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Research Topic

ANALYSIS OF CONTROLLED CROPS IN NAMIBIA FROM 2004-2011

ACKNOWLEDGEMENTS

First and foremost, I express my gratitude and give praise to the Almighty GOD for his continuous blessings and giving me an opportunity to work on this challenging project.

Moreover, I will like to thank my friend Ms. Aina Nangombe and my fellow classmates, for giving me courage in my work and helping me with some ideas to add to the project.

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ABSTRACT

This project analyses the production of controlled crops in Namibia from the period 2004-2011. Controlled crops refers to crops that are administered by the Namibian Agronomic Board in conjunction with Ministry Of Agriculture, Water and Forestry in promoting the agronomic industry and facilitating the production, processing, storage and marketing of these controlled products. The objective of the study is to assess the overall performance of controlled crops namely Mahangu (pearl millet), white maize, wheat and horticultural fresh produce which forms part of these crops in the Namibian economy. A crop situation for the North Central regions of Kavango, Caprivi, Omusati, Ohangwena, Oshikoto and Oshana were analysed for these controlled crops at regional level.

CHAPTER 1

1.1 Introduction and background of the study

In this study, much focus is on the analysis of controlled crops including horticultural fresh produce in Namibia measuring them by production or yield from the period 2004 to 2011. The first chapter of the study provides more information on the research background and discusses issues such as the statement of the problem, research objectives, research questions and hypothesis of the study.

The Namibian Agronomic Board (NAB) is responsible for promoting the agronomic industry and facilitating the production, processing, storage and marketing of controlled products in Namibia. The controlled crops administered by the Namibian Agronomic Board include mahangu also known as pearl millet, wheat and white maize. Horticultural fresh produce ranges from grapes, onions, potatoes, tomatoes, watermelons, butternuts, spanspek, dates and cabbage. Mahangu a drought resistant crop and is a staple food for more than 60 per cent of the country's population. It is produced under rain-fed conditions by a large number of producers in the Northern regions of Kavango, Caprivi, Omusati, Ohangwena, Oshana and Oshikoto regions. White maize is produced for human consumption under dry-land conditions as well as under irrigation. The main dry-land production areas are the Maize triangle situated between Tsumeb, Otavi and Grootfontein. Irrigation farming is mainly done at the following projects: Hardap Irrigation project near Mariental in the south, Etunda in the North Central Regions (NCRs) and five projects in the Kavango region i.e. Musese, Ndonga Lilena, Uvungu-Vungu, Mashare and Shadi Kongoro. Wheat a winter crop and produced under irrigation. The wheat industry in Namibia is still relatively small compared to that of mahangu and white maize. The production areas of wheat are the Hardap Irrigation Project and environs, Maize triangle and environs, North Central Areas: NCRs, Kavango and Caprivi. All horticultural fresh produce are under irrigation and is produced all over Namibia. Namibia has 16 white maize millers, 4 wheat millers and 3 processors of these grains. Production (yield) data of crops can be used or has its applications in planning, by looking at the food security and food self suffiency of a country like Namibia. Thus due to this, it is employed in the Ministry of Agriculture, Water and Forestry by the Namibia Early warning and Food Information Unit to addressed the issues and situations relating to crops and giving all relevant warnings in shortages as they arise. In this case, the study is going to concentrate on the following aspects: the North Central regions being; Caprivi, Kavango, Omusati, Ohangwena, Oshana and Oshikoto regions regarding to total cereal productions. Total productions of controlled crops and horticultural fresh produce from the period 2004 to 2011 will be analysed.

1.2 Statement of the problem

Agricultural production of these controlled crops and horticultural fresh produce has become an important practice in the lives of the majority of Namibians, ranging from the producers to the end users of these produces. Their livelihoods are acquired directly or indirectly from the agriculture of these controlled crops like mahangu, wheat, white maize and horticultural fresh produce. It is for this purpose that the world and individual nations have to take cognizance of this important element called agriculture. This goes further to challenge the ability of our productions to provide food security and food self-sufficiency for our country. This is significant because agriculture rely on a planning process in various aspects in order to be able to depict shortcomings. When this is achieved, the country will be ready for any obstacles that may arise.

Similar research on crop farming and animal farming has been carried out by Bank of Namibia, Research Department (2008) looking at critical areas of production and how to stimulate growth and these has not have had much impact in the sector as it still in the struggling mode.

Lately the changes in weather patterns experienced globally due to global warming have affected agricultural production due to many uncontrollable climatic factors, the number one being rainfall. According to climate data expert Sepiso Mwangala of the Namibian Meteorological Service as reported in the Namibian newspaper of 29 October 2012 in terms of rainfall, there is an "expectation for a general decrease of between 2,5 per cent and 7,5 per cent by the middle of the 21st century".

Rainfall being too much or too little has the potential of bringing catastrophic implications to a country like Namibia in terms of its agricultural perspectives. Crops and horticultural fresh produce will be lost thus resulting in production loss and food shortages. The changing rainfall patterns have short and long term effects in some of the core human activities.

Given these challenges, rainfall patterns further prove to be an obstacle in production of these crops in order to attain food security and economic development in Namibia.

