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Is Agricultural Productivity an engine for growth?

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ABSTRACT

Namibia recognizes agriculture, through its National development plans, as a priority sector with potential to boost socio-economic development. This is with specific emphasis to contributing to GDP, driving economic growth, job creation, poverty reduction and addressing high income inequality, among others. Moreover, the sector was expected to transform from predominantly subsistence farming practices to commercial farming whereby agricultural mechanization and modernization methods are utilized. However, despite the recognition and prioritization of the agriculture sector by the Government, it performed below expectations in view of envisioned growth and contribution to GDP while the transformation has not happened at expected levels. To this end, the sector grew by 0.8 percent in 2016 from a decline of 3.6 percent in 1981 while it contributed merely 3.4 percent in 2016 from 7.6 percent in 1981. Although, the sector's growth and contribution to GDP has not been significant enough during the review period (1981 to 2016), there is still room to change the current status towards achieving high and sustainable growth and increased contribution to GDP as well as employment creation.

Against this backdrop, the current Fifth National Development Plan's (NDP5) desired outcome is to reduce the proportion of food insecure individuals to 12 percent and increase food production to 30 percent cumulatively, while the targets are to increase the share of value added in livestock and crop farming to 30 percent and 55 percent respectively, during the 5 year plan period. NDP5 specifically seeks to safeguard, among others, production expansion and value addition in view of ensuring food security and self-sufficiency as well as increase in local agro-processing in the country. In view of the prioritization of agriculture sector, it is therefore important to investigate whether agricultural productivity is an engine for growth in Namibia. The basis of this study was to specifically investigate the causal relationship between agricultural productivity and economic growth. The paper also sought to find out the challenges constraining the sector's performance from achieving expected results and recommend how increased agricultural productivity can be beneficial to the entire economy. It is a desk research study which used secondary data from Namibia Statistics Agency (NSA) and World Bank data base for the period 1981 to 2016 and employed the Vector Auto Regression (VAR) methodology to address the study objectives.

The study concluded that indeed agricultural productivity is an engine for growth as there was causality observed from agricultural productivity to economic growth. Thus there is a need for increased agricultural productivity through mechanization and modernization of the agricultural sector (Investment). It further found out that the critical factors constraining the performance of the agricultural sector in Namibia include climate change, water scarcity, high cost of production, access to finance, access to markets, skills shortages and soil infertility, among others.

1. Introduction and Background

Namibia is endowed with natural resources such as land and water. Among these land plays an important role for agricultural purposes thereby providing agricultural produce which can be processed into agro products through value addition to realize structural economic transformation. The Agricultural sector plays an important role in contributing to socio-economic development in many countries, including Namibia. It is imperative in terms of jobs creation, addressing poverty, as well as uplifting people's living standards. Agriculture in Namibia comprises of both crop and livestock production. The majority of people in Africa acquire their livelihood directly or indirectly from agriculture (Mushendami, Biwa & Gaomab, 2008). This is not an exception for Namibia as agriculture supports 70 percent of the country's population for their livelihood (Odero, 2017). However, majority derive their livelihood from small scale farming using traditional methods of cultivation and mostly producing for household consumption.

Namibia's agricultural sector is one of the priority sectors with the potential to expand the economy sustainably, address income inequality as well as create the much needed employment. The agriculture sector employs about 20.1 percent and as such remains the biggest employing sector in Namibia. According to the Labour Force Survey for 2016 the sector provided about 135, 832 jobs, although lower by 21 percent when compared to 172 530 employed in 2012 (Namibia Agriculture Policy, 2015). Over the years, the agricultural sector's contribution to GDP averaged 6 percent from 1981 to (NSA). Between 2012 and 2016, agricultural sector contracted the most by 1.8 percent on average compared to other sectors with a contribution of 4 percent while the manufacturing sector contracted by 0.2 percent with a contribution of 10.8 percent (see Annexure). Despite the minimal contribution of the agriculture sector to gross domestic product, the sector remains vital to the lives of the Namibian population, making it one of the principal contributors to livelihood. The battle of whether the agricultural sector can promote long term economic growth will either be won or lost, how this leads to economic growth continues to be a debate among researchers till today (Myrdal, 1984).

Agricultural Productivity is key to agriculture production enhancement and sustainability in Namibia. Agricultural productivity refers to the output produced by a given level of inputs in the agricultural sector of a given economy (Amire, 2016). It expresses the varying relationship between agricultural output and one of the major inputs, like, land or labour or capital, other complementary factors remaining the same (Dewett, 1966). In Namibia, there are two types of farming systems such as commercial farming and subsistence farming. However, the agricultural sector is mostly characterized by the informal economy¹

¹ Informal economy refers to all economic activities or jobs that are not covered or insufficiently covered by formal arrangements such as labour regulations, taxation, social protection and employment benefits.

(subsistence farming) which remains underdeveloped, even though it contributes enormously (89.6%) to the total informal employment (NLFS, 2016). Subsistence farming plays an important role in the livelihood of the rural people. Therefore, there is a need to increase productivity to ensure long term food security. If rural poverty is to be reduced and agriculture is to be the basis for growth, the contribution of the informal sector to GDP should not be neglected.

1.1 Problem statement

The structure of the Namibian economy has not changed considerably in terms of the contribution of primary, secondary and tertiary industries to GDP from how it was since early post-independence period (1990 to 1999) to now. Over the years, the government of Namibia has tried to promote agriculture through its national development plans; however it has not been fruitful as output has not increased significantly to allow for sustainable food security. The current national development plan (NDP5) still identifies the agricultural sector with the potential to boost economic growth through production expansion and value addition to agricultural produce to secure food security in the country. Despite the government's efforts, recent data shows that the growth of the agriculture sector has not been significant enough and this brought with it greater concern of the need to boost economic growth in order to reduce unemployment, improve the living standards of the people and reduce poverty.

Even though Oyakhilomen and Zibar (2014) stresses that agricultural production is critical in achieving global poverty reduction in terms of its share of GDP, the sector has not been able to transform from dominantly underdeveloped subsistence to commercial thereby stimulating growth as envisioned. Given that more than half of the population depends on agriculture for survival, the government's long term goal of food security and poverty reduction depends on the productivity of the agriculture sector however productivity is affected by semi-arid area, limited rainfall and arable soil among others. Research on whether agriculture can serve as an engine for economic growth elsewhere has provided mixed results. Although, some economists support the view that agricultural development is a pre-requisite to stimulate growth, it may not be the case in some countries. Of great concern is to determine whether agricultural productivity can be the engine for economic growth in Namibia. Therefore, the question is whether agricultural productivity could be a game changer in terms of addressing the food security target under NDP5. The current national development plan advocates for boosting agricultural productivity for structural change, economic transformation and sustained food security. Specifically, the desired outcome under NDP5 is to have food production increased to 30 percent cumulatively during the 5 year plan period.

For Namibia, the question of concern is two-fold. Firstly, the study attempt to answer whether agricultural productivity can be the engine for economic growth. Secondly, it seeks to find out what is hampering the agricultural sector performance? According to the country's long-term blueprint, Vision2030, the ultimate goal is that by the year 2030, Namibia should attain the status of an industrialized nation through value addition, among others. The realization of this hinges on the importance of agricultural production as a significant primary source to the manufacturing sector.

2. Objectives

In light of the above, the primary objective of the study is to examine the relationship between agricultural productivity and economic growth in Namibia and to analyze the challenges that are hampering the agriculture sector. The critical question is whether agricultural productivity is an engine for growth. The study also aims to recommend how agriculture can be a driver to economic growth in Namibia and what can be done to increase productivity thereby providing tools for evidence-based planning informing policy making. This paper is structured as follows; overview of the agricultural sector in Namibia, objectives of the study, followed by methodology, financing in the agricultural sector, Challenges constraining the sector, empirical results, findings and recommendations.

3. Data and Methodology

The research is a desk study using secondary data sourced from publications by Namibia Statistics Agency (NSA) and World Bank data base. For the purpose of regression analysis in establishing the causal relationship between agricultural productivity and economic growth the study made use of E-views an easy to use statistical, econometric and economic modelling package using data from 1981 to 2016. It is evident from various empirical studies of Toyin (2016), Odero (2017) and Alam and Myovella (2017) on the relationship between agricultural productivity and economic growth that Vector Auto Regression technique (VAR) was the most commonly used method. Although, other studies on the same subject matter used Error Correction Model and Ordinary least squares. There are other methods that can be used however, this paper employed the VAR technique which allows for the determination of the causal relationship between agricultural productivity and economic growth in Namibia as stipulated in the objectives. VAR can be considered to determine causality with the use of Granger causality test to determine whether one time series is good in forecasting the other. According to Sims (1980) the VAR model is easy to estimate models for the use of multivariate time series and its forecast ability is super (Christiano, 2012). Under the VAR model, the variables were tested for stationarity to avoid spurious results or misleading inferences which leads to poor understanding and forecasting. Thus the variables were subjected to unit root test, cointegration test and Granger causality test.

To test for causal relationship the Granger causality test is used to test if variables are able to predict one another (Stock & Watson, 2001). The Granger causality test either rejects the null hypothesis of no causality or fails to reject the null hypothesis. If the probability value is less than or equal to 5 and 10 percent level of significance, the null hypothesis of no causality is rejected thus concluding that there is causality between the variables. On the other hand, if it is greater the null hypothesis of no causality is not rejected. The variables used in the model specification are Agricultural productivity measured by agricultural value added expressed as a percentage of GDP and Real Gross Domestic Product growth used to measure economic growth. These variable measurements were mainly identified through literature.

The Vector Autoregressive model is specified below:

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_n Y_{t-n} + \varepsilon_t$$

Where Y_t represents a column vector of the variables Real Gross Domestic Product growth, agricultural value added and ε_t is the error term which caters for all other variables that could influence the output but were not included in the model. A_1 , A_2 and A_n are coefficients of the explanatory variables.

