PFI. The PFI shall bear the credit risk of the balance.

CHAPTER THREE

3.0   ROLES AND RESPONSIBILITIES OF STAKEHOLDERS

3.1   Central Bank of Nigeria

Shall:

• Provide the funds through the MSMEDF

• Coordinate the entire Programme

• Serve as Secretariat

• Chair/Co-chair the PMT

• Review the provisions of the guidelines as deemed   necessary

3.2   Nigerian Agricultural Insurance Corporation (NAIC)

Shall:

• Provide insurance cover to the projects under the Programme in line with the non-interest banking principle

• Ensure timely processing and settlement of claims

• Serve as member of the PMT

3.3   Development Partners

Shall:

• Provide technical assistance to farmers, extension workers and banks

• May serve as member of the PMT in partner States

3.4   **Participating Financing Institutions**:

Shall:

• Verify eligible farmers and their farmlands

• Open account for the farmers

• Ensure due diligence on facility administration, monitoring and recovery

• Conduct searches on the National Collateral Registry (NCR) to ensure that none of the group member is in default of any other facility in any financial institution.

• First applications for release of funds by PFIs MUST be accompanied by copies of executed multipartite Agreements. (See 2.3)

• Obtain written authorization from the farmers to purchase seeds from input suppliers from their accounts on their behalf.

- Register their interest in the collateral on the National Collateral Registry (NCR) as second and any subsequent applications for release of funds by PFIs MUST be accompanied by evidence of COMPLETE registrations.

- Sensitize the group members on the implication of the cross-guarantee as default by one member of the cooperative automatically puts all members in default irrespective of other members paying their individual financings.

- Ratify the issuance of the Local Purchase Order by the Anchor

- Apply for release of funds after completion of all the required conditions precedent to drawdown

- Credit individual farmer's account with the released funds within 5 working days

- Ensure that the financing products used under the non-interest ABP window complies with the CBN Guidelines on Regulation and Supervision of non-interest banking.

- Render monthly returns under the Scheme to the CBN in the prescribed reporting format

- Serve as member of PMT

- Carry out any other responsibilities as may be prescribed by the CBN from time to time

3.5 Small Holder Farmers

Shall:

- Organize themselves into groups/cooperatives

- Cross guarantee one another

- Must demonstrate evidence of farm ownership/lease/rent and agree to work with extension workers

- Utilize the facility (kind and cash) for the purpose for which it was granted

- Commit to abide by the terms of agreement and not to side sell produce

- Settle the facility as and when due by surrendering the output to the PFI and Anchor or State

- Provide commitment deposit of a minimum of 5% to secure his commitment to sell the produce to the Anchor as per the terms of the MoU.

- Representative of the Small Holder Farmer association to serve on the PMT
- Ensure participating member opens bank account and obtain Bank Verification Number (BVN).

3.6   State Government/FCT

Shall:

- Co-Chair the public sector ABP PMT
- Submit Expression of Interest to participate under the ABP
- Identification of the two-targeted agricultural commodities
- Provide extension services to all participating farmers
- Provide logistics support for the success of the programme including training for the farmers and extension services.
- Establish a special 'farmers court' to try defaulting parties
- Train identified farmers for participation under ABP
- Where State act as Anchor, must uptake the farmers produce and pay the farmers through the PFI within 5 days at an agreed price
- Carry out any other responsibilities as may be prescribed by the CBN from time to time

3.7   Anchor Company

Shall:

- Co-Chair the PMT of the private sector ABP
- Identify and organize farmers into groups/co-operatives.
- Participate in the identification of input suppliers
- Train identified farmers for participation under ABP
- Provide extension service experts to support and ensure achievement of the targeted yield
- Monitor harvest and facilitate full evacuation of produce
- Establish produce collection centers which must be within close proximity to farming localities for ease of aggregation.
- Buy-up produce from PFIs and farmers at agreed price
- Pay into farmers' facility account for the produce delivered within 48 hours
- Provide guarantee as stipulated in the guidelines

11

● Carry out any other responsibilities as may be prescribed by the CBN from time to time

3.8 ROLE OF PROJECT MANAGEMENT TEAM (PMT)

Shall:

● Coordinate project implementation
● Coordinate discussions on cost of production per hectare
● Communicate the decisions taken on the project to stakeholders
● Identify genuine input suppliers who must have capacity to supply required inputs within time frame allocated
● Coordinate and monitor project to ensure settlement
● Ensure timely distribution of inputs
● Escalate issues that cannot be resolved in the team to the relevant authorities
● Make sure the programme is delivered and implemented as scheduled and within scope.

3.9 Nigerian Incentive-Based Risk Sharing System for Agricultural Lending (NIRSAL)

Shall:

● Collaborate on Technical Assistance.
● Shall provide CRG for projects that meet pre-conditions
● Carry out any other responsibilities as may be required by the CBN from time to time under the programme

CHAPTER FOUR

4.0 INFRACTIONS AND SANCTIONS

S/N	Infractions	Sanctions
4.1	**PFI**	
1	Diversion of funds to unauthorized activities	● Amount diverted shall be recovered by the CBN. ● Penal charge at the maximum Murabahah/Ijarah rate of the PFI on the amount diverted.

		● Outright ban from participating under other CBN Interventions following another infraction
2	Charging of un-authorized fees/rates	● Reversal of the charged fees/rates ● Issuance of warning letter to the PFI ● Outright ban from participating under other CBN Interventions after two infractions
3	Charging of rates higher than prescribed	● Reversal of excess rates charged. ● Penal charge at the maximum Murabahah/Ijarah rate of the PFI ● Issuance of warning letter to the PFI
4	Failure to disburse funds within specified period to the beneficiaries	● Penal charge at the maximum Murabahah/Ijarah rate of the PFI ● Recovery of the undisbursed amount plus any returns.
4.2	**Anchor**	
1	Failure to collect certified quality output from farmers after going into agreement as the Anchor to the farmers	● Anchor will cease to participate under the programme. ● Anchor will not be allowed to access agricultural and other CBN interventions ● PFI will sell output to a third party at the prevailing market price and make up the difference, if any, from the guarantee of the Anchor. Any surplus from the sales shall go the SHF.
2	Failure to pay for collected commodities within the specified period	● Anchor to pay selling price and mark-up based on the Murabahah/Ijarah rate of the PFI from the due date, and the mark-up shall be channeled to charity by the PFI and not form part of its income.
4.3	**Small Holder Farmers (SHF)**	
1	Side-selling	● Total prohibition from all CBN interventions. ● Blacklisting of the SHF on any intervention by the CBN ● Prosecution of the SHF

13

		● Settlement of the facility by the guarantors and cooperatives
2	Input Diversion	● Blacklisting of the SHF on any intervention by the CBN ● Settlement of the facility by the guarantors and cooperative members
3	Refusal to Submit Commodities to the Anchor	● Blacklisting of the SHF on any intervention by the CBN ● Prosecution of the SHF ● Settlement of the facility by the guarantors and cooperative members
4	Diversion of Funds	● Blacklisting of the SHF on any intervention by the CBN ● Prosecution of the SHF ● Settlement of the facility by the guarantors and cooperative members
4.4 Project Monitoring Team		
1	Insider related contracts and inflation of contract figures	● Suspension/Prosecution of the culpable member(s) ● Report the culpable member(s) to the relevant institution(s)

LIST OF ABBREVIATIONS AND ACRONYMS

ABP: Anchor Borrowers' Programme
ADP: Agricultural Development Programme
BVN: Bank Verification Number
CBN: Central Bank of Nigeria
DFIs: Development Finance Institutions
DFO: Development Finance Officer
DMBs: Deposit Money Banks
FCT: Federal Capital Territory
LGA: Local Government Area
MFBs: Microfinance Banks
MSMEDF: Micro, Small and Medium Enterprises Development Fund
NAIC: Nigerian Agricultural Insurance Corporation
NCR: National Collateral Registry
NIFI: Non-Interest Financial Institution
NIRSAL: Nigerian Incentive-Based Risk Sharing System for Agricultural Lending
P.A: Per Annum
PFIs: Participating Financial Institutions
PMT: Project Management Team
SHF: Small Holder Farmer

All Enquiries and Returns should be addressed to:

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June 2020

The Agriculture Promotion Policy
(2016 – 2020)

Building on the Successes of the ATA, Closing Key Gaps

Policy and Strategy Document

FMARD
FEDERAL MINISTRY OF AGRICULTURE
AND RURAL DEVELOPMENT

Contents

1. Foreword

Starting in 2010 – 2011, the Government of Nigeria, after years of benign neglect, began to reform the agriculture sector. To refocus the sector, the Government implemented a new strategy, the Agricultural Transformation Agenda (ATA). In 2011-2016, the focus was on rebuilding a sector whose relevance had shrunk dramatically. That was reflected in the lack of lending to farmers by the financial system and the dramatic levels of food imports from across the world. That intervention, the ATA, served its core purpose of helping refocus Nigeria's attention on agriculture.

Today, as we evaluate the progress made under the ATA, it is apparent that additional work is still required in order to meet our objectives. Nigeria still imports a significant amount of food. Nigeria is also not earning significant foreign exchange from agriculture, meaning we are losing on both ends. Therefore, it became paramount to "refresh our strategy" to tackle these 2 issues head on. The Agricultural Promotion Policy (APP) is that refreshed strategy.

The purpose therefore of this policy document is to provide a disciplined approach to building an agribusiness ecosystem that will solve these 2 gaps. The private sector will remain in the lead while government facilitates, as well as provides supporting infrastructure, systems, control processes, and oversight. The key federal MDAs will take on more of a regulator's role to ensure a nuanced commercial development of the market necessary to close these two gaps.

The success of the new policy will be driven by the levels of engagement of market place participants, farmers, states, investors, financial institutions, and communities. Other stakeholders from research laboratories to the Nigeria Customs Service to donors will also play vital roles. Performance will be tracked and published periodically to help inform smart decision making, but also to reinforce our fundamental goal of leveraging the capabilities of Nigeria to ensure food and income security.

The Ministry and its partners believe that the APP will be a platform for generating enduring results, and we look forward to delivering on its promise.

Chief Audu Ogbeh
Honourable Minister, Federal Ministry of Agriculture & Rural Development
June 21, 2016
Abuja FCT, Nigeria

2. Acknowledgement of Stakeholders

This policy document is the outcome of an intensive consultative process starting in November 2015 through April 2016, and involving multiple stakeholders. From farmer groups to investors to processors to lenders to civil servants to academics, many stakeholders provided detailed input, commentary, and support. We are grateful for the resources, energy and intellect put at the disposal of the Federal Ministry of Agriculture & Rural Development by parties too numerous to mention. Thank you for your continued dedication and resolve to build a next generation agribusiness economy in Nigeria.

3. Executive Summary

Nigeria is facing two key gaps in agriculture today: an inability to meet domestic food requirements, and an inability to export at quality levels required for market success. The former problem is a productivity challenge driven by an input system and farming model that is largely inefficient. As a result, an aging population of farmers do not have enough seeds, fertilizers, irrigation, crop protection and related support to be successful. The latter challenge is driven by an equally inefficient system for setting and enforcing food quality standards, as well as poor knowledge of target markets. Insufficient food testing facilities, a weak inspectorate system in FMARD, and poor coordination among relevant federal agencies serve to compound early stage problems such as poor knowledge of permissible contaminant levels.

Putting Nigeria's agriculture sector on a path to growth will require actions to solve these two gaps: produce enough fresh, high quality foods for the Nigerian market; and serve the export market successfully and earn foreign exchange. The new federal Agricultural Promotion Policy (APP) is a strategy that focuses on solving the core issues at the heart of limited food production and delivery of quality standards. As productivity improves domestically and standards are raised for all Nigerian food production, export markets will also benefit impacting positively on Nigeria's balance of payments. Given limited resources and the importance of delivering sustainable results, the Federal Ministry of Agriculture & Rural Development (FMARD) in consultation with partners has identified an initial pool of crops and related activities that will be Nigeria's path to tackling the aforementioned gaps.

First, FMARD will prioritize improving productivity into a number of domestically focused crops and activities. These are rice, wheat, maize, fish (aquaculture), dairy milk, soya beans, poultry, horticulture (fruits and vegetables), and sugar. Nigeria believes that the gap can be closed by partnering closely with private investors across farmer groups and companies to develop end to end value chain solutions. These chains will receive facilitated government support as they make deep commitments to engaging a new generation of farmers, improving supply of specialized fertilizers and protection chemicals, as well as wider scale use of high yielding seeds. In addition, Nigeria expects to work with investors to sharply improve the distribution system for fresh foods so as to reduce time to table, reduce post-harvest losses, and overall improve nutritional outcomes e.g. lowering of diabetic risk, stunting risk, etc.

Second, FMARD will prioritize for export markets the production of the following crops and activities: cowpeas, cocoa, cashew, cassava (starch, chips and ethanol), ginger, sesame, oil palm, yams, horticulture (fruits and vegetables), beef and cotton. FMARD will also work with a network of investors, farmers, processors and other stakeholders to deepen the supporting infrastructure to ensure that quality standards are defined and maintained across the value chain. That will involve adding more testing laboratories, improving traceability of crops, disseminating intelligence on export markets and consumer preferences, etc. Our goal is to build a high quality brand for Nigerian foods based on rigorous data and processes that protect food safety for both domestic and export market consumers.

To ensure that the strategy is executed as intended, FMARD is working closely with states and other federal MDAs e.g. Power, Transportation and Trade. FMARD will also evolve itself to become a more focused policy maker and regulator to ensure accountability for results. FMARD will use its convening and related powers to ensure that the enabling system is in place to support agribusiness. From investments in rural roads to reduce transport time to improved security of farming communities to reduce incidence of criminality to reduction in intra-state taxes and levies, FMARD will intensify

oversight. That oversight will ensure that farmers and investors are working in a market that is safe, competitive, and capable of enabling wealth creation in the coming years and decades.

Finally, FMARD will periodically publish metrics to track performance against the strategy e.g. tonnage of rice paddy produced, or yields/milking cow. The systems to repeatedly collect accurate data and integrate these into policy making, as well as investor planning will be refined over the next few months as part of this next wave of reform. We anticipate that if successful, key gaps such as Nigeria's continued imports of rice will disappear, while Nigerian produce e.g. beans and cocoa will once again become a quality benchmark across the globe. Reaching that point will require significant investments in people, processes and systems. Nigeria is committed to taking the necessary steps in order to move Nigerian agriculture from "a business" to a commercial ecosystem that can produce the capabilities necessary to create sustainable jobs and wealth.

4. Introduction to the Agricultural Promotion Policy (APP)

4.1 Building on the ATA Legacy

Starting in 2010 – 2011, the Government of Nigeria, after years of benign neglect, began to reform the agriculture sector. To refocus the sector, the Government implemented a new strategy (the **Agricultural Transformation Agenda**, ATA) built on the principle that agriculture is a business and therefore policy should be about supporting it. The main priority of policy was to **"restart the clock"** and reintroduce the Nigerian economy to sustainable agriculture centered on business-like attitude driven by the private sector. That strategy was in place from 2011 – 2015.