4. Literature review

There have been numerous studies on understanding the association between agriculture and economic growth yet some disagreements still exists. According to Ruttan (1968) the agriculture sector has a dynamic role in the transition process of the economy. In the early stages of development agriculture plays an important role as it provides resources to the industrial sector. Therefore, the primary sector should act as leading sectors by carrying the burden of accelerating growth. However, the question is whether empirical studies are in support with economic theory. In view of this, studies Enu (2014); Olajide, Akinlabi and Tijani (2012); Awoyemi, Afolabi and Akomolafe (2017) among others investigated the relationship and impact of the agriculture sector to economic growth in several countries. The studies had similar conclusions that agriculture output had a positive impact on economic growth as well as agricultural value added being a positive determinant of economic growth. However, Sertoglu, Ugural and Bekun (2017) further noted that though agricultural output has a positive impact on economic growth the speed of adjustment of the variables towards their long run equilibrium path is very low. In view of this, to note is that given the fact that in Namibia the agricultural sector's contribution to GDP has been minimal and growth in the sector is not satisfactory as more imports on agricultural produce are recorded, the transition process (industrialization) will take longer than anticipated.

Odetola and Etunmu (2014) and Oyakhilomen and Zibah (2014) examined the relationship and contribution of agriculture to economic growth in Nigeria. The results revealed that the agriculture sector contributed positively and significantly to economic growth in Nigeria therefore reaffirming the sector's importance in the economy. They further recommended that pro poor policies should be designed to alleviate rural poverty through increased investments in agriculture by both public and private sectors. To this end, Namibia should as well learn from other countries by involving the private sector more often with issues pertaining to agriculture investments. Private sector engagement is crucial as government (public sector) cannot operate alone. On the other hand, Umah, Eboh and Obidike (2013) also assessed the influence of agriculture on economic growth in Nigeria. The study concluded that contributions of crop production and livestock were insignificant in contributing to growth.

Faridi (2012); Ali shah, Abrar ul haq and Farooq (2015) and Toyin (2016) analyzed the impact of agricultural exports and economic growth in Pakistan and South Africa respectively. Both studies were in agreement that agricultural exports had a negative relationship with economic growth. Particularly in South Africa, the study observed no causal relationship between agricultural exports attributable to insufficient level of agricultural exports in the past while the present economic growth did not rely on level of agricultural exports either. On the same subject matter, Sheefeni and Simasiku (2017) also analyzed the relationship between agricultural exports and economic growth in Namibia. However, in the Namibian context the results concluded that agricultural exports had a positive effect on economic growth thus was a determinant of economic growth. These results are in contradiction with those in Pakistan and South Africa. Furthermore, in South Africa Bulagi, Hlongwane and Belete (2014) found causal relationship between agricultural exports and economic growth. To this end, worth noting is that the contribution of agricultural growth to economic growth varies from country to country and from one period to another within the same economy. This might be attributed to the difference of results in the studies mentioned above.

For increased productivity and value addition to be realized in Namibia, the manufacturing sector is of importance in terms of providing machinery equipment as part of production input. Both the agricultural sector and manufacturing sector are crucial players in Namibia's growth path. Therefore, sectoral linkages or interrelationships between the two sectors should be emphasized. However, in view of this Siboleka, Nyambe and Osterkamp (2014) analyzed agriculture and manufacturing sector growth in Namibia. The study employed a Granger causality model and concluded that sectoral linkages between the two sectors were not effective enough to have a strong impact on one another. In addition, Bathla (2003) investigated inter-sectoral linkages in India and found no significant relationship between the primary and secondary

sectors. This simply means that without effective linkages there is no multiplier effect on economic growth even if agricultural productivity is increased. Therefore, industrialization again can take more than anticipated.

Amare, Cisse, Jensen and Bekele (n.d) agriculture is often associated with economic and natural risks such as price fluctuations, drought, pests as well as diseases and small scale farmers are vulnerable to these risks. A country that relies on agricultural exports is affected by global economic shocks. Small holders face constraints that limit their productivity such as lack of information about production methods, market opportunities and poor access to credit or insurance which can limit the uptake of new technologies. Similarly, Namibia is not immune to such challenges of drought and global economic shocks due to its links with the rest of the world. Research papers by Shapi (2017), Amadhila (2016) and Bank of Namibia Annual Symposium (2017) on assessing the challenges of the agricultural sector, noted that access to credit, Climate change, Soil infertility, high input costs and access to markets are some of the notable constraints to the performance of the agricultural sector. Furthermore, Dhrifi (2013) recognizes three major opportunities that can transform the agricultural sector into a force for economic growth thereby reduce poverty; advances in technology, creation of regional markets and the entrepreneurial leaders dedicated to the country's economic improvement.

Empirical studies on agricultural productivity in developed countries have documented that agricultural productivity growth is critical for reducing rural poverty and promoting inclusive growth prospects. It is considered to play a role in the industrialization process. Countries such as China, India, Indonesia and Thailand implemented agricultural policy reforms with the aim to stimulate agricultural productivity growth which led to their agricultural output expansion (Wickramasinghe, 2017). China's agricultural output has been on the rise driven largely by investment in agricultural technology, construction of rural infrastructure and introduction of innovative institutional arrangements. China launched several measures with the focus on raising farmers' incomes to which government began to provide input subsidies to purchase improved seeds, made direct payments to farmers who engaged in grain production and abolished agricultural taxes.

In India, policies implemented to support agricultural development were input subsidies, incentives to encourage crop diversification with a target to encourage farmers to move from grain production to high value food commodities², establishing agricultural research institutes and agricultural universities to generate and disseminate new technologies and food price stabilization schemes. In Indonesia, government provided subsidies to agricultural inputs and invested in irrigation schemes, agricultural

² High food commodities refers to vegetables, fruits, spices and livestock

research and development and provided credit at subsidized rates to stimulate agricultural output growth. Indonesia also used border control measures such as export bans, export tariffs and variable levies to manage its agricultural markets in order to encourage domestic value addition. On the other hand, in Thailand the government strengthened the agricultural education system by investing in agricultural research and expanded agricultural universities and research centers. It also continued the funding of agricultural research and development. Over time the government of Thailand shifted its focus on strengthening agricultural markets by opening up foreign markets through trade agreements, and strengthening value chains. Generally, these are some of the lessons Namibia can learn from these countries. Commonly mentioned is the investment in agricultural research institutions.

5. Overview of the agriculture sector in Namibia

The agricultural sector in Namibia comprises of both crop farming and livestock farming. Crop farming includes pearl millet (Mahangu), maize, sorghum, wheat, grapes and dates among others. On the other hand, livestock farming includes cattle, goat, sheep and pig production. The agricultural sector remains one of the key sectors in the Namibian economy as it has been the provider of food, employment, income and foreign exchange (in terms of exports) in the economy. The livestock subsector is a significant contributor to the sector as about 80 percent of livestock production is exported as primary beef cuts, lamb carcasses and live exports (Bank of Namibia Annual Symposium, 2017). Similarly, about 55 percent of crop production was exported (2011 to 2017) such as table grapes, onions, potatoes and tomatoes (Agro-Marketing and Trade Agency, 2016). The agricultural sector also supports other sectors such as transport and manufacturing, among others, in providing the inputs for further processing of other products thus, making it crucial to other sectors of the economy.

5.1 Namibia Agricultural policies

Just five years after independence (1995), the Namibian government formulated the **National Agriculture Policy** (NAP) to guide agricultural development in the agricultural sector. The main aim of the policy is increasing agricultural production, agro-processing and marketing. The objectives of NAP are among others to accelerate the agriculture sector contribution to national growth domestic product, create a conducive environment for increased and sustained agricultural production and productivity as well as promote development of national agriculture sector across the value chain (NAP, 2015).

The **Green Scheme policy** (2008) was also an initiative by government under the Ministry of Agriculture, Water and Forestry (MAWF) to encourage the development of irrigation based agronomic production in Namibia. The aim of the policy was to increase the contribution of the agricultural sector to the country's gross domestic product (GDP), to achieve social development by upliftment of communities located within suitable irrigation areas as well as promote human resources and skills development.

In addition, the **Agriculture Marketing and Trade Policy Strategy** (2011) was formulated to guide the agricultural sector towards utilizing opportunities in both the domestic and international markets. Thus the policy serves as the roadmap for the marketing Namibia's agriculture products in the domestic and international markets. In respect Agriculture Marketing and Trade Agency was established as a special agency of the MAWF to coordinate and manage the marketing and trading of agricultural produce in Namibia. The agency's mandate is to manage fresh produce business hubs and national strategic food reserve infrastructure towards attainment of food safety and security. The fresh produce business hubs were built because Namibia's horticulture industry had missing linkages of bulk cold storage, marketing, logistical and processing facilities. The facilities are important as they provide a platform for farmers to market their produce and provide a common place where local retailers can source their produce for distribution in the domestic and international markets. This policy aims to contribute to the successful performance of the agriculture sector as well as compliment other policies and strategies across the agricultural value chain. The legal framework for the policy and strategy is defined on the basis of the Namibian constitution and major acts in the agriculture sectors. The policy framework outline draws from the MAWF's mandate and strategic plan, Vision 2030, subsidiary policies, schemes and projects.

In line with the National Agricultural Policy, **the National Drought Policy and Strategy** was formulated to manage drought, a challenge facing the agricultural sector. The policy specifically aims to shift responsibilities for managing risk from government to the farmers with financial assistance and food security interventions. The objectives of the policy are among others to ensure that household food security is not threatened by drought, encourage and support famers to adopt self-reliant approaches to drought risk as well as finance drought relief programmes efficiently and effectively by establishing an independent and permanent National Drought Fund.

The National Horticulture Development initiative was implemented through the **Namibian Horticulture Market Share Promotion (MSP) scheme** by the Namibian Agronomic Board. The initiative was funded by the Ministry of Agriculture, Water and Forestry under the **Agronomic Industry Act no 20 of 1992** to promote the consumption of local produce, import substitution, agro-processing and export marketing of local fresh produce. Importers are expected to ensure that a minimum percentage of their horticulture produce purchases consist of Namibian products, failure to meet the required percentage they are curtailed in their imports pro rata.