The ATA was a good platform to re-engage key stakeholders in Nigerian agriculture to shift focus towards how a self-sustaining agribusiness focused economy could be built. The ATA focused on how to make Nigeria's agriculture more productive, efficient and effective. It set a target of creating 3.5 million jobs by 2015; generating foreign exchange, and reducing spending on food imports. Among its key achievements was a restructuring of the federal fertilizer procurement system. Below is a brief summary of some of the key successes of the ATA:

Table 1: Select ATA Achievements (2011 – 2015) by Value Chain Stage

Area	Illustrative Achievements

Input Supply	• Set-up of the Growth Enhancement Scheme (GES) to register small holder farmers and provide targeted input subsidies (E-Wallet)
	     o GES database contains 10.5 million farmers (data integrity not verifiable)
	     o Targeted means-based subsidies provided to an ~12 to 14 million farmers between 2011 – 2014
	• Farmers gained improved access to inputs i.e. access to fertilizer and of seeds

Financing	• In partnership with Central Bank and Bankers Committee, set up of Nirsal credit guarantees • Revival and partial N15 billion recapitalization of Bank of Agriculture • Engagement with commercial banks to finance GES and boost lending to agriculture from ~1% to 6% of all formal credit by 2015 • Creation of special funds to support farmers e.g. N10B Cassava Fund and FAFIN/KfW Facility of $35M
Infrastructure & Logistics	• Designation of staple crop processing zones; 1st site in Kogi for cassava production remains under development • Concession of Federal warehouses and storage assets
Production	• Introduction of new higher yielding crop varieties e.g. Cocoa, Rice (Faro 42 and 44) • Domestic food production rose by an incremental 20.1M tons (claims not evidence based) o Rice paddy production rose an estimated 2.0 – 2.5 million tons • Creation of a Federal Dept. of Agricultural Extension
Market Access	• Re-establishment of select commodity marketing boards e.g. Cocoa Marketing Corporation
Others	• Reform of the Agricultural Research Network (ARCN)

ATA however also faced challenges and did not deliver on all the targets identified.   For example, Nigeria still imports about $3 to $5 billion worth of food annually, especially wheat, rice, fish and sundry items, including fresh fruits. As a result, Nigeria is not food secure. Wastage levels remain high in production areas, reducing supply of feedstock to processing factories, requiring them to keep importing supplies. The net effect is limited job growth across the agricultural value chain from input production to market systems, and continued use of limited foreign currency earnings to import vast quantities of food.

Below are summarized some of the ATA's shortcomings which have to be tackled in the APP:

Table 2: Select ATA Challenges (2011 – 2015) and Production Gaps by Value Chain Stage

Area	Illustrative Shortcomings
Input Supply	• GES's limited focus and exit strategy set aside, with material implications for Ministry's budget, hence the sharp rise in indebtedness to banks. The system has many leakages from farmer registration and data capture to supply and distribution mechanism. • Insufficient access to improved variety seeds e.g. still a 300,000MT gap between demand and supply of seeds
Financing	• Credit access particularly for small holders remains weak o Nirsal's 2013 change in credit guarantee rules disrupted market for agriculture financing until mid-2015 when rules were reviewed again • Backlog of unpaid GES loans (estimated at N39B) has slowed down bank lending • Of ~$8 billion in domestic and foreign investor commitments often cited, only limited volumes actually moved from idea to reality
Infrastructure & Logistics	• Investment inflows into infrastructure and midstream logistics e.g. warehouses, storage, processing systems remains rudimentary • Staple crop processing zone (SCPZ) strategy has not yield results. For example, Kogi SCPZ has not taken off due to withdrawal of Cargill, the anchor investor from the project
Production	• Growth in food production remains limited due to gaps in input supplies e.g. rice; hence rice imports still exceed $1 billion/annum. Outlined below is an *illustrative* "best estimates[1]" of demand-supply gaps given data quality issues still present in Nigeria. It is anticipated that as production gaps are closed via yield improvements, per/ton equivalent costs will also decline, helping reduce food costs and ultimately, inflation.
Market Access	• Post-harvest losses still an issue but improving moderately • Illegal food imports remain an issue, depriving farmers of market opportunities
Others	• Federal – State coordination of policy became significant challenge; some states made choices at odds with federal approach e.g. continuing direct procurement of fertilizer • Absence of programme delivery infrastructure / unit at the federal and state levels; held back key implementation and donor funding • Data collection and evidence based reporting remains weak, hence tracking results / M&E continues to be a challenge

[1] Based on data drawn from FMARD, NBS, NIRSAL, CNBC Africa, commercial bank project analysis, FAO, USDA GAIN. NDPI Foundation, and private estimates

Table 3: Gaps in Nigeria Demand and Supply Across Key Crops and Activities (2016 Estimate)

Crop	Demand (tons)	Supply (tons)	Observations
Rice	6.3 million	2.3 million	Insufficient supply chain integration remains issue
Wheat	4.7 million	0.06 million	Driven by demand for various types of wheat (white, hard, durum), etc. for bread, biscuits and semovita
Maize/Corn	7.5 million	7.0 million	Limited imports required but can shift due to feed demand
Soya Beans	0.75 million	0.6 million	Animal feed and protein cost alt. driving demand
Chickens	200 million birds	140 million	Gap filled by illegal imports that enter market at lower price point than domestic producers; gap also a moving target based on fast food/QSR demand
Fish	2.7 million	0.8 million	Fall off in ocean catch and weakness in aquaculture yields due to cost of fish feed a constraint on growth
Milk / Dairy	2.0 million	0.6 million	Driven by insufficient milking cows and low yields (~15-25 liters/day versus norm of 35 – 40 liters NZ/US)
Tomato	2.2 million	0.8 million	Actual production is 1.5 million tons but 0.7M ton is lost post-harvest
Yams	39 million	37 million	Limited gap today but volumes expected to rise in planning period
Oil Palm	8.0 million	4.5 million	Refers to fresh fruit bunch (FFB) from which oil is extracted at a 10% - 15% efficiency rate
Cocoa	3.6 million	0.25 million	Demand is global demand which will rise to 4.5M by 2020
Cotton	0.7 million	0.2 million	Demand is for seed cotton and could rise to 1.0 – 1.5 million tons subject to textile sector revival
Sorghum	7.0 million	6.2 million	Demand will rise further as use in feed grows in 2016 – 2020. Import of malt extracts and glucose syrup is currently used to manage gap, hence a commercial threat for Nigerian farmers

On balance, the ATA was an important first step towards rediscovering agriculture. As a result, many companies, individuals and donors are now keen to invest in Nigerian agriculture once again. Agriculture is viewed as a business that can provide a reasonable basis for further wealth and job growth in Nigeria.

With that in mind, the policy and strategic focus is now on how to build on the initial progress made, and transition Nigeria to a new plane In terms of agribusiness performance. That will be the focus of the proposed new policy regime. That new policy's primary focus will be on closing the demand – supply gaps between crop and livestock production. Gap closing will also include tackling related input, financing, storage, transport and market access issues present in key value chains.

4.2 The Buhari Administration's Vision and Approach

Building on the successes and lessons from the ATA, the vision of the Buhari Administration for agriculture is to work with key stakeholders to build an agribusiness economy capable of delivering **sustained prosperity** by meeting domestic food security goals, generating exports, and supporting sustainable income and job growth. In this regard, a number of specific objectives for the period 2016 – 2020 emerge:

- Grow the integrated agriculture sector at 1x to 2x the average Nigerian GDP for 2016 – 2020; sector's historical growth was between 3% - 6% per annum in 2011 – 2015, hence the need to raise performance. Assuming GDP growth of 6% in 2017, agriculture would aim to achieve 6% - 12% , allowing agricultural household income to double in 6 – 12 years, holding all else equal
  - Agriculture's Share of GDP: 23% (Q1 2016)
  - Agriculture's Share of the Labor Force: 70%
  - Agricultural Activity Mix: Crop Production: 85%; Livestock and other non-crop: 15%
- Integrate agricultural commodity value chains into the broader supply chain of Nigerian and global industry, driving job growth, increasing the contribution of agriculture to wealth creation, and enhancing the capacity of the country to earn foreign exchange from agricultural exports;
  - Agriculture's Share of Non-Oil Exports Earnings: 75%
- Promote the responsible use of land, water and other natural resources to create a vibrant agricultural sector offering employment and livelihood for a growing population;
- Facilitate the government's capacity to meet its obligations to Nigerians on food security, food safety and quality nutrition
  - Agriculture's Share of Federal Budget: ~2.0%
- Create a mechanism for improved governance of agriculture by the supervising institutions, and improving quality of engagement between the Federal and State Governments.

Unlocking Nigeria's full agricultural potential requires that Nigeria solve the underlying challenges in its agricultural system, which includes the following:

- **Policy Framework:** Nigeria suffers from policy instability driven by high rate of turnover of programmes and personnel, which in turn has made the application of policy instruments unstable. The outcome is an uneven development pathway for agriculture; lack of policy accountability, transparency and due process of law, relating to willful violation of the constitution and subsidiary legislations governing the agriculture sector. That in turn has made the business environment unpredictable and discourages investors. To address this challenge, Nigeria needs to create a policy structure that matches evidence-driven coordination among decision-making authorities with common and public goals for an agricultural transformation of the country. Building that evidence base requires that Nigeria adopt a consistent fact base to drive decision making, as well as build on prior successes e.g. the Jonathan Administration's pioneering Agricultural Transformation Agenda (ATA).

- **Political Commitment:** This pertains to the non-implementation of international protocols or conventions agreed to with other members of the comity of nations. For example, Nigeria has failed to achieve the targets in the Maputo Declaration that prescribes a minimum of 10% budgetary allocation to the agricultural sector. Political commitment at both the Federal and State levels will be required to enforce reforms.

- **Agricultural Technology:** Persistent shortcomings of the National Agricultural Research System (NARS) to generate and commercialize new agricultural technologies that meet local

market needs. NARS's challenges have been relatively severe particularly around improved varieties of seed or other planting materials and breeds of livestock and aquatic species. The failure to also deliver already proven technologies available on the shelf to farmers' fields where they are needed is a challenge. Addressing these will require better coordination among extension delivery system, the national agricultural research system, as well as public and private sector suppliers of agricultural inputs.

○ **Infrastructure Deficit:** Nigeria's agricultural sector suffers from an infrastructure challenge. Infrastructure such as motor roads, railroads or irrigation dams are either insufficient, or when available, not cost competitive. They are thus unable to operate to support scale-driven agriculture. That imposes an added cost (up to 50% - 100%) on the delivered price of agricultural produce in Nigeria, making it uncompetitive compared to global peers. In order to boost farm productivity, raise the level of marketable surplus and expand value chain participants' access to low cost infrastructure, Nigeria will need to rethink the business and operating model for agricultural infrastructure

○ **Finance and Risk Management**: Nigeria's agriculture sector continues to have poor access to financial services that enable farmers and other agricultural producers to adopt new technologies, improve market linkages, and increase their resilience to economic shocks. Poor access to financial services that enable input suppliers, processors, traders and others in agribusiness to address liquidity and encourage targeted private sector engagement in agriculture remains a challenge. Lending rates still routinely range from 10% to 30% subject to whether the borrower is considered prime, has access to low cost, government-provided financing (BoA, CBN, BOI), or is offered a NIRSAL Plc. -financed interest rate subsidy and credit guarantee. To improve financing options and de-risk value chains further, Nigeria will need to intensify innovation in financing ecosystems,

○ **Institutional Reform and Realignment:** Today, many federal and state agricultural institutions only exist on paper. In fact, the system even ignores local government areas which is actually where a majority of activity takes place. There is a need to streamline, clarify mandates and ensure continued accountability for results. Unless these issues are tackled, Nigeria will continue to struggle with the capacity of its agricultural institutions to deliver on their public mandates. A turnaround will mean, for example, adding more resources such as adding up to 15,000 extension workers, setting up more operational coordination mechanisms between the Federal Government and States in between the National Council of Agriculture, and linking rewards to performance.

In addressing these constraints, the government will apply prudent, market based policy measures to grow the sector, with a clear recognition that widespread poverty reduction through the transformation of the agriculture sector is integral to the country's long run economic growth trajectory and prosperity. Accordingly, this policy statement is anchored on **three** main pillars in line with the constitutional provision for the role of Federal Government in agricultural development:

- Promotion of agricultural investment;
- Financing agricultural development programmes and
- Research for agricultural innovation and productivity.

5. Policy Thrust and Objectives

Therefore in **2016 to 2020**, Nigeria's policy now needs to be readjusted to solve the aforementioned challenges. The go forward federal priorities (in partnership with State Governments) will be the following four: food security; import substitution; job creation; and economic diversification.

Food Security	Import Substitution	Job Creation	Economic Diversification

The new policy regime, tagged the **Agriculture Promotion Policy** (APP) Policy is founded on the following guiding principles, a number of which are carryovers from the ATA reflecting the strong desire for policy stability. New elements added reflect the lessons from the ATA, as well as priorities emerging from the aspirations of the Buhari Administration:

1. **Agriculture as a business** – focusing the policy instruments on a government-enabled, private sector-led engagement as the main growth driver of the sector. This essential principle was established in the ATA and will remain a cardinal design principle of Nigeria's agriculture policies going forward.

2. **Agriculture as key to long-term economic growth and security**—focusing policy instruments to ensure that the commercialization of agriculture includes technologies, financial services, inputs supply chains, and market linkages that directly engage rural poor farmers because rural economic growth will play a critical role in the country's successful job creation, economic diversity, improved security and sustainable economic growth.

3. **Food as a human right** – focusing the policy instruments for agricultural development on the social responsibility of government with respect to food security, social security and equity in the Nigerian society; and compelling the government to recognize, protect and fulfill the irreducible minimum degree of freedom of the people from hunger and malnutrition.

4. **Value chain approach** – focusing the policy instruments for enterprise development across successive stages of the commodity value chains for the development of crop, livestock and fisheries sub-sectors, namely input supply, production, storage, processing/utilization, marketing and consumption. Building complex linkages between value chain stages will be an important part of the ecosystem that will drive sustained prosperity for all Nigerians.

5. **Prioritizing crop**s – focusing policy on achieving improved domestic food security and boosting export earnings requires a measure of prioritization. Therefore, for domestic crops, the initial focus in 2016 – 2018 will be expanding the production of rice, wheat, maize, soya beans and tomatoes. For export crops, the initial focus will be on cocoa, cassava, oil palm, sesame and gum Arabic. In 2018 onwards, the export focus will add on bananas, avocado, mango, fish and cashew nuts. Investments in closing infrastructure gaps to accelerate productivity and investment in these crops will also be sequenced to reflect capital availability and management attention.

6. **Market orientation** – focusing policy instruments on stimulating agricultural production on a sustainable basis, and stimulating supply and demand for agricultural produce by facilitating linkages between producers and off takers, while stabilizing prices or reducing price volatility for agricultural produce through market-led price stabilization mechanisms (commodity exchanges, negotiated off-take agreements, extended farm-gate price under value chains coordination mechanisms, agricultural insurance, etc.)

7. **Factoring Climate change and Environmental sustainability** – focusing policy instruments on the sustainability of the use of natural resources (land and soil, water and ecosystems) with the future generation in mind while increasing agricultural production, marketing and other human activities in the agricultural sector.

8. **Participation and inclusiveness** – focusing instruments on measures to maximize the full participation of stakeholders including farmer's associations, cooperatives and other groups, as well as NGOs, CBOs, CSOs, development partners and the private sector. This places a premium on the role of these organizations or groups as agents of economic change in general and agricultural economy in particular, thereby drawing benefits from their policy advocacy roles as partners to and watchdog of government.

9. **Policy integrity** – focusing policy instruments on measures for sanitizing the business environment for agriculture, in terms of accountability, transparency and due process of law, ensuring efficient allocation and use of public funding and fighting corruption on all programmes involving public resources. This also applies to compliance with international commitments, protocols and conventions that Nigeria is a signatory to.

10. **Nutrition sensitive agriculture** – focusing policy instruments on addressing the issues of stunting, wasting, underweight and other manifestations of hunger and malnutrition with particular reference to the vulnerable groups, which include children under 5, nursing mothers and persons with chronic illness and disabilities

11. **Agriculture's Linkages with Other Sectors** – focusing policy instruments on the connected relationship between agriculture and other sectors at federal and state levels, particularly industry, environment, power, energy, works and water sectors.

Within this overall set of policy principles, the Federal Government will concentrate on providing an enabling environment for stakeholders at federal and state level to play their distinctive roles. The policy emphasis will be on providing a conducive legislative and agricultural knowledge framework, macro policies, security enhancing physical infrastructure and institutional mechanisms for coordination and enhancing access to adequate inputs, finance, information on innovation, agricultural services and markets.