Through the **Agricultural Bank of Namibia Act (Act no. 5 of 2003)**, Agricultural Bank of Namibia (Agribank) was mandated to advance money to persons or financial intermediaries for the promotion of agriculture and related activities. Under this act Agribank introduced the **Affirmative Action Loan**

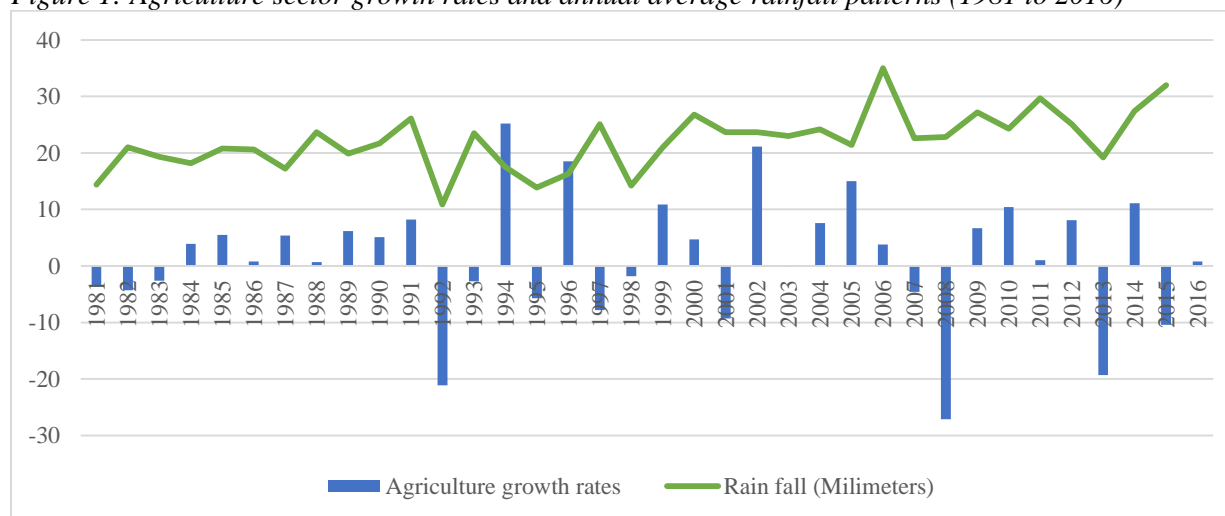
Scheme (AALS) which enables emerging farmers from previously disadvantaged communities to acquire farms in commercial areas. The Affirmative Action Loan Scheme is complemented by the North South Incentive Scheme which is a vehicle for communal farmers to sell their livestock north of the Veterinary Cordon Fence (VCF) and to purchase disease free livestock south of the VCF on a newly acquired farm.

The desired goal in the **Harambee Prosperity Plan (HPP)** with respect to hunger is to have zero deaths attributed to a lack of food. Therefore, it recognizes efforts to improve agricultural output in communal areas to support food security at household level. These includes subsidization to purchase farm implements and seeds and strengthening of agricultural extension services, to support increased crop production, government to establish fertilizer mixer plants to make fertilizers available to farmers at affordable prices, expansion of the green scheme to improve food security at both household and national level and debushing as a strategy for increasing grazing land in order to improve productivity and create employment. Under the Harambee prosperity plan, the **Harambee Comprehensively Coordinate and Integrated Agricultural Development Programme (HACCIADep)** was initiated. The programme is aimed at facilitating market access to small and medium scale agricultural producers and agro processors as means to stimulate sustainable agricultural production. This will enhance national and household food security, meaningfully contributing to employment creation in rural areas and to the reduction of income inequalities which will in turn strengthens economic activities in rural communities and spurs industrialization.

5.2 Growth in the agriculture sector

Over the years the agricultural sector experienced some fluctuations in terms of growth averaging 1.6 percent between 1981 and 2016 due to external factors. During the following years, (2001, 2003, 2007, 2008, 2013 & 2015) the sector experienced contractions attributed mainly to drought which resulted in stock losses and reduction in grain production. The sector was also hit by low rainfall which affected both livestock and rain fed crop production to weaker performance (see figure 1). However, in 2016 the sector shows a significant recovery as it grew by 0.8 percent mainly due to improved performance of both livestock and crop farming as a result of better rainfall received during this year.

Figure 1: Agriculture sector growth rates and annual average rainfall patterns (1981 to 2016)



Source: Author's generation NSA (2016) and World Bank climate portal

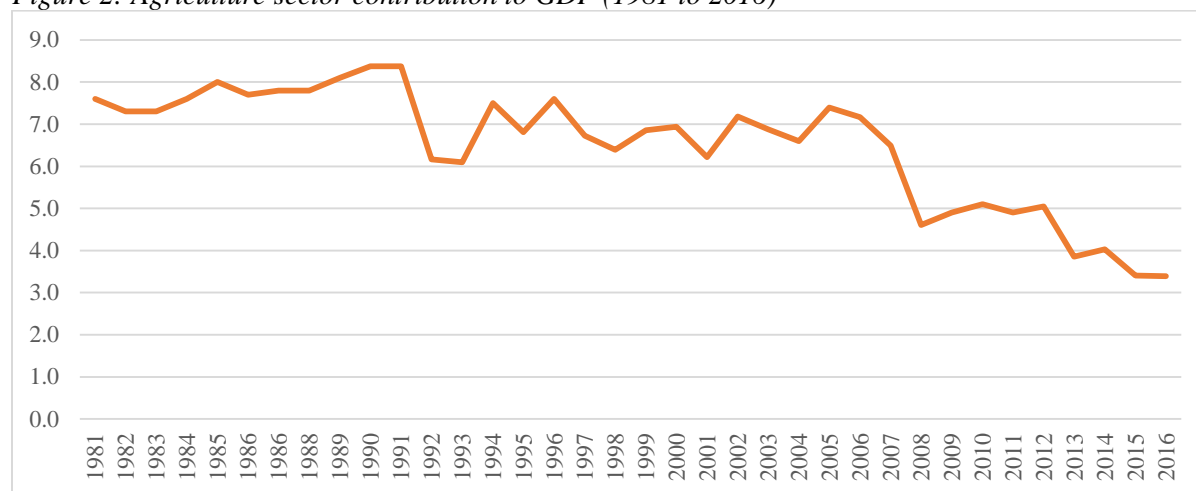
Namibia being one of the semi-arid countries in sub Saharan Africa, is subjected to persistent drought from time to time and agricultural output is extremely sensitive to climatic conditions such as drought. The effect of climate change continues to be of concern to agricultural producers in Namibia. In addition, regions where rain fed agriculture is practiced are the most affected areas in the case of there being a long absence of rain as it leads to low production in both crop and livestock farming. During the period 1981 to 2015, the annual rainfall patterns varied from year to year with agriculture per capita declining from N\$ 2439 in 1981 to N\$ 1523 in 2015. This is attributable to stagnant output with rising population growth. The country received low rainfall between 2005 and 2015 which in turn had an impact on agricultural production in general (see figure 1). Inadequate rainfall leads to low agricultural yield and increase in price of agricultural produce. Overall, to note is that over the past decade the agricultural sector is constrained by persistent and frequent occurrence of drought. The dependence on rain fed agriculture poses a threat to food security at both national and household level.

5.3 Contribution of the agriculture sector

The performance in the agricultural sector has been sluggish over the years with overall contribution to GDP dropping from 8 percent in 1981 to 3.4 percent in 2015 and 2016 of which 60 percent is attributed to the livestock subsector whereas 40 percent is attributed to the crop and forestry sub- sectors. Moreover, the economy on average grew by 3.5 percent between 1981 and 2016 while growth in the agricultural sector was 1.6 percent with a contribution of 6.5 percent to GDP over the same period. For a sector that supports the livelihood of about 70 percent of the population this trend is of most concern. A growing agricultural sector contributes to both overall growth and poverty alleviation. Thus, the development of an economy depends on the growth of the agricultural sector. Even though the contribution to GDP has been

low over the years, the agriculture sector still remains the back bone of the Namibian economy in terms of job creation (NAU, 2014).

Figure 2: Agriculture sector contribution to GDP (1981 to 2016)



Source: Author's generation NSA (2016)

5.4 Employment in the agriculture sector

Employment in the agricultural sector is volatile due to the fact that work in the sector is seasonal therefore growth in the sector need to be sustained. According to the National Labour Force Survey (2008) persons employed in the agriculture sector was 15.7 percent agriculture sector is the highest employer in the country. In (2016) this figure grew to 20.1 percent of the entire labour force, however this is relatively smaller than 27.4 percent in 2012. This shows that employment in agriculture reduced by 7.3 percent since 2012. The reduction can be as a result of an increase in labour productivity as the sector would only require a few people or migration of workers due to low pay as compared to other sectors. This may be seen as increasing unemployment as people are relieved from their jobs therefore promoting unemployment a challenge that Namibia is currently battling with and trying to address. However, increasing productivity means that a country is producing more food to feed the growing population with less labour inputs thereby releasing labour to other sectors of the economy (Manufacturing). In as much as employment in agriculture leads to improved living standards which increases access to basic needs, better health facilities and quality education, shifting of labour from the agriculture sector to other sectors should not be a national concern but rather a sign of increased productivity of the sector.

Figure 3: Employment mode by subsector (2012 to 2016)



Source: Author's generation using 2016 Namibia Labour Force survey

In Namibia, majority of people are involved in subsistence farming mostly producing for household consumption be it livestock or crop farming. As of today subsistence farming is not enough as people work hard and long but still hardly have enough to survive, hence more has to be done with less (the conversion of subsistence farming to commercial farming) with better (decent) work as work in the agriculture sector is physically demanding and working conditions are very poor (Fechter, 2012). Looking at the figures of those that were employed for income purposes in both agriculture subsectors between 2012 and 2016, a large number of people work as part time³ in the crop farming subsector, similarly more people work as full time in the livestock subsector see figure 3. This can be attributed to the fact that the Namibian agricultural sector is mostly dominated by livestock farming as compared to crop farming. Between 2012 and 2013, the high number of part-time employees could be attributed to irrigation activities in the commercial farming.

5.5 Skills in the agricultural sector

According to Namibia Training Authority (2013), Namibia's agricultural sector has limited access to skilled labour where farmers lack the right skills to perform their work as expected. The agricultural sector will only thrive if the right people are equipped with the right skills and know how in order for them to participate fully so the nation can reap the benefits out of it. In line with this, the tertiary and vocational institutions have been producing a substantial number of agriculture graduates however this has been more focused on production based agriculture rather than agro processing. A mind shift is needed to promote both production and agro processing programmes for skills development in terms fo

³ Part-time refers to people in employment who usually work less than 35 hours per week whereas full-time it is those who work more than 35 hours per week (ILO standards).

value addition. Table one shows the occupations in the agricultural sector by subsector using data for the labour force survey 2016. The table shows a larger number of skilled agricultural workers followed by elementary workers⁴ in both subsectors as compared to other occupations. However, the livestock subsector has more skilled agricultural and elementary workers as compared to the crop subsector as can be evidently seen in the table below.