6. Approach and Process

With the APP framework outlined, the next step was to create a Roadmap to guide development and execution. The process of developing the Agriculture Sector Roadmap was as follows: following the endorsement of the draft communique at the 2016 National Council of Agriculture, ten (10) thematic working groups were established by FMARD. Each working group was asked to conduct brainstorming and analysis to identify their sub-sector specific constraints, policy initiatives and suggested programmes. The

development of the Roadmap as the guiding policy framework for the agricultural sector had the following set-up and outputs:

a) Policy Plan
   • Preparation of reports by the ten multi-stakeholder working groups on key policy areas
   • Harmonization of the inputs into one policy document
   • Approval

b) Programme plan for identified policy areas with activities and budgets

c) Investment plan based on weighted priorities across possible intervention areas

7. Thematic Interventions to Unlock Full Potential Under APP

For the APP to move Nigeria closer to unlocking its full economic potential, constraints have to be identified, mapped and prioritized. As noted above, the teams' set-up by FMARD conducted a high level brainstorming and analysis to map key constraints in the agricultural value chain from production to consumption. Emerging from that effort, a matrix of constraints were identified that broadly group into productivity, financing and regulatory constraints. Each team then developed policies and interventions to act as guidelines for resolving a number of these constraints. These interventions and their originating policy choices have been organized into 3 themes as summarised below:

Table 3: Three Organizing Themes for APP

Productivity Enhancements	Crowding in Private Sector Investment	FMARD Institutional Realignment
1. Access to Land 2. Soil Fertility 3. Access to Information and knowledge 4. Access to Inputs 5. Production Management 6. Storage 7. Processing 8. Marketing & Trade	9. Access to Finance 10. Agribusiness Investment Development	11. Institutional Setting and Roles 12. Youth and Women 13. Infrastructure 14. Climate Smart Agriculture 15. Research & Innovation 16. Food, Consumption and Nutrition Security

The discussions, which follow, provide additional detail on the levers within each theme.

4.1. Theme 1: Productivity Enhancements

The discussions that follow are designed to boost system productivity, reduce post-harvest losses and expand market access related activities. The **target outcome** is a blend of metrics including but not limited to rises in **farm productivity** versus base year (% yield increases), reductions in post-harvest losses, share of agricultural input used in Nigeria by consumer goods companies, and **share of Nigerians fresh goods** sold in formal markets e.g. Shoprite**.**

4.1.1. Access to Land and Land Management

Background/ constraints:

Land is a vital input for agricultural production and regulated access to it is critical. A key issue is land title and tenure, which defines the conditions and rules guiding the right to hold a piece of land for one purpose or another. About 95% of agricultural lands are not titled, effectively nullifying their capacity to be treated as collateral for financial transactions. In recent years, the Mabogunje Committee's work began to pilot mechanisms for improving land titling with trial programmes in select states. Other challenges abound, including the doctrine in the law and the reality of community control. For example, the Land Use Act stipulates that State Governors hold land in trust for the people. Yet communities where land is situated can, in practice, throw up road blocks to land access, which contributes to difficulties investors face in acquiring land for agricultural investment. In other cases, the bureaucracy and approving authorities can also be an obstacle to land allocation even when the community's support is not in question. A number of states have made strong progress in this area regarding simplifying the process of land allocation, and issuance of Certificates of Occupancy.

The key constraints are:
- Current Land Use Act is not conducive for agricultural activities (e.g. short-term lease does not allow for agricultural loans, particularly small holder farmers)
- Process of securing and perfecting title is cumbersome, time-consuming and often expensive
- Implementation of policies does not do enough to ensure inclusion of women in agriculture i.e. gender biases in access to land, with women facing more difficulty accessing land than men
- Land grabbing with communities being dispossessed of large parcels of land
- Unclear rules and governance regarding management of land for use in farming versus grazing for nomadic cattle populations

Policy Thrust

Policy to pursue amendment of current Land Use Act:
- Facilitating the recognition and entitlement of land ownership by formal or customary means to assist collateralization;
- Farmer/land registration (identity, location, landholding and soil mapping), and low cost, web-based and digital mechanisms for verifying the existence of such titles
- Land rights that incentivize small farmers to invest in their land and raise their productivity;
- Policies that reduce implicit and explicit gender biases in land allocation and titling processes
- Policies that create a transparent, liquid market for agricultural land, improving likelihood of land being used as collateral
- Policies that allow the farmers who are commercializing to use other land (aggregate) rental markets or land markets;
- Policies that enable migration of farmers who have better opportunities elsewhere in the economy;
- Policies that facilitate establishment of commercial ranches for cattle and reduces risk of clashes between nomads and farmers

- Policies that ensure a balance between economic growth of larger agribusinesses with the economic cost of displacing small farmers, or creating land shortages over time as the rural population grows.

This policy should be firmly rooted in spatial predictions of demographic changes in rural areas.

4.1.2. Soil Fertility

Background

Soil fertility requires attention in view of the need to maintain adequate levels of macro and micro soil nutrients under intensive production systems that remove nutrients from agriculture areas. Soil erosion in Southeastern Nigeria and desertification in the North due to deforestation wash away topsoil with the nutrient layers and pose a threat to soil fertility. Climate change, with temperature increase, speeds up the breakdown of soil organic matter which is essential for water retention and root development.

The key constraints are:
- Better targeting of fertilizers to communities where the use of fertilizer is profitable; and improved incentives for fertilizer supply
- Soil degradation due to inappropriate agricultural practices; soil erosion, deforestation and climate change
- Cost-effective fertilizer delivery by use of technology
- Insufficient mapping of soils by type as an input into designing fertilizer types
- Challenges of balancing fertilizer supply with market access and demand
- Potential for distortions in fertilizer markets due to the GES subsidy

Policy Thrust

Policy to maintain and enhance soil fertility through:
- soil mapping and testing
- crop rotation to improve nitrogen fixation
- soil fertility reconstruction and formal fallow periods
- fertilizer quality control
- use of organic fertilizer
- erosion control measures e.g. tree planting
- soil/crop specific fertilizer formulation
- improved conservation, reforestation and green belt policies
- review GES subsidy and align with overall fertilizer supply / demand strategy to focus efforts in regions requiring the most support

4.1.3. Access to Information and Knowledge

Background/ constraints

In order to increase agricultural productivity and improve agribusiness, the right information is required at the right time for planning and decision-making. This is relevant to all stakeholders in the

sector, including farmers, input suppliers, processors, traders, policy makers, development partners, and researchers. Appropriate information can sharpen opportunities, clarify market access, and enable participants to make choices regarding how to deploy scarce resources e.g. extension support services.

Major constraints are:

- Disjointed and non-accessible information for planning, decision making and innovation
- Limited awareness and capacity to manage information and knowledge at federal, state and local level
- Poor ICT infrastructure to serve many stakeholders
- Poor information exchange and delivery mechanism for farmers, research, private sector, policy makers
- Ineffective research to extension delivery system i.e. limited commercialization of knowledge created

Policy Thrust

- Policy to enhance availability of information and knowledge for farmers, agribusiness and policymakers through implementation of an ICT/KM Framework by
  - Developing agricultural information systems; standards and institutional mechanisms for content generation, policy support, stakeholder dialogue, innovation and learning
    - Focus on disseminating information designed to help farmers make best choices with respect to input costs, equipment leases, agronomic practices, crop prices, and weather
  - Experimenting with new devices to enhance ICT/KM capacity in the sector
  - Reviving regional farm radio broadcasts designed to provide farming communities with timely advice on planting, weeding, harvesting and key prices
  - Promoting the emergence of specialized agricultural information and knowledge from targeted research to address farmer priorities
  - Enhancing reach, effectiveness and efficiency of the extension delivery system (through use of various methods e.g. more extension workers and electronic extension services via SMS)

4.1.4. Access to Inputs (Seeds/ Seedlings, Fertilizer, Livestock/ Fish feeds etc.)

Access to inputs remains a challenge for achieving optimal productivity of agricultural outcomes. Attempts to address this issue in the previous government administration have resulted in subsidy programmes (e.g. GES) which have been characterized by late or non-delivery of inputs. Other problems encountered include delivery of sub-standard or counterfeit inputs, and exclusion of rightful beneficiaries. Therefore, the policy objective is to increase productivity by ensuring access to timely, high quality and price competitive inputs.

4.1.4.1. (Tree) Crop Production

Background/ constraints

Overall national availability of improved seed is an area of attention for enhancing productivity. Nigeria has a number of domestic and foreign seed companies whose activities partially   rely on the

availability of seeds from the Nigerian research system. For example, oil palm seedlings rely on supply from NIFOR, the oil palm research institute in Benin City. Insufficient production of seedlings remains a challenge especially those that can mature faster e.g. cocoa and oil palm. This challenge is in turn worsened by a lack of fertilizer. While domestic companies such as Indorama and Notore produce fertilizer, about 40% - 60% of the volume used domestically is imported. The Dangote petrochemical plant targeted for commencement in 2018 is expected to help solve these challenges.

Major constraints are:
- Rapid commercialization of R&D findings into certified seeds
- Lack of access to sufficient and good quality inputs
- Ill-timed delivery of inputs
- Unreliable distribution and agro-dealer network
- Unsustainable budget commitment to the GES programme due to non-targeted distribution of subsidies
- Deficient farmer identification mechanisms for subsidized inputs i.e. insufficient means testing
- Government interference in the development of private-sector input production and supply companies
- Low level of commercialization, access to information/knowledge
- Tenure issues in long term land ownership/lease

Policy Thrust

- Policy to ensure the availability of timely and high quality inputs by
  - Stimulating domestic production of good quality inputs, especially seeds and fertilizer, by paying attention to early generation of foundation seeds and speeding up the certification process
  - Improving the functioning of the Seed Council
  - Financing for small seed companies as well as engaging with larger seed companies to buy down risks of small holder farmers markets e.g. Nirsal Plc's rice seed financing proposal
  - Engaging standards and quality control mechanisms at various points in the relevant supply chains (e.g. existing fertilizer testing centres)
  - Rechanneling subsidy programmes to ensure accountability, monitoring and evaluation
- Policy to drive emergence of a dense private sector agro-dealer network with capacity to also support near farm storage
- Policy to encourage effective fertilizer use (see *soil mapping* in policy thrust for **Soil Fertility**)
- Policy to encourage:
  - Amendment of current Land Use Act (see *policy thrust* for **Access to Land)**
  - Access to market information on markets and innovations (see policy thrust for **Access to Information and Knowledge**
  - Development of processing and storage facilities (see *policy thrust* on **Storage)**
- Review and facilitate the passage of pending fertliser and seed bills in the National Assembly

4.1.4.2. Animal Production incl. Apiculture

Background/ constraints

Nigeria has made significant progress in in the production of animal protein. Based on baseline work conducted by the in the early 1990s, it is estimated that Nigeria has 13 million cattle, 35 million goats, 22 million sheep and 80 – 120 million chickens. This has helped transform Nigeria's poultry industry into one of Africa's largest. Today, Nigeria has two broad challenges with livestock. First, the country lacks updated census data based on physical surveys and aerial overflights (systematic reconnaissance flights). Second, within specific animal categories e.g. special challenges remain that are not being addressed. For example, the rapid growth in commercial poultry has created its own difficulties that do need to be addressed with respect to waste disposal.

Third, the cattle value chain has become a security problem. Today, the cattle value chain relies on a network of nomadic herdsmen with cattle entering a brief fattening system before slaughter and processing. That supply chain however is both inefficient and a high security risk as roaming cattle increasingly is a source of friction between land owners and herdsmen. In order to protect all parties, a key shift is necessary i.e. retain cattle in ranches. Thus, what is required is for the creation of a more formal ranching system that will use better processes and inputs to extract higher value from in the form of dairy, meat, and leather. The less lean meats will in principle provide a wider range of options for sellers, as well as. Nigeria will actively support investors seeking to set-up modern ranches to raise livestock rather than infringe on the property rights of land owners and users.

Main constraints are:
- Limited knowledge of the Nigeria's livestock assets by size and location
- Conflicts with nomadic pastoral/transhumance system due to feed and fodder insecurity
- Low productive breeds of livestock
- Income loss and human health effects due to pest and disease
- Low incomes to limited access to markets hinged on lack of quality and standards as well as poor transport infrastructure
- Low income from apiculture due to low productivity of honeybees, and low demand from farmers due to lack of knowledge of the benefits of pollination for (tree)crops

Policy Thrust

- Policy to conduct regular, methodology driven livestock surveys and census in order to drive evidence based decision making
- Policy to enhance availability of improved breeds, access to finance and information about improved production methods, markets and prices
- Policy to enhance resistance breeding; promote availably of pest and disease control services, and enhance Livestock identification and traceability; zoning and compartmentalization of livestock; disease surveillance system; quarantine services; Facilitation of nationwide livestock census
- Policies to incentivize set-up of modern ranching, abattoir and processing system
- Policy to stimulate beekeeping by raising awareness about benefits of beekeeping e.g. via dedicated FMARD and State ADP experts working with farmers to install and monitor top-bar hives; use of radio and TV campaign, school programs, etc. would be a backup awareness building process.

4.1.4.3.   Fish and Aquaculture Systems

Background/ constraints

This sector caters for small, medium and large scale marine and fresh water fishing, including aquaculture, with its distinctive constraints. Nigeria has built a large domestic fishery economy but still relies heavily on imported fish and specialized feed for its protein consumption. Data from Customs indicate that Nigeria imports between $400 and $600 million worth of fish and fish products each year, creating an opportunity for further gains by domestic market participants.

Main constraints are:
- Low productive fish breeds in aquaculture
- low production due to lack of inputs (e.g. fingerlings, feed)
- poor water quality (e.g. pollution)
- security constraints in fisheries areas
- low yields due to overfishing

Policy Thrust

- Policy to enhance fish breeding; promote availability of pest and disease control services, and enhance traceability
- Policy to make fishery/aquaculture inputs available by promoting hatchery development, Standardization of hatchery and fish breeding processes
- Policy to reduce insecurity in fisheries areas
- Policy to re-inforce the regulatory framework for fishing activities

4.1.5. Production Management

4.1.5.1.   *Water/ Irrigation Systems*

Background/ constraints

Water is a relative scarce commodity for production and hence requires attention. Increased productivity of crops will require a prudent use of additional water through irrigation. Optimizing the use of available water resources is important and can be achieved by the choice of crops with limited water requirement, use of water conservation techniques as well as efficient irrigation methods. Intensification of crop production, combined with effects of climate change such as desertification and increased evaporation, result in surface water reduction. Further along the value chain, water is essential for processing and hence requires ample attention. The quantity and the quality (clean water) are important factors for food processing and human health. At present, Nigeria uses a system built around River Basin Authorities to allocate water in specified tracts of the country. Unfortunately, that system is yet to provide the right level of water supply across the country; it still has great potential if appropriate investments are made in irrigation systems as has been the case recently in the Hadejia River Basin Authority.

Major constraints are:
- Under-utilization of large dams due to decline in water dispersion systems e.g. pipes,   pump stations and related supporting infrastructure
- insufficient water for full year agricultural production
- insufficient investment in irrigation systems and equipment whether drip or otherwise
- reducing water availability and increasing drought due to climate change and deforestation
- substandard quality of water (e.g. due to overuse of agrochemicals and dumping of wastes)

Policy Thrust

Policy to promote optimize use of water for agricultural production through:
- Revitalizing existing, and development of new, small (earth) dams, tube wells and wash bores.
- Facilitating optimization of the utilization of existing large dams for irrigation.
- private sector investment in irrigation and irrigation systems, including fee for service providers
- Promoting water conservation by harvesting run-off water and reducing desertification by tree planting etc.
- Revitalizing the River Basin Authorities and transforming their role in water availability and pricing

4.1.5.2. Pest & Disease

Background/ constraints

Pest and disease control is critical for incomes in the crops (including tree crop), livestock and fisheries subsectors and important for human health. In specialized systems with a limited genetic base, rapid spread of pests and diseases can occur and attention is required for preventive as well as curative measures. Pesticide overuse may occur during the production or storage process which affects food quality and human health. Overuse has spill-over effects on soil and water bodies with indirect effects on human health. FMARD in addition to promoting safe use of pesticides and other crop protection chemicals intends to also explore integrated pest management control programmes, as well as explore the use of organic control mechanisms.