Table 1: Occupation by subsector for 2016

Occupation (ISCO-88)⁵	Livestock farming	Crop farming
Legislators, senior officers and managers	953	402
Professionals	259	186
Technicians and associate professionals	1366	263
Clerks	151	353
Service workers and sales	2205	1067
Skilled agricultural	40892	24583
Craft and related trades	905	446
Plant and machine operators	671	332
Elementary occupation	35631	18865
Armed forces		162
Total	83032	46657

Source: Author's generation using NSA (NLFS) 2016

5.6 Agricultural Exports and Imports

Namibia relies heavily on imports of food products including horticultural produce, making it a net importer. Most horticultural produce⁶ in Namibia are produced under irrigation while cereals⁷ are mostly rain fed. Between 2011/12 and 2017/18, the horticultural production marketed locally⁸ decreased from 30 009 tons to 28 599 tons which also increased imports from 38 047 to 52 853 tons during the same period

⁴ Skilled agricultural workers includes farmers or growers/producers performing a range of production and harvesting and Elementary workers refers to farm labourers who perform a variety of tasks and duties that are mostly of a simple and routine nature operations on livestock, crop/horticultural and mixed farming enterprises –often under supervision

⁵ ISCO stands for International Standard Classification of Occupations

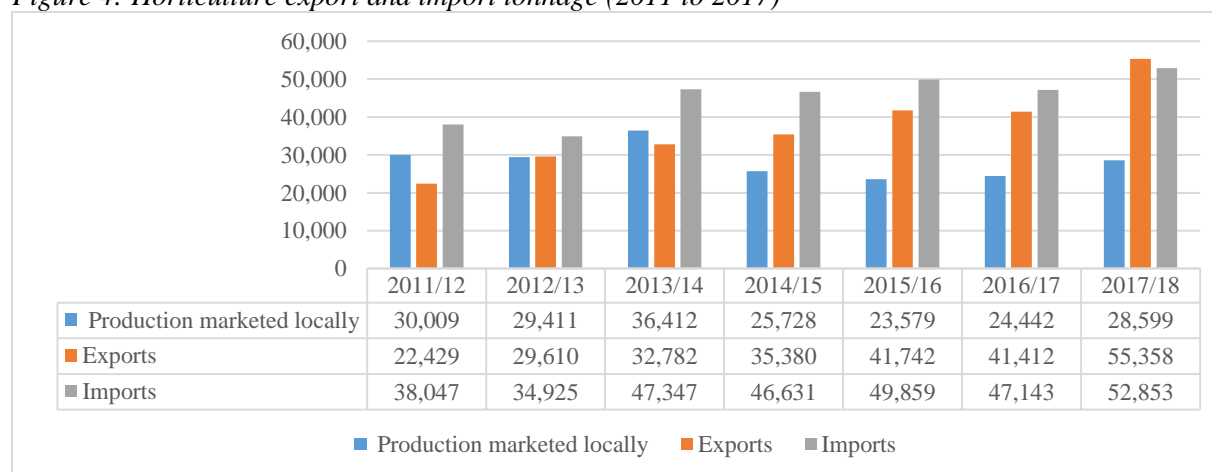
⁶ Horticultural produce includes tomatoes, potatoes, onions, carrots, cabbage, dates, grapes etc.

⁷ Cereals consists of white maize, wheat and pearl millet

⁸ Production marketed locally does not refer to total production it refers to production marketed locally on formal markets excluding own consumption.

(see figure 4). This signals the potential growth in the agro processing industry through increased productivity in the agricultural sector thereby reducing import dependence. In 2015/16, rain fed agronomy performed poorly due to drought therefore horticultural production also suffered resulting in a reduction of local produce formally marketed (NAB, 2016). In terms of exports, Namibia exported a total of 36 959 tons of horticulture on average between 2011/12 and 2017/18 respectively. Table grapes being the most exported product in terms of tonnage and monetary value.

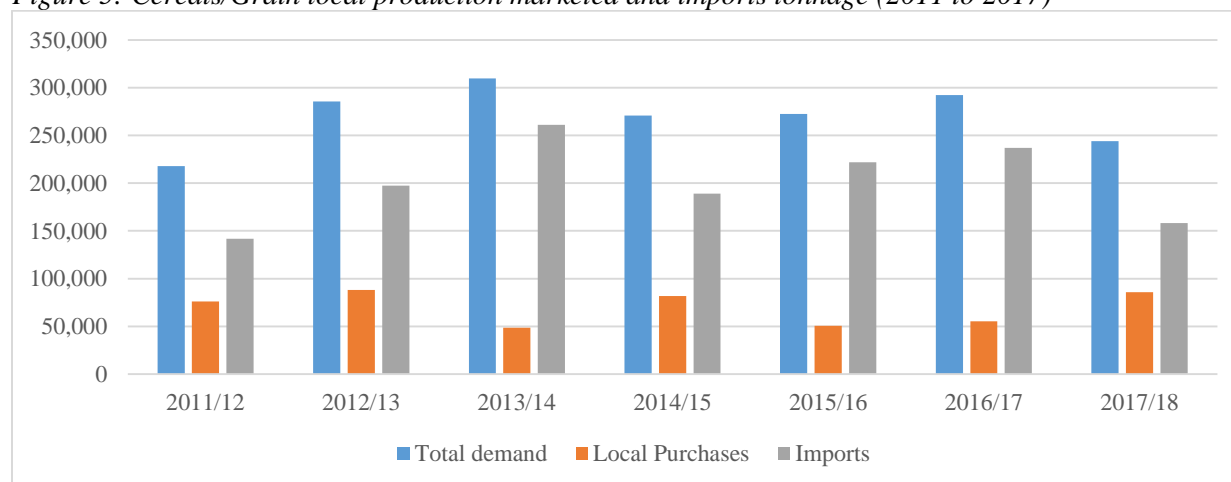
Figure 4: Horticulture export and import tonnage (2011 to 2017)



Source: Author's generation using AMTA annual report (2016-17)

Figure 5 shows the trend for local production marketed and imports for white maize, wheat and pearl millet. Crops such as white maize, wheat and pearl millet are produced under irrigation and rain fed conditions. In 2015/16 white maize under irrigation reduced due to excessive heat as a result of drought conditions (NAB, 2016). In view of this, local production/ purchases of white maize marketed reduced to 39 161 tons in 2015/16 from 69 433 in 2014/15 (see annexure). Generally, the imports of grains have been increasing over the years indicating low production of grains in the country. In 2016/17 period, 237 034 tons of grains were imported with wheat being the most imported product, while 55 354 tons was sourced locally. On the other hand, there was a reduction of imports in 2014/15 which can be attributed to more production of cereals as more rain fall was recorded during the period (see figure 5). Imports of agricultural products still remains dominant indicating an opportunity to invest in the agricultural sector. The reliance of food imports from South Africa does not mean Namibia cannot produce its own food.

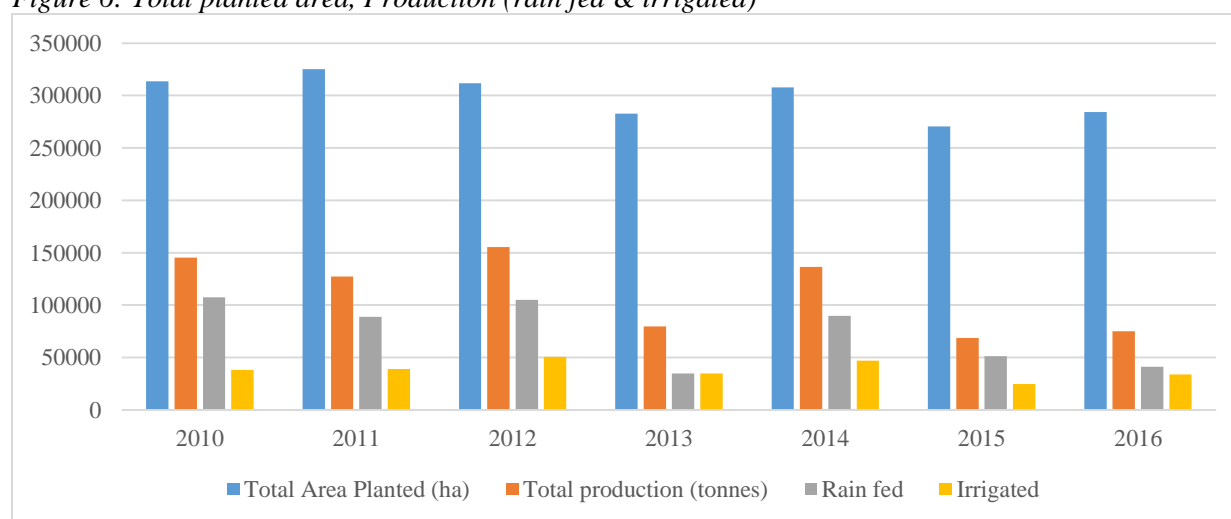
Figure 5: Cereals/Grain local production marketed and imports tonnage (2011 to 2017)



Source: Author's generation using AMTA annual report (2016-17)

Figure 6 below shows the area planted under rain fed and irrigation, total production for cereal such as white maize, wheat and pearl millet. The total area planted for cereals yearly from 2010 to 2016 has been more less the same. It decreased to 284 192 hectares in 2016 from 313 548 hectares in 2010 which also decreased total production to 74 975 tonnes from 145 413 tonnes over the same period. Production under rain fed has been varying depending on the rainfall received during each period and shows a decreasing trend from 2010 to 2016. Rain fed constitutes a larger portion of crop production as compared to irrigation this simply means that most crops are rain fed. Worth noting is that, wheat is wholly irrigated, millet is wholly rain fed while maize is both rain fed and irrigation. This shows that Namibia's agricultural sector is mostly dependent on rain fed which can be a threat to food sustainability in the absence of rainfall.

Figure 6: Total planted area, Production (rain fed & irrigated)

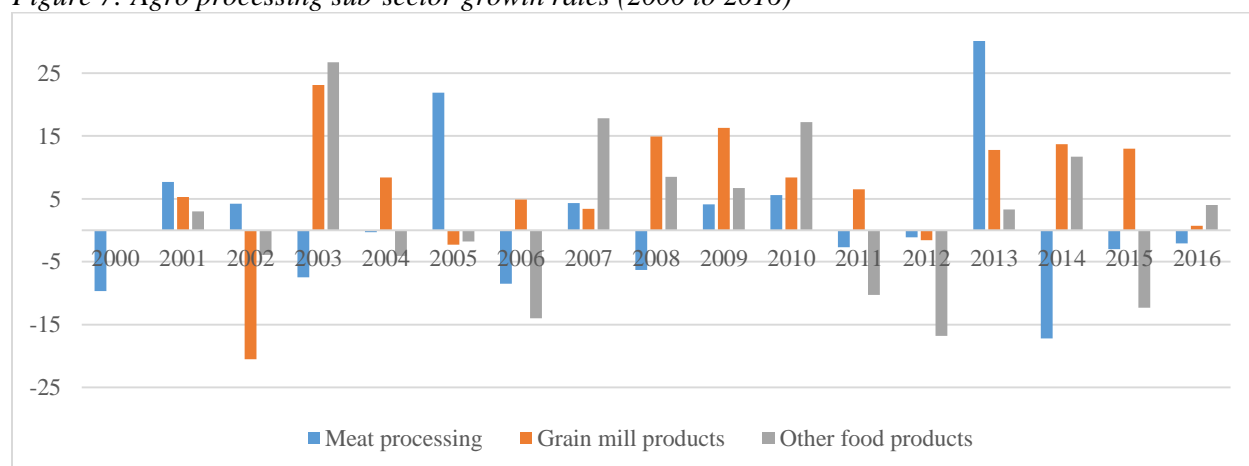


Source: Author's generation using MAWF report 2016

5.7 Agro processing

The agro processing subsectors shows positive growth rates on average from 2000 to 2016 with grain mill products being the only subsector to have recorded a higher average growth rate of 8.8 percent during the same period (see figure 7). Similarly, in 2015 the grain mill products subsector was still the only subsector to experience positive growth of 13 percent as compared to other subsectors which were in negatives. Meat processing in 2016 shows a contraction of 2.1 percent attributable to the farmers restocking livestock due to better rainfall received in the country during that rain season. Again this trend is worrisome.

Figure 7: Agro processing sub-sector growth rates (2000 to 2016)



Source: Author's generation using NSA data (2016)

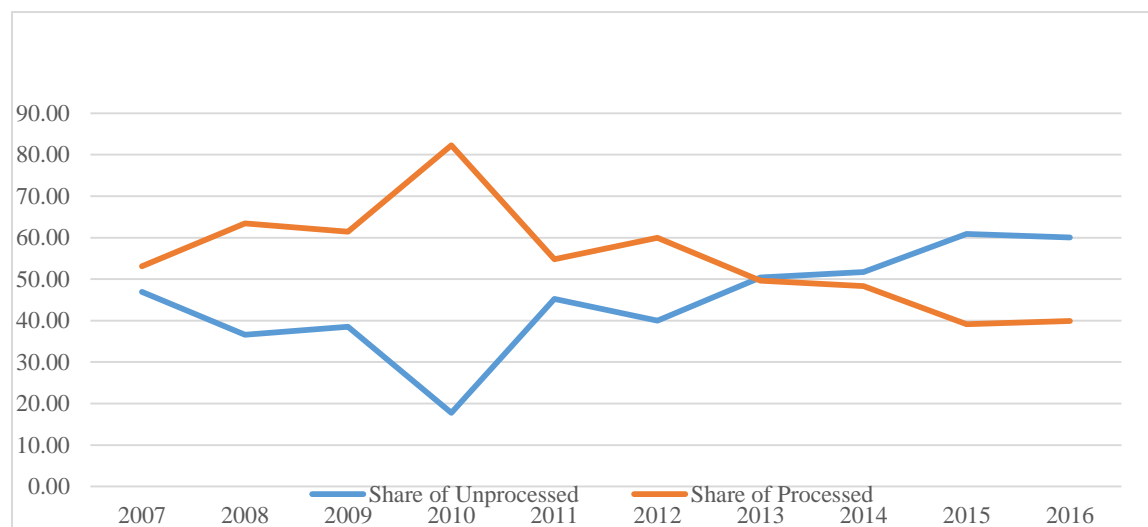
The agricultural sector has the potential to contribute to national foreign earnings. However, despite the fact that the government of Namibia encourages the processing of agricultural products in the country through the industrial policy (growth at home strategy), it still exports more of unprocessed agricultural products⁹ in its primary state especially from the livestock sub-sector. Of total agricultural exports, 45 percent unprocessed and 55 percent processed agricultural products were exported from 2007 to 2016 on average respectively. The share of processed agricultural exports was more than that of unprocessed agricultural exports from 2007 to 2012. However, the share of unprocessed agricultural exports became larger than processed from 2013 to 2016 due to the significant increase in demand of live animals as it carries more weight than crop farming in national accounting methodology (NSA, 2016). One question forever remains as to why that is the case despite all the efforts in view of addressing value addition¹⁰? This can be attributed to among others, poor/slow implementation of the growth at home policy.

⁹ Agricultural unprocessed products includes live animals, animal products, crops, vegetables fruits while processed products includes meat preparations and other food products.

¹⁰ For the purpose of this paper, value addition refers to transforming a raw agricultural product into something new from its original state through processing (manufacturing).

Generally, a trade off was observed between processed and unprocessed share of agricultural exports as suggested in figure 8. This is evident for example in 2010 where the gap is highest between processed and unprocessed thereby indicating that when unprocessed was low 17.7 percent, processed was high 82.3 percent. This is attributed to the fact that both processed and unprocessed are from the same basket of agricultural produce.

Figure 8: Share of Agricultural Exports (processed and unprocessed)



Source:

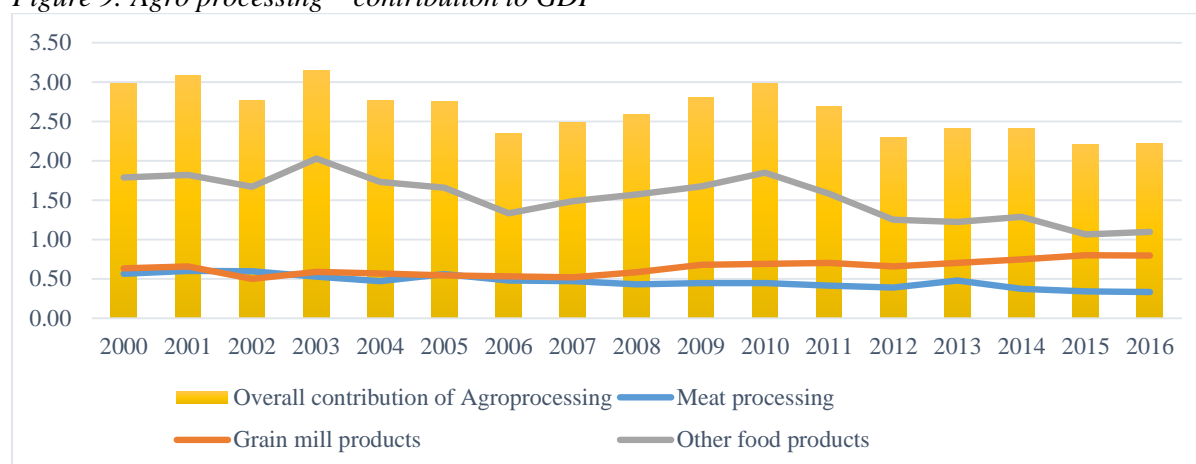
Author's generation using NSA (2016)

5.7.1 Value addition in agricultural products

Value addition is the process of increasing the economic worth or value of a commodity by transforming it into another commodity. Most studies on value addition in agriculture focus on change in form of agricultural product, changes in production process or change in marketing strategies. The assumption of focusing on value addition is that there are unexploited profits going unclaimed in the manufacture of food or other products from raw agricultural produce (Kehinde & Aboaba, 2016). Namibia exports agricultural products in raw form which entails forgone economic gains and income through value addition. According to Bank of Namibia annual symposium (2017), about 80 percent of local production is exported in its primary state e.g. beef cuts, lamb carcasses and live exports. This simply means that value addition takes place outside Namibian borders indicating a loss of local jobs. In line with Namibia's industrial policy (Growth at Home), the view is that Namibia has the potential to double its manufacturing output and reduce its rising import bill on food thereby discouraging exports of raw materials. The Growth at Home Strategy aims at value addition by encouraging local sourcing of agricultural products. However, despite the growth at home strategy in place for value addition the overall agro processing contribution to GDP trend is still not significant enough as it averaged almost 3 percent. Between 2000

and 2016 meat processing, grain mill products and other food products¹¹ averaged 0.47 percent, 0.64 percent and 1.54 percent respectively. Meat processing is believed to be the largest contributor in terms of agro processing relative to grain mill products, and shows a declining trend over the last five years (2012 to 2016). This can be attributed to the increase in the number of live animals exported, temporally closing of abattoirs in Okahandja, Katima Mulilo, Rundu and Oshakati and the outbreak of foot and mouth diseases as well as drought during that period. To this end, this trend is of concern to the realization of the industrial policy. Therefore, for value addition to take place increased agricultural productivity and local processing should be emphasized.

Figure 9: Agro processing – contribution to GDP



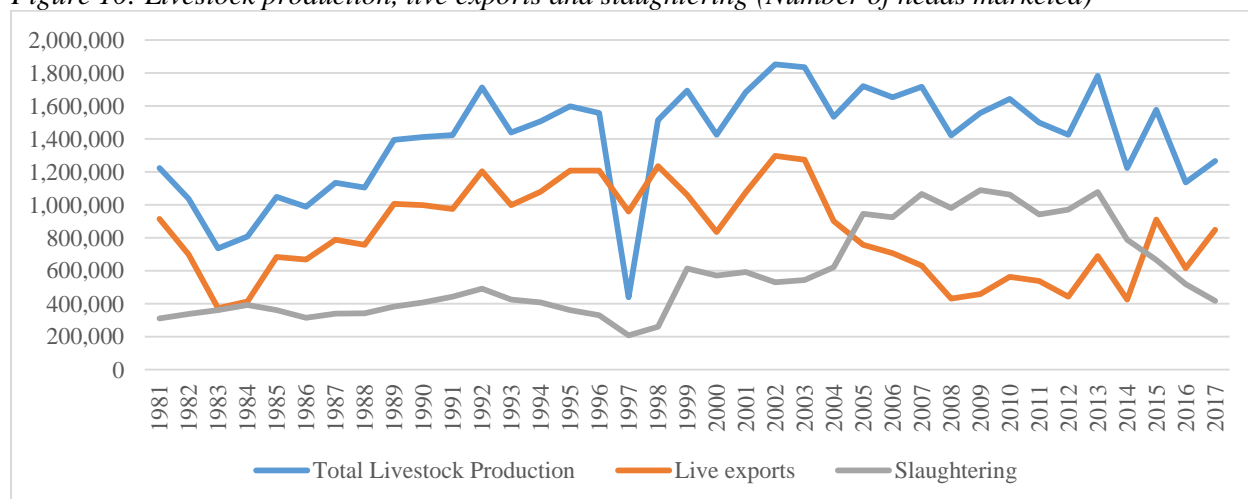
Source: Author's generation using NSA (2016)

The livestock subsector is the backbone of the agricultural sector in Namibia. Livestock production has been on an increasing trend over the years. However, it decreased to 440 028 in 1997 attributable to drought which affected production in return. The number of heads marketed increased from 1 224 110 in 1981 to 1 266 672 in 2017. On average about 828 002 of both large and small stock¹² were exported live of which 578 549 were slaughtered between 1981 and 2017. Live exports have been government's concern over the years as it strives to increase the number of slaughters to encourage value addition in the country. Looking at the trend, there has been an increase in live exports compared to slaughtering from 1983 to 2005, however a tradeoff is seen thereafter. Moreover, slaughtering declined for the past five years (2015 to 2017). This can be attributed to closure of abattoirs during that period. Overall, it is evident that less processing is done in the country as more livestock are exported live.