Major constraints:
- Indiscriminate use of agricultural inputs such as fertilizers, herbicides, pesticides, and veterinary medicines, often leads to contamination of food with chemical hazards;
- Poor disease containment and control mechanisms

Policy Thrust

Policy for safe use of agro-chemicals and pesticides by:
- enhancing regulation, inspection and enforcement of safe use of agrochemicals
- enhancing access to information about safe use of agrochemicals
- quality assurance and testing for residues
- promoting safe alternatives where available e.g. organic pesticides
- integrated pest management and control mechanisms
- facilitate inter-ministerial co-ordination for disease control

4.1.5.3. Mechanization

Background/ constraints

Mechanization of the various steps in the production system for various value systems and commodities is required to enhance productivity and scale up production of the agricultural sector. It has an investment component, which requires review of the modalities of ownership and use for small, medium and large-scale producers. Based on estimates developed by FMARD, Nirsal and Propcom/DFID, Nigeria needs to add over 100,000 - 120,000 tractors and related equipment over the coming 5 to 8 years in order to achieve its production target. Production, maintenance and access to

effective equipment are other aspects that require attention. FMARD intends to work with private sector partners to expand supply of spare parts, ensure compliance with scheduled maintenance, and train mechanics, in addition to boosting the network of entrepreneurial service centers.

Major constraints are:
- Insufficient network of entrepreneurial service centers to provide fee for service mechanization
- Homogenous selection of technology
- Lack of access to machines, equipment and spare parts at affordable rates
- Underdevelopment and poor funding of mechanization research and development
- Poor resource base and poor technical skills leading to low patronage of fabricators
- Pool of trained mechanics and technicians to support equipment maintenance

Policy Thrust

Policy to promote information, finance and availability of relevant equipment along the value chain of key commodities by:
- promoting private-sector-led mechanization services as well as cooperative solutions for private sector-led tractor hiring system
- stimulating domestic production of equipment linked with complementary targeted import and standardization of agro-technology

4.1.6. Storage

Background/ constraints

Given the current post-harvest loss rates of up to 60% for perishable crops, Nigeria needs to rapidly introduce new storage solutions across its agricultural system. At the national level, Nigeria has recently invested ₦66 billion to establish 33 silo complexes, 25 grain aggregation centres, and 9 units of Blumberg warehouses, which have now been privatized by way of concession. The project, which is at varying degrees of completion or deliverables, aims to keep 5% of national output in storage. In addition, if successful, the project will help sustain national food security in terms of food price stabilization, market and macroeconomic stability. It also aims at delivering food in periods of national disaster as well as food aid to regional markets*.*

Constraints:
- Finance is critical to storage; for instance, farmers who need cash quickly are reluctant to store. They thus sell products at the point when poor pricing prevails.
- Poor management of storage facilities, including silos
- Poor food quality, with pesticide residues, moulds and aflatoxin
- Health effects due to unsafe use of pesticide and agrochemicals (inter-ministerial approach);
- Post-harvest losses due to rodents and pests
- Fluctuating and non-accessibility of affordable food during times of emergency, drought etc.
- Underproduction that leads to undersupply of grain and pulses in the market, tightening government competition with private sector buyers while filling the national reserve.

Policy Thrust

- Crowd in private investments into the sector to deepen overall logistics and infrastructure footprint, creating options for farmers and other value chain actors
- Policy to enhance finance, information and availability of proper methods for safe and effective storage (Blumberg large scale; local storage solutions etc.)
- Policy to facilitate public-private partnerships to rapidly expand storage and related logistics support infrastructure
- Policy to improve access to finance and information to expand use of safe and effective small, medium scale storage facilitate by targeting research (e.g. on irradiation) and stimulating private sector solutions; ensuring testing and quality control on agrochemical residues and aflatoxin
- Policy to enhance information about Good Agricultural Practices (GAP) and innovative methods of storage at community, state or federal level, on safe and responsible use of agrochemicals
- Policy to ensure that government maintains a safe storage that can guarantee national food security for a minimum of 1 year; review silos project and other forms of storage to ensure these will meet the goal of 5% grain in storage better and faster
- Policy to enforce standards in quality of storage facilities:
    - Enforcement of minimum Moisture Content for stored food
    - Promotion of the use of alternative pest control in storage

4.1.7. Processing

Background/ constraints:

In Nigeria today, there are broadly two types of food processing: cottage level and industrial processing. Due to insufficient food inspection and standards enforcement, food processing often involves output of uneven quality especially at the cottage level. The challenge sometimes emerges from a lack of standards or when these are present, insufficient enforcement or a lack of enabling systems. For example, while not a case of food processing, the processing of cotton suffers from a clear, industry wide standardization system. As a result, contaminants in cotton e.g. plastic threads in the cotton reduce the grading awarded and therefore the cash returns attributable to the farmer. For crops with export market potential, that imposes a quality penalty as well e.g. recent restrictions on Nigerian beans exports to the European Union due to the presence of contaminants. Rectification of the challenge will require changes to processing standards, training, equipment, and inspection protocols. Such a preventive strategy alongside other investment decisions such as improvements to local infrastructure (roads, power, water, land), will improve economic outcomes for sector participants.

Constraints are:
- Inadequate infrastructure provision around high agricultural produce areas
- Lack of extension services and poor capacity for post-harvest handling
- Lack of quality standards for produce inspection, grading, food safety and traceability, customized to Nigerian conditions for both large and small-scale growers
- Cultural restrictions to modern processing practices and technology (e.g. in the sub-sector of livestock processing/ abattoirs)
- Lack of efficient coordinated government efforts to monitor the inflow of agricultural produce at the land borders, seaport and airports and to follow developments in the international trade arena closely to the benefit of market actors in Nigerian agriculture

- Improper linkage between upstream farm practices e.g. pesticide/fertilizer use, and downstream food quality requirements in domestic and export markets

Policy Thrust

FMARD will promote policies to:
- Crowd in private investments into the sector to deepen value addition and reduce waste
- Enhance access to finance and information about innovative processing methods
- Facilitate out-grower schemes to secure supply of quality inputs from high production areas and improving access to value chain finance
- Enforce quality standards, food safety for markets that ensure emergence of modernized, safe processing zones.
- Enhance capacity of the NAQS of FMARD and Produce Inspection Department of FMITI as well foster policy synergy between FMARD and FMITI on agricultural commodity trade.
- Intensify awareness of public and farmer understanding of food safety protocols

4.1.8. Marketing & Trade

Background/ constraints

Marketing and trade in agriculture have common constraints across rural markets as well as those serving larger urban markets, but there are also differential impacts. Consumption by Nigeria's growing population (~180 million) requires foresight in terms of the types of food demanded and therefore the implications for production, processing, marketing, and trade. These implications are relatively well known (models of demography, geo-located, with clear understanding of how food preferences shift with increased income or urbanization). In general, this roadmap focuses more on the production side, and does not include the derivative needs of a rapidly growing urban market for food. Market access issues will be dealt with in partnership with private sector actors. Finally, Nigeria has not exploited global markets for its key foods e.g. cassava for a variety of reasons including quality, market knowledge and financing issues. While tariff regimes are an issue, the bigger barrier is overcoming the phytosanitary requirements set by importing countries. In order to do that, the entire value chain of stakeholders need to be involved in preparing crops for export.

Major constraints are:
- Infrastructure (road, power, farmer data, etc.)
- Lack of quality market information to enable identification of market opportunities, coordination among market actors and transparency
- Inadequate linkage within multiple agricultural supply chains
- Lack of coordination of efforts to improve efficiency between concerned government agencies
- Marketing constraints due to poor infrastructure and transportation (roads, railways etc.)
- Limited awareness and understanding of key export markets e.g. US, UK and EU
- Poor understanding of the lifecycle of contamination of crops from early stage soil preparation to post-harvest handling

Policy Thrust

Policy to enhance access to domestic and international markets by:

- Crowd in private investments into the sector to deepen private service provision required to enable markets function effective e.g. expand work on Lakaji corridor started by USAID/MARKETS II
- Enhancing access to market information (process, opportunities etc.) by facilitating the establishment of national agricultural information system that provides easy access to information on markets, regulations, price discovery etc.
- Establishment of inter-ministerial working group to address the challenges of agricultural business
- Quality assurance and disease control via traceability
- Policy around quality control and standardization on crops, livestock, fisheries including apiculture
- Policy to improve infrastructure to reach markets
- Create export market support teams to work with other key agencies in MITI to provide seminars, guidance and support to Nigerian exporters to win in select markets e.g. China, US, EU and UK

4.2.   Theme 2: Crowding in Private Investment

The discussions which follow are designed to deepen the financial sector's engagement with the agribusiness value chain. The **target outcome** is a lower cost of financing and a greater availability of such financing as measured by **cost of capital (%) paid, number of loans issued versus overall credit provision, levels of private capital formation, and the number of participants in the sector.** Note that while they are not explicitly listed here, there are a number of APP priorities for which crowding in of private investment is a key goal. These include Storage, Processing, Marketing & Trade, and Infrastructure. While FMARD will continue to make selective interventions in these areas, encouraging private capital to take the lead on driving projects into these spaces is a key shift.

4.2.1.   Access to Finance

Background

Agricultural finance is critical for producers of all sizes (from smallholder farmers, medium size farmer and larger commercial farms) as well as to properly-functioning input supply markets, processors and traders. Beyond the access to capital – defined as volume and price of capital, a related issue includes competition. It is vital that finance and risk management tools be available from multiple sources (channels), other than the conventional banking system; examples are public capital markets, private equity and other non-bank channels. However, the current policy efforts to mitigate these issues while partially successful (e.g. raising lending from 1% in 2011 to ~6% in 2015) can do even more. Based on prior discussions between CBN, the Bankers Committee, FMARD and NIRSAL Plc, a 10% of all formal credit provided should go to agriculture by 2017 – 2018. Access to insurance contracts also remains a challenge. While new providers have been licensed by the Insurance Commission to retail agricultural insurance (e.g. IGI), NAIC remains the dominant supplier. However agricultural insurance penetration remains below 3% (measured by farmers enrolled and cropping area covered) versus 10% target (using India and China as proxies) which would be a reasonable target by 2021.

Constraints

- insufficient access to credit and insurance products
- inadequate mechanism and channels for agricultural financing

- prohibitive interest rates for the agricultural lending
- non-recognition of cooperative and other farming-based organizations by financial institutions
- Inadequate capacity of financial institutions to lend to the agricultural sector, and inadequate capacity of FMARD to facilitate agribusiness investment.

Policy Thrust

- Policy to enhance availability of credit for all farmers and agribusiness through:
  - stimulating cooperative banking and affordable loans through commercial banks
  - increase in capacity and size of market-driven guarantee and risk schemes (e.g. NIRSAL)
  - legislation recognizing alternative finance mechanisms e.g. warehouse-receipt financing, commodity-trade financing, crowdsourcing, private equity, etc.
  - deepening of FMARD's capacity to facilitate agribusiness investment agreements
- Engagement with legislature to increase public sector funding to the minimum recommended 10% of the national budget
- Access to savings
- Improved financing for agro-dealers to offer trade credit
- Policies that support quasi-equity financing for growth of agribusiness companies, etc.
- Access to multi-year finance as well as seasonal shorter-term capital.
- Review structure of agricultural insurance markets in partnership with the Insurance Commission to intensify competition and product innovation
  - Partner with Nirsal Plc to expand access and grant making to support actuarial training
  - Drive for mass market access to insurance contracts including multi-peril insurance, improvement of leasing, lowered transaction costs for financial services
- Improved use of existing collateral (and asset-based lending)
- Revision to existing subsidies regimes e.g. GES to more pareto optimal targeting and structure e.g. ATM cards pre-loaded with cash and redeemable only at inputs suppliers

4.2.2. Agribusiness Development

Background/ constraints

One of the policy thrust components of the present Government is prioritization of private sector as an engine to drive growth of Agricultural sector. This has required the development of some effective institutional frameworks to facilitate and coordinate the delivery of Agribusiness and Investment Services.

The post-harvest handling of agricultural produce is an important component of value chain development, and a catalyst for progressive and sustainable expansion of agribusiness, investment and agro-processing activities, thereby eradicating waste and ensuring import substitution, food security, wealth creation, employment generation, human capital development and security of human life and property.

Lack of government coordination (100%), inconsistencies in policy, regulatory, laws, taxes and administrative practices (94%), lack of security of raw material supplies to food processors (75%), lack of human capital (50%), were identified as top constraints facing agribusiness investors in Nigeria from two recent surveys commissioned by FMARD in 2013.

Major Constraints:
• Absence of appropriate and adaptive processing technology at small scale level
• Absence of rural infrastructure to support rural primary processing
• Inadequate capacity for processing or crude processing methods
• Lack of quality control and standard
• Low private sector investment in agriculture/agro-processing
• Absence of low cost, market-oriented research prototyping
• Inaccessibility and high cost of fund for agro-processing
• Low level of capacity of local fabricators
• Poor quality of information and irregular dissemination impedes investors' abilities to properly plan investments
• No single point of contact: Investors do not know how to find available services and are compelled to interact with resources across multiple MDAs to achieve their objectives
• Ill-timed service delivery: Delivery of Government service are frequently delayed, while contracts and MoUs with MDAs and State Governments can go unfulfilled

Policy Thrust
• Promotion of access to agro-processing through both public intervention and facilitation of private sector investment.
• Revitalization of Staple Crops Processing Zones, Agribusiness Incubation Centres and Agro-industrial parks
• Partnership with State Governments to incentivize agribusiness development including safeguards for small holders, rapid collateralization of land, and focused infrastructure access
  o Provision of rural infrastructure, roads, water, electricity and others
• Harmonization of standards, quality and other food safety measures for food security, market and trade
• Facilitation of provision of modern paddy handling equipment in key clusters
• Establishment of price discovery mechanisms and selective use of supports
• Establishment and leverage in a consultative capacity of a National Agribusiness Consultative and Advisory Forum.

4.3. Theme 3: FMARD's Institutional Realignment

The discussions which follow are designed to deepen the capacity of the Ministry and its key partners to regulate the sector, engage previously excluded stakeholders, lead policy dialogue and broker the necessary agreements to improve the ease of doing business in Nigeria's agriculture space. The **target outcome** is a more engaged agribusiness market space and ecosystem as measured by **ease of doing business in the sector.**

4.3.1. Institutional Setting and Roles (Federal vs. State Government vs. Local Governments)

Though the two tiers of government – Federal and State – have authority over agriculture, collaboration has not always been smooth, nor desirable results generated. Therefore, in order to ensure full potential henceforth, both parties have to focus on greater collaboration, implementing policies jointly approved at the National Council on Agriculture. Both parties have to set-up mechanisms to remove conflict and focus squarely on implementation. Beyond the obvious, at the farm level, delivering results is truly about local government areas (LGAs). LGAs are truly the field operators with whom investors often deal with, and therefore cannot be a footnote in economic reform discussions. Important that ALGON be consulted and actively engaged to improve operational effectiveness of agriculture.

Constraint:
- Apathy in states for key programmes driven by federal government
- History of non-involvement of LGAs in policy execution due to implicit control issues between States and LGAs
- Disturbance by government intervention of market processes and hampering development of the private sector
- Scattered, incompatible or inefficient policy processes and programmes of the various stakeholders at federal and state levels

Policy Thrust

- Identify ways of boosting cooperation and accountability at the State level to ensure reform is carried out consistently
- Create explicit partnership with LGAs with a focus on operational and investment execution issues from infrastructure to community relations to access to high quality talent
- Leverage improved federal-state dialogue to engage other investors and improve levels of communication in the agribusiness economy further

4.3.2. Youth and Women

The joint issue here is the need to maximize the contributions of women and youth to agricultural production and elimination of discriminatory practices in the employment of women and youth in the sector. In a number of cases such discrimination is explicit (e.g. via cultural inheritance practices), or inadvertent. A key goal of policy should be to shift behaviors that result in negative outcomes for youth and women, and reinforce such shifts by expanding wealth creation opportunities for youths and women.

Constraints:
- Poor enforcement of gender based policies, as well as institutional bias
- Lack of capacity and employment opportunities for internship and mentoring
- Limited access to finance
- Lack of mechanization serves as disincentive to women and youths
- Lack of synergy between and among MDAs and other non-state actors in respect of implementation of women and youth programmes

Policy Thrust
- Develop and launch entrepreneurship platforms that create a pathway for youth and women to enter agribusiness economy
    o Expand cooperation with CBN's intervention funds targeted at women and youth e.g. MSME
    o Facilitate investment advisory support for potential entrepreneurs
- Review the subsisting gender policy document with a view to improving the implementation activities
- Expand training of key leaders and influencers across FMARD to ensure gender / youth considerations integrated into decision making
- Expand capacity building for women and youth for entrepreneurship, including technical training and access to financial services
- Facilitate dialogue with farmer groups and service providers (for women and youth) to expand pool of ideas FMARD can pursue to institutionalize change

4.3.3. Infrastructure

The policy recognition for rural development relates to the need, as a responsibility of the government, to reduce poverty in rural areas, alleviating the suffering of rural dwellers and creating enablers for economic take-off in the rural areas. These will be achieved through the systematic provision of individual infrastructural facilities and also through the integrated approach to rural development.