¹¹ Other food products refers to the manufacturing of dairy and bakery products.

¹² Large stock refers to cattle while small stock refers to sheep and goat.

Figure 10: Livestock production, live exports and slaughtering (Number of heads marketed)



Source: Author's generation using Meat Board of Namibia data

6. Agricultural linkages to other sectors

Studies on economic development have proved that generally economies begin as mainly agricultural based before becoming industrialized through manufacturing industries. There are mixed thoughts in terms of the agricultural linkages to other sectors, there are those in support (Bediane & Makombe, 2014, Breisinger & Diao, 2008, Subramanian, 2010) and those who are not (Bathla, 2003 and Siboleka, Nyambe & Osterkamp). The other view advanced by some scholars is that the manufacturing sector has to compete with the agricultural sector for labour while others believe that these two sectors are complementary not competitive. The agricultural sector is known to transfer to the non –agricultural sectors the resources it generates and output from other sectors such as manufacturing also impacts the agricultural sector. The manufacturing sector supplies agriculture sector with inputs like fertilizer, pesticides and machinery. Such interdependence is measured through backward or forward linkages. It is evident that there exist some backward and forward linkages¹³ between agriculture and non-agricultural sectors specifically the manufacturing sector. Given the linkages of agriculture with other sectors, investment in agriculture will in turn impact economic growth. Although, Siboleka, Nyambe & Osterkamp (2014) concluded that sectoral linkages between agriculture and the manufacturing sector in Namibia were ineffective attributable to weaknesses in existing policies undermining development in these sectors, the agriculture sector was found to be of utmost importance in terms of employment and income effects (Humavindu, 2013).

¹³ Backward linkage is simply how a sector depends on others for their input supplies while forward linkage is how the sector distributes its outputs to the remaining economy.

6.1 Backward linkages

Observations of data using the Namibia Social Accounting Matrix (SAM 2013) input-output¹⁴ tables, the following backward linkages were observed. Commercial cereal crop output requires about 7 percent of chemicals and pharmaceuticals, 5 percent of machinery and petroleum products as well as less than 3 percent of electricity and transport as inputs. Commercial horticulture output requires 7 percent of machinery, 4 percent of petroleum, transport and chemicals and pharmaceuticals. Commercial animal product output requires 18 percent of machinery, 15 percent petroleum, 8 percent transport and less than 7 percent from other food products, chemicals and pharmaceuticals and transport. Traditional (subsistence) agriculture requires 11 percent petroleum, 7 percent pharmaceuticals, 8 percent transport. Meat processing requires 40 percent commercial animal products, 15 percent machinery, 12 percent transport, 11 percent petroleum, 5 percent other food products and pharmaceuticals. Grain milling requires 20 percent from commercial cereal crops, 5 percent petroleum and 6 percent transport. Other food products require 4 percent of machinery and transport, 2 percent of petroleum products and pharmaceuticals. Beverages require 6 percent transport, 5 percent from grain milling and petroleum, 2 percent of electricity, wholesale retail and trade and pharmaceuticals.

6.2 Forward linkages

Commercial cereal crops provides about 20 percent of its output to grain milling, 5 percent to wholesale retail and trade, 3 percent to traditional agriculture and less than 2 percent to hotels, health, education and public administration. Commercial horticulture provides 8 percent to commercial animal products, 3 percent to meat processing, 2 percent to wholesale and retail trade and less than 1 percent to hotels and restaurants and other food processing. A commercial animal product provides 40 percent to meat processing, 6 percent to wholesale and retail trade, 5 percent to traditional agriculture and leather and related products as well as hotel and restaurants. Traditional agriculture provides 5 percent to wholesale and retail trade, 4 percent of its output to meat processing and less than 2 percent to hotels and restaurants and private services. Meat processing provides 12 percent of its output to wholesale and retail trade and hotels and restaurants, 4 percent to traditional agriculture and less than 2 percent to textile and wearing apparel. Grain milling provides 11 percent of its output to wholesale and retail trade, 5 percent to beverages and hotels and restaurant, 4 percent to traditional agriculture, 2 percent to commercial animal products. The analysis took into account the most significant contributors in each case.

¹⁴ The SAM is a summary table representing the production process, income distribution and redistribution which occurs between sectors and actors of production. The input –output table shows how much of each product is used as input for the production of another product.

Given the observations from the SAM and conclusions from Humavindu (2013), there is a clear indication that there are backward and forward linkages between agriculture and other sectors in the economy, however, in terms of agricultural output these linkages are more significant between wholesale and retail trade, manufacturing (agro & meat processing, textile and leather subsectors). Noteworthy is that Humavindu (2013) emphasized the prominence of agriculture linkages from the employment and income perspective as his study mainly focused on the key sectors of the Namibian economy using SAM 2004. Contrary to the above view, Siboleka, Nyambe and Osterkamp (2014) found the linkages to be ineffective as these linkages are not strong enough for the sectors to impact one another. This could be attributed to the methodology (regression analysis) employed in their study. In terms of industrialization, agriculture can contribute positively, however sectoral linkages still need to be strengthened through investments in both sectors.

7. Financing of Agricultural Sector in Namibia

Agricultural finance is defined as financial services available for agricultural production e.g. farming and production related activities such as input supply, processing trade and marketing¹⁵. Lack of access to finance has been observed as a constraint to farmers in Namibia. The agricultural finance system in Namibia consists of commercial banks, Agribank and Development Bank of Namibia. In Namibia access to credit has been a concern for farmers as lending rates for commercial banks are always high (from 1991 with 22 percent and 10 percent in 2017) making it unfordable for most small scale farmers in the rural area with no startup capital, whereas Agribank's lending rate range between 4 and 8 percent (2011 to 2017) depending on the period. In response to the plight of farmers, the government established Agribank with the mandate of promoting agricultural development related activities through the provision of affordable loans specifically to small scale farmers in Namibia. However, with this being a good initiative by government, farmers still experience a problem in the delays of loan approvals by Agribank (Shapi, 2017). If agricultural productivity is to be encouraged finance should be made available to those willing to engage in agricultural activities.

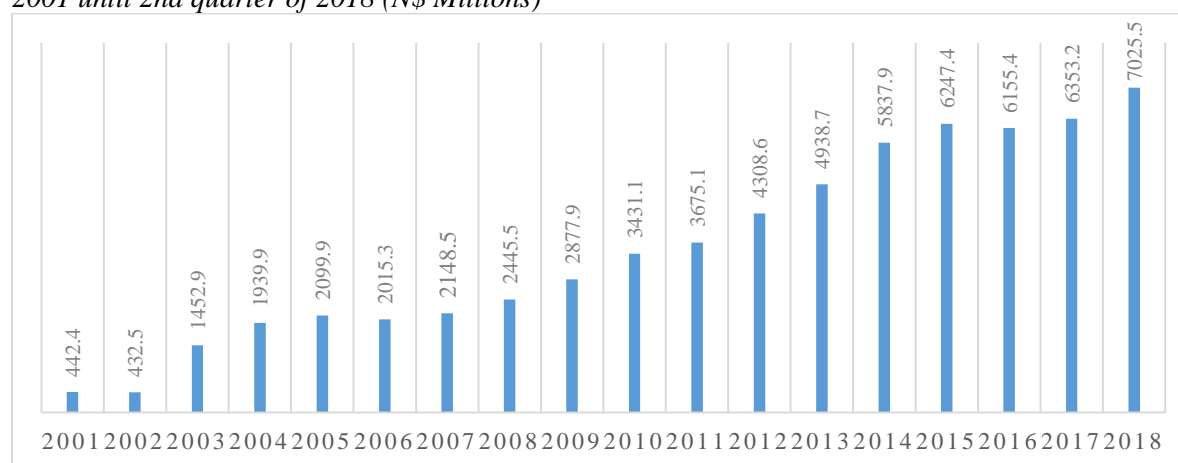
Credit lending to agriculture from financial institutions¹⁶ has been increasing over the last 18 years in Namibia. It has moved at low pace from 2001 to 2011 and increased rapidly thereafter till the year 2018 see figure 11 below. In terms of credit extension to the agricultural sector, total loans from financial institutions averaged N\$ 449 million in 2001, N\$ 3675 million in 2011 and N\$ 7026 million in 2018 respectively. However, despite the increase in credit lending year on year from financial institutions to the agricultural sector, the agricultural sector is still experiencing low productivity. Amadhila and Ikhide

¹⁵ See Amadhila (2016)

¹⁶ Financial institutions refers to Development bank, Agribank and Commercial banks

(2016) are of the opinion that although, financial institutions particularly commercial banks do finance agriculture the financing goes to agro processing, agro trading and related businesses while production in the agriculture sector is ignored. On the contrary, from the findings of this paper it might not be necessarily the case that financing is directed to agro processing as suggested by Amadhila and Ikhida (2016) as data shows a decline in agro processing. For increased agricultural productivity to be realized, production in the agriculture sector should be at the fore front thus credit should be extended to production in order to transform the sector from the current low productivity as this will serve as the needed breakthrough. The figure below shows commercial bank's lending to the agricultural sector for which disaggregated data was unavailable.