Constraints:
- High mobility of rural population to the urban area in search of better life
- Implicit urban-biased of development policy authorities that ignore the rural areas
- Sluggish growth and development of rural economy to support rural development efforts
- Poor state of rural infrastructure to attract investment in rural areas
- Absence of database for rural infrastructure planning and perpetual reliance of government on old database

Policy Thrust
- Government will ensure that all stakeholders play their roles in the provision of rural infrastructure.
- As approved by NCA already, government will resuscitate and review the Rural Infrastructure Survey project of FMARD, with a view re-establishing the old database for rural infrastructure planning;
- Aggressive promotion of rural infrastructure buildup will be embarked upon
- Economic activities will be promoted in rural areas.
- Aggressive promotion of rural infrastructure will be undertaken
- Improve the enabling environment for investment opportunities

4.3.4. Climate Smart Agriculture

The notion of climate smart agriculture was sponsored by FAO, as an approach to developing the technical, policy and investment conditions to achieve sustainable agricultural development for food security under climate change. This entails (i) sustainably increasing agricultural productivity and

incomes; (ii) adapting and building resilience to climate change; and (iii) reducing and/or removing greenhouse gases emissions, where possible. At the COP21 Summit, Nigeria presented its preexisting position on climate smart agriculture, the Nigeria Agriculture Resilience Framework (NARF). NARF has not been implemented and that will be a key focus area going forward.

Constraint:
- Limited awareness of climate issues, and therefore key changes required to   protect agriculture
- Poor management of land, water, soil nutrients and genetic resources;
- Inconsistency of the governance regimes, policies, legislations and financial mechanisms with the requirements for climate friendly agricultural practices
- Inefficient and unsustainable management of agriculture and natural resources e.g. soil, water, etc.
- Lack of awareness of soil management practices
- Limited availability of drought resistant variety of crops
- Lack of research into climate smart agriculture
- Lack of cooperation and synergy among the key MDAs and other stakeholders
- Absence of comprehensive soil map for Nigeria
- Lack of awareness on climate change and its effects on agricultural practices
- Lack of access to alternative energy use
- Poor infrastructure to support climate smart agriculture

Policy Thrust

- Boosting public awareness through advertising of importance of climate smart agriculture
- The management of land, water, soil and other natural resources will be improved
- Institutional linkages and partnerships will be strengthened for ensuring climate smart agricultural governance, policies, legislations and financial mechanisms
- Environmental impact assessment will be carried out on major agricultural projects
- The use of renewable energy will be promoted with the involvement of private sector
- Broad public and stakeholder awareness on Climate Smart Agriculture will be created
- Government will facilitate soil map to improve land use and management practices
- Government will increase the adoption of global best practices on climate change, including the aspects of adaptation, mitigation and carbon credit

4.3.5. Research & Innovation

Agricultural research is recognized as a critical enabler of economic growth. It is therefore prioritized by the constitution and explicitly assigned as the primary responsibility of the Federal Government on the Concurrent Legislative List. Thus, the importance of agricultural research on the policy agenda of the Federal Government, towards national food security, import substitution and job creation cannot be overemphasized. To this end, the Federal Government will engage its institutions and bodies at different locations in the country, to conduct research for increased agricultural productivity and to make the research results available to farmers and other actors in the agricultural development of the states.

In this regard, institutions and organizations owned by the Federal Government that make up the National Agricultural Research System (NARS) comprise **15** Commodity-based Research Institutes, 11

Federal Colleges of Agriculture, a specialized National Agricultural Extension Institute, over 50 Faculties of Agriculture in regular Federal Universities; and 3 specialized Universities of Agriculture. The activities of these institutions come under the purview of Agricultural Research Council of Nigeria (ARCN), which oversees their operations. In addition, Nigeria hosts a number of relevant international research institutions e.g. the International Agricultural Research Centre (IARC), and the International Institute of Tropical Agriculture (IITA). However, despite the existing institutional capacity, the NARS has not been able to engineer a significant and sustainable agricultural growth that would ensure national and household food security, create wealth and employment and make Nigeria a competitor in the global food markets. Part of that is the result of a weak mechanism for translating research into field usage. The well documented weaknesses in the extension system as well as a failure to properly incentivize innovation at the inventor level are contributing factors.

Going forward, Nigerian agricultural research also has to contend with the need to become climate smart. That shift will require different research priorities, development of new varieties, and a more rapid co-creation cycle with industry and operators.

Constraints:
- Poor and irregular funding for agricultural research and extension,
- Research outputs not demand-driven
- The research-extension linkage system is weak; so the technologies or innovations generated are not effectively delivered to farmers or commercialized for the benefit of end users.
- Departure in the programmes of the universities of agriculture from their statutory mandate in relation to the programmes of FMARD

Policy Thrust

Policies that will drive improvements here include:
- incentives for NARS to improve its ability to attract talent, maintain productive partnerships (domestic and foreign)
- expand research community's capacity to leverage digital innovations to lower costs of field work
- incentivize NARSs to engage with farmers more broadly and at lower price point / cost as a step for ultimately improving extension services to farmers.
- reform and reposition the ARCN to strengthen it for more effective delivery of its mandate activities, with particular emphasis on the following aspects:
  - review process for granting intellectual property and upside to researchers at ARCN institutions
  - encourage set-up of start-ups and venture companies to license and commercialize existing and future intellectual property emerging from the ARCN
- Empower and strengthen ARCN to set and drive the national intellectual agenda for agricultural research;
  - Resuscitate the Competitive Agricultural Research Grant Scheme;
  - Reactivate the process of establishment of the Center for Crop and Animal Improvement for training of breeders;
  - Pursue, vigorously, the establishment of spin-off companies in Research Institutes & Colleges;
  - Support FMARD in negotiations with the World Bank towards securing funding for WAAPP-2 Nigeria that is expected to commence in 2017;

- o Strengthen existing Adopted Villages, Agricultural Research Outreach Centers (AROC) and Agricultural Research Technology Transfer Centres (ARTTC) and the establishment of new ones.
- o Establish select commercial farms to demonstrate research results in managing large-scale agriculture.

4.3.6. Food, Consumption and Nutrition Security

Background/ constraints

Food consumption is closely linked to nutrition. Adequate food is required of the right   composition and quality for sustaining good health. Food can be obtained from personal production or purchased on the market. The quality of food relates to the composition of macro and micronutrients as well as safety aspects, e.g. residues of agrochemicals. Furthermore, diseases and other factors determine the nutritional quality and status of food. Intake of micronutrients can be enhanced by fortification, either by direct addition post-harvest or systemically through breeding. As Nigeria's work and eating habits evolve, a striking rise in levels of obesity and diabetes is emerging in urban areas; co-morbidities including kidney disease and cardiac complications are also emerging. It is critical that in the short to medium term, government intensify its work to help evolve eating habits in Nigeria towards a more balanced regimen in order to reduce overconsumption of certain classes of foods e.g. carbohydrates.

Major constraints:
- Low income resulting in low purchasing power for adequate food
- Lack of access to nutritious foods
- Lack of awareness about proper nutrition and importance of balanced diets e.g. food pyramid
- Poor quality of food due to contamination with agrochemicals (pesticide), bio-chemicals (e.g. aflatoxins), or pests and diseases.

Policy Thrust

- Policy to ensure national food security by
    - o expanding strategic food reserves to make food available at short notice during periods of unexpected scarcity and for stabilizing food prices
    - o provide food during periods of emergency due to civil strife or natural disasters
- Policy to make nutritious foods available at local level through school feeding programmes, and fortification of foods through breeding and at post-harvest handling
- Policy to raise awareness about nutritious foods including publishing of the food pyramid in schools and via social media to improve awareness about balance (see discussions on **access to Information & Knowledge)**
- Policy to enhance the quality of foods by proper use of agrochemicals, quality control and testing (see chapter on **Pest & Disease)**
- Policies to encourage continued expansion of organic farming and sale of the freshest foods domestically and internationally
- Policies to create a standard system for food safety inspections, origin tracking and nutrition labeling e.g. caloric content
- Policies to encourage tighter linkages in the supply chain policies of supermarkets and regional farm centres

8. Next Steps: Prioritization, Costing and Implementation

A preliminary prioritization of the policy priorities is presented below. In summary, FMARD's strategy is to initially prioritize investing in systems and markets, and then shift focus to boosting productivity so that farmers and other investors can earn the highest possible return on their increased output.

Note that while activity will occur across the 16 key areas, what will be different will be the intensity of activity. For example, improvements to input productivity will have a lighter touch in 2016 – 2017, while emphasis on improving market access and storage will have a heavier touch in the same planning period. That way, existing gains in productivity will have commercial outlets, setting up the right context for further productivity gains in 2017 – 2018.

Table 4: Preliminary Prioritization and Timelines for APP Implementation

Thematic Category	Policy Themes	2H 2016	1H 2017	2H 2017	1H 2018	2H 2018	1H 2019	2H 2020
Productivity Enhancements	17. Access to Land	Blue	Blue	Yellow	Green	Green	Green	Yellow
	18. Soil Fertility	Blue	Blue	Yellow	Green	Green	Green	Yellow
	19. Access to Information and knowledge	Blue	Blue	Yellow	Green	Green	Green	Yellow
	20. Access to Inputs	Blue	Blue	Yellow	Green	Green	Green	Yellow
	21. Production Management	Blue	Blue	Yellow	Green	Green	Green	Yellow
	22. Storage	Green	Green	Yellow	Yellow	Yellow	Blue	Blue
	23. Processing	Green	Green	Yellow	Yellow	Yellow	Blue	Blue
	24. Marketing & Trade	Green	Green	Yellow	Yellow	Yellow	Blue	Blue
Crowding in Private Sector Investment	25. Access to Finance	Green	Green	Yellow	Yellow	Yellow	Blue	Blue
	26. Agribusiness Investment Development	Green	Green	Yellow	Yellow	Yellow	Blue	Blue
FMARD Institutional Realignment	27. Institutional Setting and Roles	Green	Green	Green	White	White	White	White
	28. Youth and Women	Yellow	Yellow	Yellow	Green	Green	Green	Green
	29. Infrastructure	Green	Green	Green	Green	Green	Green	Green
	30. Climate Smart Agriculture	Blue	Blue	Blue	Green	Green	Green	Green
	31. Research & Innovation	Yellow	Yellow	Yellow	Green	Green	Green	Green
	32. Food, Consumption and Nutrition Security	Green	Green	Green	Green	Yellow	Yellow	Yellow

Legend	Light Touch	Moderate Support	Heavy Support
Definition	Limited Naira and persons allocated; maintenance mode	50% of budgeted investment, persons and political support	100% of budgeted investment, persons and political support
Colour Code	Blue	Yellow	Green

Holding the above initial prioritization as a starting point, the next step are as follows:

1. **Develop a preliminary analysis on the decision process, cost and administrative impact of each policy**
   a. Action item required to implement the proposed reform in terms of decision i.e. executive action, or legislative action e.g. proclamation in Official Gazette
   b. Anticipated cost of implementing the decision e.g. capital expenditure, personnel cost, or administrative costs, and over what time frame e.g. cost of opening cattle ranches by the private sector
   c. Key administrative systems that will be impacted by decision e.g. impact on Federal Extension Department of adding 15,000 new extension workers

2. **Create an implementation plan and timeline for the policy**
   a. What should be done in 2016 versus 2017?
   b. What are the key dependencies in the system to ensure full impact from related policies e.g. impact of financial access on storage

3. **Convene key stakeholders to share emerging cost, decision and implementation plan**
   a. Integrate feedback and refine policy prioritization as appropriate
   b. Commence implementation of the APP

4. **Set up a dedicated implementation support team that will act as an analytical engine as well as project management office for tracking the APP**
   a. Staff team with primarily mix of senior and junior civil servants, with some outside technical and commercial advisory support
   b. Assign responsibilities for executing the APP across key departments and agencies of the Ministry; where appropriate e.g. coordination with State Governments and other Federal MDAs, create a cross-departmental and agency team
   c. Commence execution of the policy and on a quarterly basis, review progress against plan; when necessary course correct as needed
   d. Periodically publish progress updates on key parameters within the Ministry and share with other 3rd party stakeholders

FMARD anticipates that by **August 30, 2016,** all the above steps would be completed, and the first progress review session will occur on October 2, 2016.

9. Appendix: Policy Matrix Summary

The tables below summarize the key policy choices encapsulated in the APP. The matrix is organized along the 3 thematic categories: boosting productivity, intensifying role of private investors, and rebuilding the Ministry's capacity to conduct its core regulatory roles.

Productivity Enhancements	Crowding in Private Sector Investment	FMARD Institutional Realignment
1. Access to Land 2. Soil Fertility 3. Access to Information and knowledge 4. Access to Inputs 5. Production Management 6. Storage 7. Processing 8. Marketing & Trade	9. Access to Finance 10. Agribusiness Investment Development	11. Institutional Setting and Roles 12. Youth and Women 13. Infrastructure 14. Climate Smart Agriculture 15. Research & Innovation 16. Food, Consumption & Nutrition Security
Target: Blend of metrics including but not limited to rises in **farm productivity** versus base year (% yield increases), reductions in post-harvest losses, share of agricultural input used in Nigeria by CPG companies, and **share of fresh goods** sold in formal markets e.g. Shoprite.	Target: lower cost of financing and a greater availability of such financing as measured by **cost of capital (%) paid, number of loans issued versus overall credit provision, levels of private capital formation, and the number of participants in the sector.**	Target: The **target outcome** is a more engaged agribusiness market space and ecosystem as measured by **ease of doing business in the sector.**

9.1 Policy Matrix: Productivity Enhancements

Lever	Value Chain Constraint	Policy Objective	Proposed Policy Reform	Enabling Program	Supporting Program
1. Access to Land	Limited investment and low productivity of small-medium scale producers and the private sector/ investors due to 1. Absence of investment in land due to insecurity of longer –term rights of land use for small, medium and large scale farmers 2. Cultural practices on land use unfavorable to women 3. Land grabbing: communities dispossessed of large parcels of land 4. lack of access to finance since land can't be used as a collateral (Current Land Use Act is not conducive for agricultural activities (e.g. short-term lease doesn't allow for agricultural loans, difficult process in acquiring title to land)	Policy to ensure conducive access to land in order to attract investments by small, medium and large farmers and processors	Policy to: 1) Amend current Land Use Act especially facilitating the recognition & entitlement of land ownership by formal or customary means to assist collateralization	Programs to address: Ad 1-4 - Map, inventory and log ownership / titles of all land in Nigeria using GSP and related low cost technologies - Support reforms to land titling (in States) - support farmer/ land registration (identity, location, landholding; farm size) - improve ease of access to land title information e.g. via low cost web databases - Provide financial institutions link to land title databases and fund collaterization initiatives	1. Enhanced access to Finance (Policy thrust 10) 2. Enhanced access to Information & knowledge (Policy thrust 3); info on land title procedures
2. Soil Fertility	Soil fertility is related to availability of macro and micro nutrients for crops which need to be replenished when harvesting and removal of nutrients with crops. In addition, soil fertility is related to the structure and level or organic matter which determines	Policy to maintain and enhance soil fertility and promote soil erosion control	Refine GES support by expanding access to soil tailored fertilizer e.g. NPK formula adapted to soil fertility, crops and agro-ecological zones	Programs to address: Ad 1: *ineffective use of fertilizer* - make soil map information accessible	Complementary measures: - Enhance Access to land (Policy Thrust 1) - Enhanced access to Finance (Policy thrust 10)

	the capacity to storage water, air and nutrients. Low Productivity due to low soil fertility is due to 1. Non-availability and lack of access and ineffective use of fertilizers especially in high intensity systems 2. soil erosion from inappropriate agricultural practices, deforestation and climate change and cultivation with top-soil run-off in sloping areas			- enhance soil testing and mapping - provide information and enhance awareness of farmers on effective fertilizer use and soil fertility management (See 4. Access to Info & Knowledge - fertilizer quality control and provision - encourage targeted soil/ crop specific fertilizer formulation by agribusiness Ad 2: *soil degradation and soil erosion* - enhance investment in long-term soil improvement as tree planting and use of organic fertilizer (see 1 Land use) - dedicated erosion control and reforestation programs	- Enhanced access to Information & knowledge (Policy thrust 3); info on fertilizer use; identification of erosion-prone slopes, degradation areas; advisories to reduce soil degradation; scenarios on climate change effects - Access to inputs (Policy Thrust 5)
3. Access to Information and Knowledge	Access to information is an essential input along the production value chain. Small/ medium scale farmers and processors don't have access to timely relevant information with effects on productivity and related areas. Moreover information is not available for informed decision-making by stakeholders as agribusiness, government at federal and state level and development partners. This relates to coordination and planning. Constraints are due to: 1. Disjointed and non-accessible information on soil, inputs, weather, production/ processing methods, prices/markets.	Policy to enhance availability, accessibility and use of timely and relevant information and knowledge required by the various stakeholders especially farmers, agribusiness, policymakers, research and education, private sector and donors at local, state and federal level	Policy reform to: - Address the lack of availability, accessibility and use of information and knowledge amongst stakeholders in the sector through the implementation of an ICT/KM Framework - Streamline knowledge generated under FAMRD programs and Projects for systematic screening, messaging and dissemination under the FMARD Knowledge Management Platform	Programs to address: - Development of agricultural information systems, standards and institutional mechanisms for content generation, policy support, stakeholder dialogue, innovation & learning Ad 1. *Making information accessible* - develop a multi-stakeholder Datacenter and Knowledge system with a focus on weather, input costs and crop prices - Foster multi-stakeholder interaction for data and information processing	Complementary measures: - Youth and women (Policy Thrust 13) as special target groups - Research and innovation (Policy Thrust 16) for ensuring information flow to end-users

2. Ineffective mechanisms for processing and exchange of information and knowledge and learning 3. Limited local capacity and infrastructure to connect and identify information and knowledge for productivity increase and innovation 4. Inefficiency in delivery of government and agribusiness services and implementation of policies and programs due to lack of coordination 5. Absence of plans for use of scarce natural resources (soil, water) and reaction to market opportunities for the agricultural sector and monitoring of the sector.		- Align with the Knowledge Management initiative of the Vice President - Develop new strategy for extension services, tightly linked to agricultural research, and promoting demand-driven and pluralistic extension services, involving qualified NGO and Private sector	- Target research to address short and longer-term priorities Ad 2. *Institutional mechanisms* - Set-up a multi-stakeholder mechanism to address constraints in Information & Knowledge flows - Enhance efficiency and effectiveness of the extension delivery system (through use of various methods e.g. e-extension, radio, SMS) and partners e.g. NGOs and private extension services - rebuild national extension services team and add private and NGO based extension workers also Ad 3: *Building capacity* - Raise awareness and build capacity to manage and use information and knowledge - enhance ICT infrastructure and capacity of stakeholders e.g. via SMS, radio and TV advertising Ad 4. *Enhance coordination and learning* - enhance information processing and use by stakeholders for learning and optimal program and service delivery Ad 5. *Planning of the sector* - build capacity in planning of the agricultural sector at federal and state level with use of production and economic models, spatial data

			(GIS) in combination with satellite and other data for monitoring at sector level.	
4. Access to Inputs (various production systems)	**(Tree) Crop Production** incl. vegetables: Low productivity and related low incomes of small- medium scale farmers due to 1. Ill-timed availability and poor quality of fertilizer (adulterated) 2. Ill-timed availability and poor quality of seeds (adulterated) 3. Lack of access to finance; deficient farmer identification mechanisms for subsidized input	Policy to promote timely availability of good quality inputs for crop production via privately controlled agro-dealer network	Policy reforms to: Fertilizers - Ensure approval of the Fertilizer act; ensure inclusion of measures to stimulate domestic production of good quality fertilizer- import only trace micro elements - Promote private sector rural market penetration i.e. agro-dealer networks - Migrate GES to more targeted system and commence gradual withdrawal from subsidy by 2020 except for select poor farmers Seeds - Review Seed policy/act - Identify and leverage global expertise to improve technical know-how - Promote private sector rural market penetration; gradual withdrawal from subsidy Revision of the GES and submission of the revised NAGESS to NASS: - Sharpened and gender balanced targeting of beneficiaries;	Programs to address: Ad 1. Fertilizers: - Analyze and address constraints in private sector fertilizer production and distribution systems with the agribusiness sector - Enhance standards and quality control mechanisms at various points in the relevant supply chains (e.g. fertilizer testing centers) - Stimulate targeted fertilizer composition and distribution linked to soli maps Ad 2. Seeds: - Target the research system to produce relevant crops - increase the number of breeders for key commodities - review and address short term shortfalls in seed availability - Analysis and address constraints in private sector seed multiplication, testing and distribution system with the agribusiness sector - Enhance standards and quality control mechanisms at various points in the relevant supply chains (e.g. seed quality control testing centers) - Review and enhance partnerships with ICCO, World Cocoa Foundation and Cashew Alliance to integrate	Complementary measures for this production system 1. Enhanced access to land (Policy thrust 1) 2. Enhance soil fertility (Policy thrust 2) 3. Enhanced access to finance (Policy thrust 10) 4. Enhanced access to Information & knowledge (Policy thrust 3) 5. Improved Storage (Policy thrust 6) 6. Improved Processing (Policy thrust 7) 7. Enhanced Marketing (Policy Thrust 8)

			- Value chain and geographical focus - Key vehicle for mainstreaming climate change and nutrition	expertise into Nigeria's campaign/APP **Ad 3. Input subsidy (GES)** - Stimulate availability of good quality inputs for smallholders by rechanneling subsidy programs to ensure adequate targeting, accountability, monitoring and evaluation (subsidies to be sharply targeted to address market failures) - Agree and publish timetable for sun-setting subsidy except for most vulnerable farmer population - Negotiate timeline for paying down accumulated GES debt	
	Animal Production (incl. livestock, poultry, small animals) 1. Conflicts with nomadic pastoral/ transhumance system 2. Low productive breeds 3. Limited feed and fodder availability 4. Income loss and human health effects due to pest and diseases 5. Limited or costly access to markets (poor quality, lack of standards and poor transport infrastructure) 6. low income in apiculture and related suboptimal pollination of crops/ trees	Policy to enhance productivity and disease resistance of livestock Policy to stimulate beekeeping	Policy reforms to: Ad 1. - regulate grazing / sedentary livestock zones - Improve incentive for feed and fodder industry (including their establishment in Staple Crop processing Zones) -	Programs to address: Ad 1. - to stimulate sedentary livestock production by fostering access to land, feed, water and markets; settle nomadic/ pastoral groups and move towards intensified livestock production as a demo for upscaling Ad 2. - to enhance availability of improved livestock breeds with higher productivity (milk, meat) and resistance for cows and poultry especially by AI, crossbreeding programs - target research to productivity and resistance breeding	Complementary measures for this production system - Enhanced access to land (Policy thrust 1) - Enhance soil fertility (Policy thrust 2) in relation to organic fertilizer - Enhanced access to Finance (Policy thrust 10) - Enhanced access to Information & knowledge (Policy thrust 3) on productive breed, inputs, pest- and disease, markets incl. quality and standards, - Improved Storage (Policy thrust 6) - Improved Processing (Policy thrust 7) - Enhanced Marketing (Policy Thrust 8)

			Ad 3. - promote production and marketing of feed and fodder by review and addressing constraints in multi-stakeholder setting **Ad 4.** - to promote availably of pest and disease control services, and enhance Livestock identification & traceability; zoning & compartmentalization of livestock; disease surveillance system; quarantine services; Facilitation of nationwide livestock census **Ad 5.** - access to information & Knowledge **Ad 6.** - to stimulate beekeeping by making improved bee types available; raise awareness amongst farmers about benefits of beekeeping for (tree) crops; provide specialized FMARD and State ADP advisers to help farmers get started and manage honey production	
	Fisheries: 1. Low productivity of fish breeds in aquaculture 2. low production due to lack of inputs (e.g. fingerlings, feed) 3. poor water quality (e.g. pollution)	Policy to enhance sustainable fisheries and fish production	Policy reforms to: **Ad 1.** - Expand R&D into new breeds **Ad 2.**	Programs to address: **Ad 1.** To target research to enhance fish breeds **Ad 2.** - To monitor and analysis and resolve issues on the supply chain of aquaculture inputs (fingerlings, fish feeds)	Complementary measures for this production system - Enhance access to land (Policy thrust 1) - Enhance access to Finance (Policy thrust 10) - Enhance access to Information & knowledge (Policy thrust 3) with info on

4. security constraints in fisheries areas (pirates) 5. low yields due to overfishing with risk of structural long-term damage to fish stocks		- Review and ensure enforcement of water act with regard to pollution Ad 3. - re-enforce the regulatory framework for fishing activities and avoid over fishing Ad 5. - partner with Navy to conduct enforcement operations in exclusive zone	- to make fishery/ aquaculture inputs available by promoting hatchery development Ad 3. - to promote availability of pest and disease control services - to enhance traceability; standardization of hatchery & fish breeding processes Ad 4. - to reduce insecurity in fisheries areas e.g. marine army patrols Ad 5. - Programs to re-enforce the regulatory framework for fishing activities	- Fisheries equipment, methods, inputs, market prices etc. - Improved Processing and storage (see Policy thrusts 6, 7) - Enhance Marketing (Policy Thrust 8)
5. Production Management	**5a: Water / irrigation:** Majority of small – medium scale farmers do not use irrigation or do so sub-optimally due to: 1. Lack of access to irrigation equipment 2. Poorly maintained, non-functioning or lack of dams/ reservoirs and large scale irrigation schemes 3. insufficient water for full-year agricultural production; reducing water availability and increasing drought due to climate change, deforestation 4. substandard quality of water (e.g. due to overuse of agrochemicals)	Policy to promote optimized and sustainable use of water resources for agricultural production	Policy reforms to: Ad 1. - Stimulate Private sector investment in irrigation through tax concessions for importation of efficient irrigation equipment Ad 2 and 4. - Ensure Water Bill is passed together with Min. of Water Resources to National Assemble (review the Bill beforehand especially with respect of introducing / strengthening water user associations (WUAs) and quality of water Ad 3. - Create pilot studies on commercial pricing of water and fee for service irrigation business models	Programs to address: Ad 1. - Target research to develop effective irrigation equipment - Access to Finance Ad 2. - Revitalize existing and development of new small (earth) dams, tube wells, wash bores. - Facilitate optimization of the utilization of existing large dams for irrigation. Ad 3. - Promote water conservation by harvesting run-off water and reducing desertification by tree planting etc. - Develop with States scenarios/ models and plans for sustainable use of water	Complementary measures: 1. Enhanced access to finance Policy (Thrust 10): investment in small-medium-large scale irrigation 2. Enhanced access to Information & Knowledge (Policy Thrust 3): on - Appropriate equipment purchase and maintenance - Finance options - health risks of irrigation 3. Improved Equipment (Policy Thrust 4) 4. Climate Smart Agriculture (Thrust 14)

			- Promote leasing as alternative option to medium to long term financing for access to irrigation equipment. -	for agriculture (include for production and processing) - Partner with States and River Basins to explore more efficient ways of off-season water pricing and supply (i.e. dry season farmer) Ad 4. - Raise awareness on water quality and disease prevention	
	5b: Pest- and disease control: Loss of income of farmers due to 1. wide spread pest- and disease that reduce produce (e.g. aflatoxin in groundnut; avian flu in poultry, tree diseases) due to limited prevention and lack of control measures 2. Indiscriminate use of agricultural inputs such as fertilizers, herbicides, pesticides, and veterinary medicines contaminating food with chemical hazards (ban of export of beans to EU due to pesticides)	Policy for • reducing pest and disease in crops, animal and fishery subsector • Safe and effective use of agro-chemicals & pesticides in agriculture	Policy reforms to: Ad 1 and 2. - Enhance regulation and enforce safe use of agrochemicals and fertilizers including organic options	Programs to address: Ad 1. *prevention and control measures* - targeting research and agribusiness to pest- and disease prevention - strengthen pest-and disease inspection - quality assurance and testing for residues - design and launch integrated pest management Ad 2. *lack of awareness and knowledge* • intensify regulation and inspection of pesticides • use extension workers to enhance access to information about safe use of agrochemicals • promoting safe alternatives where available e.g. organic pesticides • control of pesticide residues in food crops	Complementary measures: 1. Enhanced access to finance (Policy Thrust 10) 2. Enhanced access to Information & knowledge (Policy Thrust 3) on • Pest resistant crops/ breeds • Methods to prevent pest and disease • Safe use of agro-chemicals • regulations 3. Enhanced Marketing (Policy Thrust 8) on marketing opportunities organic food / tracing
	5c: Mechanization:	Policy to build on progress from Propcom/Nirsal Mechanization	Policy to:	Programs to:	Complementary measures:

			Ad 1 to 3.	Ad 1 to 3.	- Enhanced access to finance (Policy Thrust 10)
	Government inefficiency, absence of private fee for service suppliers and presumption that each farmer needed to own equipment reduced overall mechanization levels to less than 10% - 15%. Underlying causes: 1. Insufficient number of private entrepreneurs providing equipment leasing services in a market historically dominated by governments 2. Inappropriate offer of technology for different locations and users (e.g. tractors versus light equipment for smallholders) 3. Poor resource base, poor technical skills leading to low patronage of fabricators. 4. Lack of access to machines, equipment and skilled technicians at affordable rates	work; promote availability of relevant equipment along the value chain of key commodities for small, medium and large scale farmers and processors	- stimulate domestic production of equipment linked with complementary targeted import and standardization of agro-technology - Promotion of bank funded leasing as an alternative option for access to agricultural equipment and machineries e.g. TOAN/FCMB/Sterling Bank partnerships	- stimulate domestic production of equipment - enhance standardization of agro-technology - target research to develop appropriate machines & equipment - promote private-sector lead mechanization services as well as cooperative solutions for e.g. private sector-led tractor hiring system. - expand entry of youth service providers as equipment leasing providers in rural areas - Enhance skill building for mechanization maintenance via partnership with private sector, vocational schools and Federal mechanization institute to train technicians to maintain equipment	- Enhanced access to Information & knowledge (Policy Thrust 3) - Improved Storage (Policy Thrust 6) - Enhanced Marketing (Policy Thrust 8) - Target group Women and Youth (Policy thrust 13) for special attention
6. Storage	This relates to storage if food for small, medium and large scale producers and processors. Constraints in storage lead to low incomes of farmers/ processors and health effects of consumers due to: 1. Spoilage of products due to rodents & pests 2. inappropriate access to appropriate storage facilities/ technologies 3. unsafe use pesticide & agrochemicals (inter-ministerial approach); 4. moulds & aflatoxin	Policy to enhance availability of proper methods for safe and effective storage (small- medium large scale storage)	Policy reform: Ad 1 to 4. *to enforce standards in quality of storage facilities*: - Enforcement of minimum Moisture Content for stored food. - Promotion of the use of alternative pest control in storage and safe use pesticide & agrochemicals (inter-ministerial approach);	Programs to address: Ad 1-2, 4. - target research on key storage constraints moulds/ aflatoxin, rodents (e.g. on irradiation) - enhance access to improved storage facilities and measures via complementarity measures (access to Finance and Access Information & Knowledge) - complete concession of existing FMARD storage assets - develop PPP model to facilitate and fast track	Complementary measures: 1. Food Security, Consumption and Nutrition (Policy Thrust 16), Enhanced access to Finance (Policy Thrust 10), and Agribusiness Development (Policy 11): intensify presence of private investors in storage 2. Facilitate investment in small and large scale storage solutions e.g. Blumberg system 3. Enhanced access to Information & Knowledge (Policy Thrust 3): on