Figure 11: Banks' lending to the agricultural sector by various financial institutions average between 2001 until 2nd quarter of 2018 (N\$ Millions)



Source: Author's generation using Bank of Namibia Data

7.1 Financing products by Agribank

Collateral is one of the requirements one needs to have access to financing from any bank for business purposes. However, to note is the fact that not everyone wanting to do business has collateral. People may be willing to engage in agricultural activities but cannot do so due to lack of collateral. For Agribank to have introduced a no collateral loan product reaching out to all farmers including part time farmers¹⁷ without access to collateral is a step further to increasing agricultural productivity. The no collateral loan product means that people can have access to financing without collateral provided they are employed, as repayment of loans¹⁸ will be done through monthly installments deducted from salaries (payslip). Moreover it will empower more farmers to produce food not only for self-consumption but for

¹⁷ Part time farmers refers to those involved farming activities as a secondary source of income.

¹⁸ The repayment of the loan will be done over the period of 12 to 54 months by means of payroll deductions to enhance collections success rate.

commercial purposes thereby increasing agricultural productivity and food security in the country. The loans can be used to purchase seasonal inputs, livestock, machinery as well as finance water and power infrastructure for farming among others and this will go a long way in addressing challenges of high input costs that are hindering farmers from producing at their maximum potential.

Agribank also launched an agro processing loan product in support of the growth at home strategy advocating for value addition to agricultural produce and expand food production at a household level thereby contributing to economic transformation as subsistence farming will graduate into commercial farming. In addition, another product known as emerging retail financing product is yet to be launched, which will target full time communal farmers with no other source of income. These farmers will be given loans up to N\$1 million on condition that they sign up a mentorship agreement for a period of 2 years. The mentorship agreement enables farmers to be exposed to training by improving their knowledge, skills and attitude towards commercial farming in order to ensure that they increase their productivity and income and be able to repay back the loan at a later stage. Again this initiative is good as farmers will gain the necessary skills for the realization of increased agricultural production. In terms of approving loans, if a loan is less than N\$ 200 000 it takes about a week to be approved while a loan of more than N\$ 500 000 it takes about a months.

8. Challenges in the agriculture sector

Despite Namibia's aspiration to increase value addition through the growth at home strategy, create jobs and reduce import dependence, Namibia's agricultural sector is constrained by a variety of challenges. Literature¹⁹ on challenges affecting the agricultural sector has identified these such as access to credit, climate change and water shortages, livestock diseases, high cost of production and lack of skills, among others. Each of these is discussed below.

Climate change and water scarcity: Namibia as a semi- arid country is exposed to recurring droughts which negatively affects agricultural production. Scarcity of water is a major threat to development in Namibia including for the agricultural sector which takes a higher consumption of water. The effect of climate change continues to be of concern for agricultural producers in Namibia. Given the fact that the country depends more on rain fed agriculture, this poses a challenge in meeting the national goal of food security. If food security is threatened it only leads to high levels of poverty in the country. Government took an initiative by adopting the drought policy (2010) by encouraging and supporting farmers to adopt self- reliant drought risk management²⁰ approaches to ensures that household food security is not compromised by drought (GRN, 2010). The challenge of climate change prompted government to

¹⁹ See Amadhila and Ikhide (2016), Shapi (2017) and Bank of Namibia Symposium (2017)

²⁰ Preparedness and adaptation measures to reduce exposure to drought and reduce reliance on government

promote green scheme irrigation programmes to increase food security in the country to which 11 green scheme projects are in operation currently and more to come. However, despite these efforts water scarcity still remains a challenge not only for the agricultural sector but to the entire nation as it is important to human life. If water scarcity is not addressed, increased agricultural productivity is not possible and Namibia will continue to import fresh produce from South Africa as local production doesn't meet national demand.

Loss of soil fertility: Soil infertility has been an issue in agriculture as it leads to a decline in crop yield. A decline in crop yields increases poverty and malnutrition since majority of the people survive on agriculture in Namibia. Continuous cultivation which is mostly practiced in Namibia is the main source of soil infertility leading to nutrient mining of the soil. Even when farmers have the knowledge to manage their farms the lack of resources or affordability of resources limit them to do so.

Livestock diseases: The agriculture sector is also affected by frequent outbreaks of animal diseases such as foot and mouth diseases especially in the northern parts of Namibia. Government's objective is value addition in terms of livestock, however the quality of livestock necessary for slaughter and exports is mostly affected by various diseases. Animal diseases may lower market value due to changes in livestock appearance which makes them less attractive to buyers. The true market value of final products may be altered resulting in reduced meat consumption thereby reducing exports as well.

Inadequate skills: The agricultural sector in Namibia has limited access to skilled labour. Farmers lack the right skills to perform their work to an expected standard (Namibia Training Authority, 2013). Agricultural knowledge and know how is of importance to agricultural productivity in terms of when and how to use inputs as well as marketing and advertising. Better training of farmers leads to higher outputs as technologies and techniques are used more efficiently. Moreover, at a stakeholder engagement with key players in the agriculture sector revealed that although there are training programmes and unit standards in the country, they are predominantly production biased with less emphasis on agro-processing. This, was seen as being detrimental to the noble goal of value addition (agro-processing) currently to be pursued according to Vision 2030 and NDP5.

High cost of production: High cost of production inputs such as seeds, fertilizers, water and electricity used for production purposes hampers the sector at large. Most farmers especially in communal areas are unable to afford seeds and fertilizers due to higher price thus a hindrance to agricultural productivity. In addition, commercial farmers are also faced with high costs of water and electricity.

Lack of quality agricultural data by policy makers: Policy makers are faced with lack of up to date quality data on the structure of agriculture while farmers have a problem of accessing information related to production technologies, access to markets, price information and credit business.

Access to credit/finance: Despite the availability of financial institutions such as Development Bank of Namibia, Agribank and other commercial banks access to finance remains a challenge to farmers wanting to engage in agricultural related activities due to high interest rates and the provision of collateral. Collateral is the main requirement to access credit from banks as this serves as a guarantee for the bank to recover its money in case the borrower (farmers) defaults. In addition to collateral, potential borrowers are screened to determine their suitability. Even though, Agribank provides efficient and affordable services through accessing credit at low interest rates (4% to 8.25% depending on loan product), farmers are still faced with delays in the processing and approval of loans (Shapi, 2017).

Access to agro markets: The agro marketing and trade agency (AMTA) under the Ministry of Agriculture, Water and Forestry was tasked to facilitate agricultural marketing for ease access to markets. However, this initiative seems not to be fruitful as AMTA is unable to expand markets for farmers, hence many produce get spoiled at AMTA' hub and producers still encounter difficulties in marketing their produce due to strong competition from South African fresh produce distribution and marketing channels. For this reason, poor marketing and access to markets still remain a challenge to agricultural development. In addition, increased agricultural productivity requires investment in transport, storage and processing facilities. Thus, government cannot succeed alone as agricultural development requires active engagement of private sector such as farmers, input suppliers and buyers.

9. Quantitative Analysis of Agricultural Productivity and Economic Growth

In order to answer the question of whether agricultural productivity is an engine for growth particularly in Namibia, the Granger causality test was employed to test the causal relationship between agricultural productivity and economic growth. The Granger causality decision rule is such that; if the probability value is less than or equal to 1, 5 or 10 percent level of significance, the null hypothesis of no causality is rejected. Moreover, if it is greater the null hypothesis of no causality is not rejected. Based on the Granger causality test results it shows a probability of (0.0806) which is less than 10 percent level of significance thereby rejecting the null hypothesis of no causality. Therefore, concluding that agricultural productivity in Namibia influences economic growth. In other words higher levels of productivity can result in higher economic growth which answers the main question of this study. The study found a unidirectional relationship from agricultural productivity to economic growth and not the other way round. These results concurs with the findings of Odero (2017), Awoyemi, Afolabi and Akomolafe (2017) and Odetola and

Etumnu (2014) done in Namibia and Nigeria respectively. In actual sense, one would expect economic growth to have an influence on agricultural productivity in Namibia as an increase in economic growth would mean investing more resources in the agriculture sector.

10. Findings and recommendations

Most studies on agriculture indicate that agricultural productivity is beneficial to economic growth especially in developing countries like Namibia. Statistics shows that the agricultural sector contributions to GDP has been trending downwards since 1981, recording a decrease of 3.4 percent in 2015 and 2016 from 7.6 percent in 1981. Despite government efforts of trying to promote the agricultural sector through its national development plans to address the issue of food security, growth in the sector has just averaged 1.6 percent between 1981 and 2016 indicating that the sector is still struggling and more needs to be done. The under performance of the sector is affecting food production as well as the realization of reducing poverty which government aspires to achieve by 2030. The study also found that agricultural productivity can be an engine for economic growth as causality was observed between the two variables. Having seen that agricultural productivity can be an engine for economic growth in Namibia, increased agricultural productivity through investment needs to be encouraged. However, related literature on the same subject matter in Namibia point out challenges facing the agricultural sector contributing to its unsatisfactory performance that needs to be addressed. Issues such as access to credit, soil infertility, climate change, water scarcity and access to markets among others are the factors hampering the agricultural sector in Namibia. Therefore, the following recommendations are based on the constraints mentioned in this paper.

For Namibia to increase agricultural productivity the following are recommended:

- Given the fact that Namibia is a semi-arid country therefore will continue to experience climatic conditions such as drought which has a negative impact on agricultural production both livestock and crop production. In order to safeguard livelihoods and food security of future generations thereby reduce poverty, agricultural communities (farmers) will have to adapt to climate change by coming up with alternatives such as the adoption of irrigation system. Irrigation systems are vital under these circumstances. Where irrigation is possible the conversion from rain fed agriculture to irrigated agriculture is emphasized as it has an impact on employment and incomes.
- Government should ensure that climate change adaptation researches be undertaken to help inform decisions by farmers and prepare them as to when a drought/flood is expected to be able to have other alternatives. Climate change adaptation information is also crucial to agribusiness and policy makers to be able to make informed decisions.