				development of additional storage capacity Ad 3. - ensure testing and quality control on agrochemical residues and aflatoxin - Promotion of the use of alternative pest control in storage.	- proper methods for safe and effective storage; GAP and innovative methods of storage at community, state or federal level, - safe use of agrochemicals - management of storage facilities including silos - health effects of contained food and safe food use
7. Processing			Policy to: 1. Promote provision of adequate infrastructure (energy/ water/ roads) around high agricultural produce areas (SCPZ) and coordinate with MDAs and States on power supply and water access 2. Submission of the SCPZ Bill to NASS 3. Review policies on food quality and enforce quality standards, food safety for markets that ensure emergence of modernized, safe processing zones.	Programs to address: Ad 1. - stimulate research on key food processing and ensure access to Info & Knowledge Ad 2. - Introduce and enforce quality standards for inspection, grading, food safety and traceability, customized to Nigerian conditions for both large and small-scale growers. Related measures are to enhance capacity of the NAQS of FMARD and Produce Inspection Department of FMITI - Expand ranks of food quality inspectors at FMARD - Launch awareness campaigns on importance of contaminant free food processing e.g. publicize ppm levels required by crop Ad 3. - Coordinate with MDAs and States to catalyze measures for water access and power supply (use of water,	Complementary measures: - Enhanced access to Finance (Policy Thrust 10) and Agribusiness Development (Policy 11): facilitate expansion of processing facilities in close proximity to production to reduce transport costs - Enhanced access to Information & Knowledge for processors/post-harvest handling (Policy thrust 3) on processing technologies, quality standards, energy and water as well as supply security - Enhanced access to mechanization (Policy thrust 5c) - Improved Storage (Policy thrust 6) - Enhanced Marketing (Policy thrust 8)
	Insufficient integration of agricultural production to the industry, resulting in low value addition, and limited spill over-effects, including in term of growth and job creation: 1. Limited private investments in agro-industries due to absence of enabling environment 2. inappropriate technology (e.g. due to unawareness or cultural restrictions to modern processing practices and technology (e.g. in the sub-sector of livestock processing/ abattoirs); Absence of appropriate and adaptive processing technology at small scale level 3. sub-standard processing methods (hygiene, use of additives etc.) 4. suboptimal power and water supply 5. unstable supply of raw materials	FMARD will promote policies to increase the quality and volume of food processing in Nigeria			

			conservation and alternative energy sources for processing; promote provision of adequate infrastructure; focus on high agricultural production areas (SCPZ) Ad 4. - facilitate out-grower schemes to secure supply of quality raw material - see also Policy Thrust on Agribusiness	
8. Marketing & Trade	Low incomes of small-medium – large scale producers/ processors due to: 1. Low demand/ prices for locally-produced food products as compared to imported products 2. Substandard quality of products 3. Gluts due to lack of information for domestic and international markets- inadequate linkage within multiple agricultural supply chains 4. poor infrastructure (roads, railways etc.) – poor coordination between relevant agencies	Policy to enhance access for agricultural produce to domestic and international markets	Policy reforms to 1. Concession of FMARD silos with intention of catalyzing public warehousing and Warehouse Receipt System operations in Nigeria 2. finalize the privatization of Abuja Commodity Exchange and simultaneously set-up licensing regime that will open up the market for multiple viable and credible exchange operators to compete – in cooperation and with supervision and guidance from the Securities Exchange Commission (SEC) 3. Submission, in coordination with Ministry of Health, of the Food Safety Bill 4. policy to improve infrastructure especially in rural areas, to reach markets	Programs to address: Ad 1. - promote consumption of domestic produced food of good quality - promote export of Nigerian foods into key global markets - explore fiscal policies backing food exports to explore potential for new incentives - set-up FMARD export support team to provide market insight and technical coaching Ad 2. - enhance quality assurance via traceability, quality control & standardization crops, livestock, fisheries incl. apiculture Ad 2 and 3. - facilitate access to market information (prices, regulations etc.) by establishing the national agricultural Information & Knowledge System linked to enhanced access to Info & Knowledge)	

| | | | - monitor the inflow of agricultural produce at the land borders, seaport and airports and to follow developments in the international trade arena closely to the benefit of market actors in Nigerian agriculture
- Promote strengthening of marketing and trade organizations within and across value chain

Ad 4.
- promote development of low cost infrastructure to help open rural producers to new markets | |

9.2 Policy Matrix: Crowding in Private Investment

Lever	Value Chain Constraint	Policy Objective	Proposed Policy Reform	Enabling Program	Supporting Program
10. Access to Finance	This relates to access to finance for short term credit for annual inputs as well as for longer-term investment in agriculture. Constraints in this area are due to: 1. Limited rural credit access points 2. insufficient access to credit and loans for small-medium scale producer/ processors due to need for collateral, risk for crop failure 3. high interest rates for agricultural lending	Policy to enhance availability of credit at reasonable conditions for farmers and agribusiness	Policy reforms to: Ad 1 to 3. - Facilitate and legislate alternative finance mechanisms e.g. warehouse-receipt financing, commodity-trade financing, equipment leasing, crowdsourcing, etc. - Promote incentives for commercial and microfinance banks to develop appropriate financial products relevant in rural areas for farmers, women and youth - Promote inclusive agribusiness development	Programs to address: Ad 1. Expand rural access points: Ad 2 and 3. reduce need for collateral: - intensify push to have lenders lend based on purchase order from downstream user - stimulating cooperative banking and affordable loans through commercial banks, microfinance banks and financial NGOs; - recognition of cooperatives and other farming- based organizations financial institutions	Complementary measures; • Work with commercial banks and large buyers of feedstock to deepen "anchor lender" supply chain based financing • Work with Central Bank of Nigeria (CBN) on ensuring utilization of MSME Fund and Non-Oil Export Fund • Work with Nirsal Plc on expanding innovative use of credit guarantee and interest rebate • Work with NSE and family owned enterprises to use capital markets to go public

	4. limited budget support for agriculture (1% of budget) and therefore limited public financing of inputs		to facilitate small farmers access to technology, services and financing; - Lobby to increase public sector funding to the minimum recommended 10% of the national budget (Maputo Declaration) - Continue reform in the agricultural insurance sector through developing new products (e.g.. micro-insurance, weather-index insurance) and allow private insurance companies to participate to government-sponsored insurance programs - Eliminate NAIC's monopoly on government agricultural insurance contracts -	- capacity development of financial institutions to lend to the agricultural sector - increase capacity and size of market-driven guarantee and risk schemes (e.g. NIRSAL) targeting rural areas - Capacity building of FMARD to facilitate agribusiness investment - Boost agric insurance penetration to 10% by 2021 Ad 4. expand targeted public financing: - intensify push to raise public budget to 10% of spend; refocus on enabling services e.g. extension, rural infrastructure and improving access to capital	
11. Agribusiness Investment Development	Suboptimal productivity and ineffective and costly investment in the agricultural sector by agribusiness due to: 1. Poor land acquisition and land use processes 2. Inability to access appropriate financing; Structurally deficient & inadequate lending to agriculture; high cost of credit 3. Weak infrastructure e.g. electricity, roads; poor rural infrastructure for rural primary processing 4. erratic supply of raw materials and agro-inputs; Low level of capacity of local fabricators; supply insecurity 5. Poor market access due to lack of organized market for agric. commodities in Nigeria	Policy to promote agribusiness sector to optimally play its' driving role for increasing productivity, generate growth and jobs in the agriculture and food systems in Nigeria	Policy reforms to - Reappraise the Commodity Marketing Corporations with a view of restructuring (unbundling & management by farmers / supply chain participants) - One Stop shop (physical and on-line) for investors to foster coordination of stakeholders incl. FMARD, other MDAs and States, and to provide access to information - Intensify private sector partnerships to drive innovative solutions	Programs to address: Ad 1, 3 - See Policy thrusts 1, 3 Ad 3 - See policy thrust on Infrastructure Ad 4-5 - Catalyze establishment of price support mechanisms and supply-security - Promote access to agro-processing through both public intervention and facilitation of private sector investment (widening the SCPZ concept)	Complementary measures: - Enhance access to Land (Policy thrust 1) - Enhance access to Finance (Policy Thrust 10) especially Continuing the support for NIRSAL of the CBN, and work towards the quick restructuring of BOA (through BPE; Creating long-term funding opportunities that will match the financial requirements of the long-term gestation agri-businesses - Enhance access to Information & Knowledge (Policy thrust 3)

	6. Lack of quality control and standards for production/ marketing 7. Poor access and quality of information *(company profiles, policies, marketing systems)* impeding investors' abilities to properly plan investments; Investors do not know how to find available services and are compelled to interact across multiple MDAs; On quality standards for export 8. Absence of research prototyping for products and equipment 9. Institutional issues: - Untimely service delivery: delayed delivery of Government services while contracts and MoUs with MDAs and State Governments can go unfulfilled - Government interference in the development of private-sector input production and supply - contradicting policies due to weak inter-ministerial collaboration/ coordination, double taxation etc.		- Submit the SCPZ bill in coordination with FMITI, Establishing the SCPZ agency to accelerate the implementation of the SCPZ Program and accelerate investment in processing; - Establish Private Investment Monitoring Committee and harness dialogue with partners such as NABG and GROW AFRICA. - Explore domestication of Principles of Responsible Investments from the World Food Security Committee	Ad 6. - Enhance introduction of quality standard and tracing e.g. leverage technical assistance from the World Food Security Committee Ad 7. - See Policy Thrust no 4 Access to Information & Knowledge - Catalyze provision of rural infrastructure, roads, water, electricity and others - Encourage investment in power including alternative energy - Revitalize Staple Crops Processing Zones, Agribusiness Incubation Centres and Agro-industrial parks Ad 8. - target research to address needs of the agribusiness sector in PPPs Ad 9. - facilitate an inter-ministerial National Agribusiness Consultative and Advisory Forum to address the challenges of agricultural business - set up Agribusiness platform to partner with States to drive innovation and results via PPP, special incentives, and technical advisory grants	especially… company profiles, market prices for various commodities, inputs, data on production trends - Enhance access to mechanization (Policy thrust 5c) - Improve Storage (Policy thrusts 6) - Improved Processing (Policy thrusts 7) - Enhance Marketing (Policy Thrust 8)

9.3 Policy Matrix: FMARD's Institutional Realignment

Lever	Value Chain Constraint	Policy Objective	Proposed Policy Reform	Enabling Program	Supporting Program
12. Institutional setting and roles	1. Apathy in states for key programs driven by federal government 2. Absence of local governments from policy execution discussions / processes 3. Disturbance by government intervention of market processes and hampering development of the private sector 4. Scattered and incompatible or inefficient policy processes and programs of the various stakeholders at federal and state level	Enhance optimal fulfilment of roles of all multi-stakeholder mechanisms are in principle to include FMARD, other MDAs, private sector, agribusiness investors, States, LGAs, research/education and development partners	Policy reform to: - Improve accountability of states for growth in agribusiness - Explicit engagement with Association of Local Government of Nigeria (ALGON) to drive competitiveness of agriculture and removal of rural barriers	Programs to address: Ad 1- 3 - facilitate state level intervention through restructuring existing dialogue mechanisms with key stakeholders (FMARD, other MDAs, private sector, agribusiness, States, research/education and development partners) - create investment advisory forum to work with ALGON members to drive results at LGA level; focus on operations to separate from policy role of State Governments	
13. Youth and Women	Youth are an increasing portion of the population with 70% of the population under age 35. It is important to grow employment for this rapidly growing segment of the population. High mobility of rural population to the urban area in search of better life weakens the human resource base required for dynamic and productive agricultural production. Women are the main drivers of small and medium scale agricultural production though have less access to land, inputs and agricultural services than men and hence require special attention. Problems with youth and women in the areas of employment in rural areas and agriculture especially due to:	Policy to foster full inclusion of youth and women in the agricultural sector.	Policy reform to: - Review the gender policy document; implement related activities by shifting key behaviors at the institutional level - Promote a meritocratic entrepreneurial ecosystem designed to migrate youth and women into service provision roles e.g. fee for service mechanization, agro-dealerships, etc. - Transform rural quality of life to reduce urban drift	Programs to address: Ad 1. - partner with private companies to expand rural footprint of modern conveniences e.g. movie theater, shopping malls, etc. Ad 2. - foster building of capacity of women and youths in entrepreneurship, including support to start entrepreneurial ventures, technical training and access to financial services Ad 3	- Enhance access to Land (Policy thrust 1) with a focus on women and youth rights - Enhance Access to Finance (Policy Thrust 10) with a focus on women and youth rights - Enhance access to Information & Knowledge (Policy thrust 3) for women/ youth to enhance access to land, finance and production measures and making program accessible for coordination - Enhance access to mechanization (Policy thrust 65)

	1. High mobility of youth to urban areas 2. Poor skills sets; low literacy levels; Lack of capacity building opportunities 3. Limited access to finance 4. Lack of mechanization and innovation incentives for women and youths 5. Lack of synergy between/ among MDAs and others for implementation of women and youth programs. 6. Lack Access to land 7. perception of drudgery of the agriculture sector by young persons			- See Policy thrust on Access to Finance - Strengthen the capacity of relevant stakeholders Ad 4 - launch enterprise competition to find and empower new entrepreneurs with grants to launch mechanization service centers Ad 5 - foster multi-stakeholder mechanisms and system to enhance collaboration and synergies. - review and ensure institutionalization and effective implementation of women and youths programs Ad 6. - See Policy Thrust 1 Ad7 - expand edutainment program to change the narrative by promoting agriculture as a business	- Improve Storage (Policy thrusts 6) - Improved Processing (Policy thrusts 7) - Enhance Marketing (Policy Thrust 8)
14. Infrastructure	Main problems with rural infrastructure (energy, roads, railways, airport, water supply, ICT connection) are as following: 1. Poor state of rural infrastructure to attract investment in rural areas. 2. urban-bias in development policy 3. high costs of transport due to 'taxes', poor road maintenance, scarcity of transport in rural areas.	Policy to ensure that all stakeholders play their roles in the provision of rural infrastructures. Policy to leverage existing inter-ministerial coordination to problem solve in infrastructure	Policy reform is to: Ad 1. - Incentivize states and private investors to expand pool of rural infrastructure e.g. irrigation, roads, gas, ICT Ad 2. - Promote economic activities in rural areas; provide the enabling	Programs to address: Ad 1, 3 - Setup a multi-stakeholder mechanism to ensure that all stakeholders play their roles in the provision of rural infrastructure and barriers are reduced (energy, roads, railways, airport, water supply, ICT connection, banks);	

			environment for investment opportunities - Identify and address conflicting policies and synergies Ad 3. - Simplify and reduce cost of intra-state transport; consider creating legislation to solve issue - Publish data on cost structure of production by state to encourage competitiveness at state and LGA level	- resuscitate and review the Rural Infrastructure Survey project of FMARD, with a view of re-establishing the database for rural infrastructure planning. Ad 3 - Information & KM raise awareness of rural communities about prevalence or absence of road regulations - provide options for enhancing local transport - explore legislative solution to improve intra-state commerce	
15. Climate Smart Agriculture (CSA)- Climate change	Climate change effects relate to increasing temperatures, more droughts/ erratic rains effecting agricultural production patterns options. Low agricultural productivity and production failures as a result of climate change are due to: 1. limited availability of varieties /breeds adapted to higher temperatures, drought-resistant, new diseases 2. Inefficient and unsustainable practices to manage agriculture and natural resources e.g. soil, water genetic resources etc. 3. Limited synergy among the key MDAs and stakeholders (MDAs, including Ministry of Environment); Inconsistency of governance regimes, policies, legislations and financial mechanisms with the requirements for climate friendly agricultural practices;	Policy to mitigate effects of climate change in agriculture and reduce its negative impact on environment	Policy reform to: - Implementation of the Nigeria Agriculture Resilience Framework (NARF) - Adaption of the Climate Change policy framework for Nigeria 2015 (Review) - Promote adoption of global best practices on climate change, including the aspects of adaptation, mitigation and carbon credit - support policy to reduce deforestation and charcoal production and alternative energy	Programs to address: Ad 1. *Adapted varieties/ breeds* - Target research and agribusiness to make available adapted varieties/ breeds; increasing availability of drought tolerant and short maturing varieties/ breeds; breeding/ multiplication programs for drought-tolerant materials; Ad 2. *Lack of knowledge for adaptation* - Boost public awareness of key climate issues as well as Nigeria's strategy for tackling this; invest in radio, TV and social media campaign - Improve information on Good practices for management of land, water, soil and other natural resources	1. Enhanced access to Finance Policy (Thrust 10): 2. Enhanced access to Information & Knowledge (Policy Thrust 3) with - Information on causes of climates change - About solutions/ technologies of climate smart agriculture and related indicator of climate change - About scenarios and policy forecasts - Projects and initiatives for coordination and dialogue - Access to Finance- insurance - Reducing climate changing emission alternative energy sources