- Water scarcity remains a challenge for the sector given the fact that the sector is highly dependent on water availability. Therefore, for the purpose of increased agricultural productivity the need to address the issue of water scarcity should be prioritized. For this reason Government should explore alternative technologies to harvest water (rainfall, floods), desalination plant that draws water from the sea for purification which could be beneficial to the country in the long run despite the cost. However, it cannot be achieved by government alone thus private sector participation is encouraged to invest in water infrastructure as this will ensure long term sustainability of water supply. In the Harambee spirit, let's work together as this is not an individual issue rather a national issue.
- On the issue of marketing, in order to increase agricultural productivity investment in transport, storage and processing facilities is of most important. Therefore, set up storage (hubs) and processing facilities in rural areas as this will cut on transport cost and produce being wasted.
- Continuous cultivation on the same land should be discouraged as it contributes to soil infertility which affects output (yields). Therefore, to get maximum yield without compromising soil fertility is of importance though the use of integrated soil fertility management by using fertilizers, manure as well as engage in crop rotation activities.
- There is a need to speed up the process of loan approvals by Agribank given the fact that it is the only bank with affordable interest rates as compared to commercial banks, therefore it is at an advantage side.
- Some sought of training should be made available to small scale farmers to instill the right skills needed in terms of skills development for them to produce at a larger scale. According to the agricultural sector skills plan report, Namibia 's agricultural sector lacks the right skills and majority of the people still use the old (traditional) way of cultivating (Namibia Training Authority, 2013).
- Input costs of water and electricity will continue to be an obstacle for farmers not to produce at their maximum potential. Government does offer subsidies to farmers however maybe it's still not enough given that water and electricity are considered expensive by farmers. If nothing is not done to address these challenges the growth at home strategy of value addition will also not be realized.
- Training especially in agro-processing should be introduced at both tertiary and vocational institutions in order to promote value-addition and industrialization in line with national aspirations as articulated in Vision 2030 and NDP5.

Annexure

Annex Table 1: Granger causality test result

<i>Cause</i>	<i>Effect</i>	<i>Probability value</i>	<i>Decision</i>
<i>GDP growth</i>	Agricultural Productivity	0.1960	NO
<i>Agricultural Productivity</i>	GDP growth	0.0806*	Agri productivity → GDP growth

Source: Author's compilation and values obtained from E-views

**denotes rejection of the null hypothesis at 10% level of significance*

Annex Table 2: Data

Year	GDP growth	Agricultural value added
1981	0.97	9.08
1982	-0.4	8.79
1983	-1.82	8.38
1984	-0.24	8.29
1985	0.46	7.8
1986	4.78	8.23
1987	3.55	9.68
1988	0.81	9.81
1989	1.86	9.11
1990	2.05	9.79
1991	8.17	10.74
1992	7.19	7.7
1993	-1.58	8.27
1994	1.73	11.27
1995	3.9	10.61
1996	3.19	10.42
1997	4.22	9.53
1998	3.29	9.62
1999	3.37	9.92
2000	3.49	11.82
2001	1.18	10.51
2002	4.79	10.94
2003	4.24	10.94
2004	12.27	9.74
2005	2.53	11.32
2006	7.07	10.47
2007	6.62	9.22
2008	2.65	8.23
2009	0.3	8.95
2010	6.04	9.27
2011	5.09	8.9
2012	5.06	8.68
2013	5.62	6.87
2014	6.35	7.23
2015	5.99	6.5
2016	1.08	6.85

Source: Author's generation obtained from World Bank database and NS

Annex Table 3: Cereals/Grain local production marketed and imports tonnage

	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
WHITE MAIZE							
Total Demand	118,533	178,180	206,928	151,960	159,820	154,177	127,143
Local purchases/production marketed locally	63,228	72,438	36,694	69,433	39,161	43,948	76,660
Imports	55,305	105,742	170,234	82,527	120,659	110,229	50,483
WHEAT							
Total Demand	96,473	102,545	96,569	114,635	106,601	131,086	111,107
Local purchases/production marketed locally	11,930	14,819	11,312	11,600	11,411	9,822	6,863
Imports	84,543	87,726	85,257	103,035	95,190	121,264	104,244
PEARL MILLET							
Total Demand	2,835	4,903	6,017	4,082	6,207	7,125	5,813
Local purchases/production marketed locally	975	1,040	532	750	111	1,584	2,344
Imports	1,860	3,863	5,485	3,332	6,096	5,541	3,469

Annex Table 4: Area planted and Total Production

	2010	2011	2012	2013	2014	2015	2016
Total Area Planted (ha)	313548	325183	311779	282612	307837	270613	284192
Total production (tonnes)	145413	127291	155466	79683	136339	68716	74975
Rain fed	107456	88661	104935	34818	89770	51205	41211
Irrigated	37957	38855	50531	34685	46801	24505	33764

Annex Table 5: Percentage Contribution to GDP

Industry	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Agriculture and forestry	5.3	4.0	4.3	5.1	5.0	4.9	3.4	3.9	3.3	3.4	4.5
Fishing and fish processing on board	3.2	3.6	3.9	3.5	3.2	3.1	3.0	2.8	2.6	2.7	2.5
Mining and quarrying	12.7	17.2	10.9	10.4	8.7	12.7	13.2	12.2	11.7	11.8	12.1
Primary industries	21.3	24.8	19.1	19.0	16.9	20.7	19.6	18.9	17.6	18.0	19.1
Manufacturing	13.6	11.4	13.0	12.5	13.7	12.2	11.0	10.0	9.7	11.0	10.8
Electricity and water	2.4	2.0	2.0	1.9	2.0	1.9	1.9	1.9	1.5	2.3	2.6
Construction	3.5	4.0	3.2	3.2	3.5	3.3	3.9	5.0	5.5	3.9	2.9
Secondary industries	19.5	17.5	18.3	17.5	19.1	17.3	16.8	17.0	16.8	17.3	16.3
Wholesale and retail trade, repairs	11.0	10.7	11.1	11.2	11.4	10.7	11.6	12.4	11.5	11.3	11.3
Hotels and restaurants	1.7	1.6	1.7	1.7	1.8	1.7	1.6	1.8	2.0	2.3	2.6
Transport, and communication	4.2	4.7	5.2	5.1	5.1	4.7	4.7	4.8	4.7	4.9	4.9
Financial intermediation	5.1	4.5	5.0	5.6	5.2	5.1	6.2	5.7	6.9	6.7	6.2
Real estate and business services	8.5	7.5	8.7	8.6	8.9	8.2	7.7	7.2	7.1	7.0	7.1
Community, social and personal service activities	2.9	2.7	2.8	2.7	2.9	2.2	1.8	1.8	1.9	1.8	1.8
Public administration and defence	9.0	9.0	10.1	11.0	9.7	11.0	11.4	11.1	11.6	11.0	10.7
Education	6.9	6.9	7.4	7.1	8.2	8.3	8.6	9.2	9.5	9.5	9.8
Health	3.0	2.9	3.0	3.1	3.2	3.0	2.9	2.9	3.0	2.9	3.0
Private household with employed persons	0.7	0.9	1.0	1.0	1.1	1.1	0.9	0.9	0.9	0.8	0.9
Tertiary industries	53.0	51.5	55.8	57.2	57.6	55.9	57.3	57.9	59.1	58.2	58.4
Less: Financial intermediation services indirectly measured	1.1	1.1	1.1	1.2	1.2	1.2	1.2	1.3	1.3	1.2	1.1
All industries at basic prices	92.7	92.7	92.1	92.5	92.4	92.8	92.3	92.5	92.2	92.3	92.7
Taxes less subsidies on products	7.3	7.3	7.9	7.5	7.6	7.2	7.7	7.5	7.8	7.7	7.3
GDP at market prices		2.6	0.3	6.0	5.1	5.1	5.6	6.4	6.1	0.6	-0.9

Annex Table 6: Annual percentage change

Industry	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Agriculture and forestry	-27.1	6.7	10.4	1.0	8.1	-19.3	11.1	-10.4	1.5	12.6
Fishing and fish processing on board	12.9	36.0	-2.4	-4.8	-7.6	3.0	-2.5	2.3	9.1	1.3
Mining and quarrying	2.6	-31.7	22.2	-5.4	25.1	1.7	-6.0	-4.9	-5.8	12.8
Primary industries	-4.9	-14.0	13.7	-3.6	14.4	-3.7	-1.6	-5.2	-1.5	10.6
Manufacturing	4.9	2.0	7.5	5.7	-6.8	4.4	-0.1	-4.3	5.6	1.3
Electricity and water	-8.9	-16.4	2.4	1.7	15.4	-4.4	1.5	13.6	6.8	1.8
Construction	15.4	-17.5	6.8	15.9	7.5	28.7	42.6	24.3	-26.3	-25.6
Secondary industries	4.9	-4.4	6.8	7.1	-1.8	8.6	10.9	6.8	-6.4	-6.7
Wholesale and retail trade, repairs	-4.0	10.0	7.5	5.8	4.3	14.8	13.9	7.4	3.1	-7.5
Hotels and restaurants	3.5	5.5	6.5	9.5	8.1	9.0	10.8	5.6	3.5	-1.1
Transport, and communication	10.7	16.0	6.7	4.9	8.0	6.4	5.7	6.9	7.0	0.8
Financial intermediation	16.0	-2.5	9.5	5.7	6.8	17.9	10.9	5.0	2.8	2.8
Real estate and business services	6.6	7.6	1.7	5.7	4.7	4.6	2.8	4.4	1.0	0.9
Community, social and personal service activities	0.7	-0.5	1.6	11.2	-16.6	-9.9	3.0	11.9	-0.3	-0.1
Public administration and defence	11.8	5.3	2.8	5.3	2.7	3.8	1.4	14.0	3.3	0.3
Education	4.9	3.0	-0.2	17.4	4.4	3.3	10.3	4.1	2.8	-1.2
Health	-8.0	5.5	9.5	5.7	5.7	8.9	10.2	17.5	7.2	-1.3
Private household with employed persons	8.6	8.6	8.6	8.6	8.6	-6.7	5.5	1.7	1.4	1.0
Tertiary industries	5.1	6.0	4.6	7.4	3.9	7.3	7.7	7.9	3.2	-1.4
Less: Financial intermediation services indirectly measured	2.0	-7.3	23.4	10.6	4.5	18.8	5.3	0.1	2.1	-0.2
All industries at basic prices	2.7	-0.3	6.6	5.1	4.8	5.1	6.6	5.5	0.6	-0.5
Taxes less subsidies on products	1.8	8.0	0.0	5.3	8.9	11.5	4.1	12.5	0.9	-5.5
GDP at market prices	2.6	0.3	6.0	5.1	5.1	5.6	6.4	6.1	0.6	-0.9

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