4. Unclear policy measures and longer – term plans due to lack of adequate data on production and environment and climate changes; Lack of research into climate smart agriculture 5. Lack of awareness on climate change and its effects on agricultural practices e.g. changing production zones, desertification, water availability changes; rising temperatures and desertification, change of production systems 6. Soil degradation and increase of CO2 due to deforestation and charcoal production. Lack of access to alternative energy sources in agriculture (micro hydropower, solar, bioenergy)	.		- Provision of strategic information & Knowledge on effects and potentials; soil fertility mapping for agricultural purposes - enhance dissemination of CSA weather & climate information to farmers in partnership with State & other relevant stakeholders (NiMET, Survey General's Office, FMENV, Water Resources, Ministry of Information, NISHA, NASRDA); Ad 3. *Coordination* - Strengthen multi-stakeholder coordination to ensure climate smart agricultural governance, policies, legislations and financial mechanisms. - Asses environmental impact on major agricultural projects Ad 4. *Lack of evidence-based policy* - foster research and policy analysis for scenarios and planning of agriculture across Nigeria with the States in view of the various effects of climate change - Upscale & establish Agro-sensor stations in collaboration with NiMET across agro-ecological zones in the country; Ad 5. *Lack of awareness on causes-effects* - Raise awareness on Climate change effects and climate	

| | | | | Smart Agriculture via access to Information & Knowledge

Ad 6. *Alternative energy/ soil degradation*
- reduce CO2 emissions; promote use of renewable energy with the involvement of private sector; efficiency of emission by more efficient targeted fertilizer use
- promote Tree planting, especially in drought-prone areas to reduce land degradation;

Ad 7. *Compensation risk aversion*
- expansion of agricultural insurance for climate change adaption (weather index crop insurance) | |
| **15. Research and Innovation** | Information and knowledge is not easily accessible to end-users due to:

1. Weak research-extension linkages so technologies or innovations generated are not effectively delivered to farmers or commercialized for the benefit of end users; Research results are not made accessible to end-users

2. Research outputs not demand-driven; Departure in the programs of the universities of agriculture from their statutory mandate in relation to the programs of FMARD.

3. Lack of investment in staff and equipment in research. Poor and irregular funding for agricultural research and extension | Policy to strengthen research and innovation on priority areas and disseminate outputs | Policy reforms to:

- Enhance effectiveness and efficiency of the agricultural research system; shift focus partially to make output more climate smart

- pursue the reform of ARCN to reposition the agency and strengthen delivery of its mandate activities | Programs to address:

Ad 1. Access to information & knowledge
- Implement the Information & KM Framework including a) strengthening capacity of stakeholders to access information, b) aggregate existing information on innovations (of research, projects) and c) enhance access through various means of delivery SMS, radio, extension services
- to document and disseminate innovations and good practices
- target research to address key priorities and ensure close interaction with end-users e.g. Climate Smart Agriculture | Complementary measures:

- Enhance access to Finance (Policy Thrust 10) especially for equipment

- Enhance access to Information & Knowledge (Policy thrust 3) especially on innovations and financing options

- Enhance access to mechanization (Policy thrust 5c)

- Improve Storage (Policy thrusts 6)

- Improved Processing (Policy thrusts 7) |

4. Funding to introduce and apply innovations			Ad 2. - to prepare longer-term research programs on key priorities with aligned funding form government, development partners and private sector. Also ensure efficient M&E system on outputs and finance. Ad 3. Research system orientation - enhance efficiency and targeting of the national agricultural research system (ARCN and institutes) - Review need and relevance of measures and past initiatives as establishing a) a Competitive Agricultural Research Grant Scheme, b) a Center for Crop & Animal Improvement for training of breeders; c) spin-off companies in Research Institutes & Colleges; d) Strengthen existing Adopted Villages, Agricultural Research Outreach Centers (AROC) and Agricultural Research Technology Transfer Centers (ARTTC). Ad 4. - Access to Finance; Access to Mechanization - Drive formation of start-ups and venture funds to commercialize innovations; partner with private investors - Review and revise rules governing IP in ARCN system to ensure innovators are appropriately rewarded	- Enhance Marketing (Policy Thrust 8)

16. Food, Consumption and Nutrition Security	Food security at national level is achieved by a combination of domestic food production, imports and strategic storage. Shortages may arise due to structural or incidental low production (droughts, disasters) and in the absence of sufficient forex and proper infrastructure to import and distribute food across the country. Food shortages (real or anticipated) drive up prices and thereby jeopardize access to food for urban and rural population. At household level a similar combination of own production, purchase from the market and storage determine access to food and nutritional security. In addition to the quantity the quality of food (macro/micro) nutrients are important. Nigeria's food consumption needs to on balance become healthier and mindful of downstream implications e.g. diabetes due to starch levels in an increasingly sedentary population. Children and women of child-bearing age are particularly prone to the effects of under-or malnutrition requiring special attention. Problems and constraints in this area are due to: **National food and food security** 1. Low production that leads to under supply of grains and pulses in the market, resulting in government competing with private off-takers for filling the national reserve. 2. Inappropriate food storage facilities to mitigate fluctuating production and poor accessibility of food during times of emergency, drought etc. 3. limited forex to finance food imports	Policy to ensure national food and nutrition security by ensuring adequate availability of safe and nutritious food at affordable prices for rural and urban population in Nigeria at national and household level	Policy reforms to: - promote sustainable agriculture and food systems to improve freshness and quality of Nigerian food intake - set nutrition standards to reduce increasing cases of diabetes and obesity - promote private management of the grain reserve silos	Programs to address: **National food and nutrition security** Ad 1. - measures under Policy Thrust 1-9) Ad 2. - review of the silos project and other levels of storage to meeting the goal of 5% grain in storage; - maintaining strategic reserves to food make available at short notice during period of strive and for stabilizing food prices; maintain a safe storage that can guarantee national food security for a minimum of 1 year? - provide food during periods of emergency due to civil strife or natural disaster - promote private sector led initiatives to enhance cooling and cold chain, processing and packaging of nutritious food Ad 3. - import substitution and export promotion **Household level food – and nutrition security** Ad 4 - To enhance productivity and incomes of small/medium producers through measure under Policy Thrusts 1- 9)	Complementary measures: - Enhance access to land (Policy thrust 1) - Enhanced access to Finance especially short term credit during off-season - Enhanced access to Information & Knowledge (Policy thrust 3). This includes food consumption and nutrition data as well as information on nutritious varieties/ breeds, nutritionally sound food consumption practices, storage methods, pest-and disease - Enhance access to inputs especially access to nutritious varieties (including use of (bio)fortification) - Reduce risk of contaminated of foods by proper use of agrochemicals and testing (see Policy 5b Thrust on Pest & Disease). This includes a comprehensive aflatoxin control strategy - Enhance access to mechanization (Policy Thrust 5c) - Improve Storage (Policy thrust 6): household food storage solutions; reducing post-harvest losses

	Household level food – and nutrition security (Under –and malnutrition) 4. high level of under/malnutrition 5. insufficient household food production and storage 6. insufficient purchasing power for adequate food throughout the year 7. suboptimal use of nutritious foods due to lack of awareness about proper nutrition 8. inaccessibility of nutritious food at local level/ market 9. Poor quality of food due to contamination with agrochemicals (pesticide) or pests & diseases (e.g. aflatoxin) 10. Rise in food related illnesses e.g. diabetes, renal failure and cardiac challenges particularly in urban areas			- To enhance household food storage solutions (Policy Thrust 6) **Ad 5.** - To stimulate short term credit at affordable rates access to Finance **Ad 6.** - Programs to raise awareness about and generate demand for nutritional foods (Policy thrust 5c on Pest-and Disease control and 4 Access to Information & Knowledge) e.g. Radio and TV advertising - Support the development of a national food consumption and nutrition monitoring system - Promote expansion of organic food production - Awareness raising on use for health effects of inappropriate use of agrochemicals and positive effects of use of nutritious foods (Policy thrust 4 Access to Information & Knowledge).via radio and TV advertising **Ad 7.** - promoting production, processing and consumption of nutritious foods incl. vegetables, poultry, dairy - fortification of foods through breeding (Vit. A in cassava, potatoes cereals etc.) and medium-large scale food fortification.	- Improved Processing (Policy thrust 7) incl. fortification options - Enhance Marketing (Policy Thrust 8) to enhance market access for producers

			Ad 8. - to make nutrition foods available at local level through to children via effective school feeding programs linked to local production - where relevant ensure (bio) fortification of food Ad 9. - see Policy thrust on Pest-and Disease 6b) Ad 10. - see Ad 7 - focused on publishing food pyramid and promotion of balanced diets	

ABSTRACT

Exploratory study for resilient wheat farming in Nigeria

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ABSTRACT

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Abstract

Wheat growing has been the most difficult aspect of Nigerian agriculture for decades. Certain issues remain unresolved, posing a threat to the country's goal of diversifying revenue and lowering its growing reliance on imported wheat. Low wheat production, insecurity in Nigeria's wheat region, a lack of mechanized and updated farming techniques, and uncompetitive pricing are among the issues.

This study for resilient wheat farming in Nigeria was conducted with the specific objectives of exploring the sociopolitical situation affecting wheat farming, studying the perceived effects of climate change on production of wheat and livelihoods of wheat farmers, analysing the government policies and schemes on wheat production, examining the marketing behaviour of wheat farmers, and arriving at policy options for resilient wheat farming in Nigeria.

In view of the key research objectives, an ex-post facto research design was employed. A multi-stage sampling technique was adopted where three states (Jigawa, Kano and Yobe) and six local government areas (Ajingi, Bade, Garun Malan, Kafin Hausa, Nguru and Ringim), two from each state, were selected for the study. Furthermore, forty respondents were randomly selected from each local government area, making the total sample size of 240. Personal interviews and focus group discussions were used to collect primary data. A pre-test was also conducted to ensure the validity of the instruments. Secondary data was gathered from policy documents, relevant literature, government reports, newspapers, and so on. The elicited data was tabulated, analyzed, and interpreted by the use of descriptive statistics, inferential statistics, likert scale of summated rating, content analysis techniques (MAXQDA 2022 statistical software), price spread analysis, compound growth rate analysis, Kruskal-Wallis test, discriminant function analysis, and the Kendell coefficient of concordance test.

The study revealed that the farmers were within their active age, married, and living below the poverty line, have low levels of education, mostly explored additional sources of income, and have enough years of experience in wheat farming. The farmers have marginal land size and acquired it through one method, using mostly

certified and non-certified seeds and sourcing it mostly from two places while in contact with an extension agent most of the time. The respondents also participated in other activities for livelihood earning and have a larger number of household members, mostly with one earning member. The study revealed that the most common biotic, abiotic, social and political stress affecting wheat crops and farmers differ with regard to location. The major stresses affecting wheat farmers in Nigeria were pests and diseases, wild birds, marketing of their produce, rodents and domestic animal attacks.

The social and political situations affecting wheat production were identified as internal social factors, external social factors, and political factors. Lack of good cultivation practices and the knowledge level of the farmers were the major internal social factors. These, among others, prevented the farmer from fully adopting the recommended agronomic practices. While the major external social factors were consumer food habits, consumer demand for convenience, lower produce prices, and high input costs, The political factors identified were social security issues, inconsistent government policies, intricacies in implementation, the role of the media in publication, role-playing by the milling industries, international trade interests, and lack of political will. No doubt, wheat millers imported more than required in 1986. It may have been a means for them to sabotage AWPP's success. The present approach employed by the milling industry, if sustained, will surely boost the wheat crop production in the country. Further findings indicated that the overall growth rate during the study period was -1% for production and only a minimal growth rate of 2% for harvested area, while a 5% positive growth rate was recorded in imports. It was a clear indication of the low yield of the wheat crop in Nigeria.

The findings affirmed that the respondents were aware of climate change, with the majority of them having a medium perception of its effects on wheat production in Nigeria. There was a significant difference among the respondents with regard to the climate change perception which was influenced by their age, educational level, secondary occupation, years of experience, contact with extension agents, and household size. Additionally, Nigeria's climate has no or little effect on wheat crop production. However, it may be that wheat production in Nigeria has been affected largely by human action rather than climatic and environmental factors.

The findings inferred that the wheat production policies were domiciled in Kano state and that there was no equal distribution and allocation of resources among the states. The Anchor Borrower Program (ABP) is the only program having participants across the study areas. This may be because there is advancement in policy handling among the implementing agencies. The ABP failed to capture sustainability in production as well as rural infrastructural development in the program statement. The Agricultural Promotion Policy (APP) document left no stone unturned, the Federal Ministry of Agriculture and Rural Development is driving the implementation of the policy. The policy document gives priority to stakeholders' roles and responsibilities and is more concerned about sustainability in the production of the priority crops as well as reliability in the marketing channels. The document considers modern day agricultural approaches through the involvement of private sectors in all areas of the agricultural commodity value chain. For the improvement of rural livelihoods, the policy considered the development of the farming communities' infrastructure. However, the respondents have a medium perception of government policy and scheme on wheat production in Nigeria which influenced by their age, educational level, secondary occupation, years of experience, contact with extension agent, farm size, household size and monthly income, and there was no significant difference in their perception.

The majority of the respondents sell their produce immediately after harvest if the price is favourable due to financial urgency for both wholesalers and retailers in the case of Jigawa and Yobe, and consumers in the case of Kano. The majority sell in the local market due to proximity and using trucks as their main transportation facility. The study also inferred that the majority of the respondents relied on informal sources of market information and utilized them regularly. This revealed the kind of trust the respondents gave to those sources and affirmed the weakness of the extension system in the study areas, especially in Yobe state. There were four marketing channels in Jigawa and Kano, while three were identified in Yobe. The producers received the highest percent of the marketing share in channel I (producer –consumer) and a higher amount in channel II (producer–retailer–consumer). The marketing margin was higher in channel III (producer–wholesaler–retailer–consumer) and the producers received a lower amount when compared with channels I and II. This indicates that the more the

actors, the less the producers share. There was no additional information obtained from channel IV as it involved industrial processes.

Moreover, the study shows that there was significant variation between the states with regard to the variables under study among the respondents between the states. The variable marketing behaviour had the most prominent effect in predicting membership in the group between Kano and other states, while farm size was the most prominent effect between Jigawa and Yobe. The variability in net income of a wheat farmer in Nigeria could be predicted with 99.3% accuracy using age, total output, selling price, straw price, quantity of pesticide used, frequency of irrigation, and total cost of production.

The study confirmed that the major constraints affecting wheat farmers in Nigeria were a lack of government intervention, a weak extension system, high input and pest and disease costs, a low output price, insufficient credit facilities, a lack of high-yielding varieties, poor yield, and a lack of a regular market. There was strong agreement on the most important constraints among the respondents of different states.

For Nigeria to achieve the desired outcome, focused commitments and the adoption of a multi-dimensional approach are required. Political factors were the major concerns surrounding the wheat production sector and would be overcome through a yearly stakeholders' round table meeting to review the situation. External social factor issues would be addressed by raising awareness and establishing a commodity board to ensure remunerative prices for farmers and reasonable prices for consumers, as well as a consistent supply of raw materials to milling industries. Extension should be intensified to enhance the knowledge level of the farmer for better understanding and increased adoption of new varieties. This could help to overcome internal social issues. More young people need to be persuaded to work in wheat farming in order to increase production and sustainability.

Resilient wheat farming in Nigeria could be achieved through focused commitments across the stakeholders' line. Legislation should be enacted to deal with saboteurs, and the adoption of a multi-dimensional approach toward solving any unforeseen circumstances, should be resorted to.