1.3 Research objectives

The objective of this study is to assess the overall performance of these controlled crops and horticultural fresh produce in the Namibian economy by production in (tons).

Specific objectives of this study are:

1.3.1 To identify controlled crops and horticultural fresh produce which have the potential of increasing the value addition within these sector, as well as the related investment requirements.

1.3.2 To establish import and export relations of horticultural fresh produce.

1.3.3 To analyze controlled crops in terms of total productions in tons and actual area planted in hectares at National level.

1.3.4 To analyze crop situation (Cereals = Mahangu + White maize + Wheat) for North Central Regions (NCRs) in terms of actual area planted in hectares, actual production in tons, year and rainfall patterns at regional level.

1.4 Research question

This study will be guided by the following questions:

1.4.1 How regression analysis can be applied to model factors affecting productions (tons) in Namibia?

1.4.2 Is there is a significant difference in mean between imports and exports of horticultural fresh produce for the years under review (2004-2011).

1.4.3 Is there a correlation between actual production in tons and actual area planted in hectares for these controlled crops?

1.4.4 Is there a significant difference in total mean cereal productions (cereals= white maize+wheat+mahangu) for the North Central Regions (Caprivi, Kavango, Ohangwena, Omusati, Oshikoto and Oshana) at regional level for the period 2004-2011?

1.4.5 Is there a significant difference in total mean productions in tons for these controlled crops at national level for the years under review?

1.5 Significance of the study

Agriculture is an important practice in Namibia and the world at large and thus it is quite of importance to create awareness of the situation of these controlled crops and horticultural fresh produce by productions (yields) in Namibia so that the necessary mechanisms and structures can be put in place to help the sector in areas where it lacks and primarily this is the sector that can drive Namibia as a whole towards food self-sufficiency. Improved production levels means increased ratio in production and thus through this we can address many socio-economic problems.

At regional level we would like to establish whether the crops situation for North Central Regions so that better planning and monitoring can be achieved. Improved production levels means increased ratio in

production and thus through this we can address many socio-economic problems. As the saying goes agriculture is the backbone of any country and increasing production is a key factor in these regard.

1.6 Hypothesis

i). H_0: There is no difference in mean between imports and exports of horticultural fresh produce for 2004 – 2011.

H_a: There exists a difference in mean between imports and exports of horticultural fresh produce for 2004 - 2011.

ii). H_0: There exists no correlation between actual productions in tons and actual area planted in hectares of these controlled crops from 2004 -2011.

H_a: There exists correlation between actual productions in tons and actual area planted in hectares of these controlled crops from 2004 -2011.

iii). H_0: There is no difference in mean total cereal productions for North central regions (Caprivi, Kavango, Ohangwena, Omusati, Oshikoto and Oshana) from 2004 – 2011

H_a: At least one of the mean total cereal productions is different for the North central (Caprivi, Kavango, Ohangwena, Omusati, Oshikoto and Oshana) from 2004 – 2011

iv) H_0: There is no relationship between total cereal productions, actual area planted, year, North Central Regions and rainfall for the regions in millimeters from 2004 - 2011.

H_a: There exists a relationship between total cereal productions actual area planted, year, North Central Regions and rainfall for the regions in millimeters from 2004 - 2011.

v) H_0: There is no difference in mean total productions for these controlled crops from 2004 – 2011

H_a: At least one of the mean total productions is different for the controlled crops.

Limitation of the study

This study was hampered by time constraints in view of analysing available data from the period before 2004. The other limitation was lack of financial resources which curtailed the researcher from studying individual production areas (Etunda, Mashare and Hardap Irrigation schemes) across Namibia which will have given an in-depth picture of what is prevailing.

The researcher was also compelled to limit the study area of the research to productions (yields) of these controlled crops and horticultural fresh produce, leaving other areas of agriculture like livestock due to time and insufficient data captured for this area. Therefore this does not give a complete picture of the findings of agriculture in general in Namibia.

There was also some difficulties in accessing certain information which was deemed classified. As a result, this limited the researcher from giving a broader view of the situation under study. This on the other hand defeated openness and purpose of the study.

Delimitations

This study was limited to data obtained from the Namibian Agronomic Board (NAB) for the total productions by year of these controlled crops and horticultural fresh produce. Under the variable productions only secondary data for these controlled crops and horticultural fresh produce were obtained. The North central regions namely Caprivi, Kavango, Oshana, Oshikoto, Ohangwena and Omusati from the data obtained from the Ministry of Agriculture, Water and Forestry were included to view the production levels and to analyse a crop situation as these areas receive better rain compared to other regions and areas in Namibia and could be used as a basis to see if productions is affected by rain, as these would influence the data analysis for this variable as it could not be compared to the other regions and areas left out, thus could not constitute a clear picture of what happens at these regions and areas.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Agriculture is an important sector in any given continent, country or village. It contributes to the upliftment of people's lives and GDP of any economy in the world at large. It is important to know the conditions of your area in order to plan your agricultural productions. However, no agriculture has much value if one cannot produce in abundance the products.

2.2 Related Literature Review

2.2.1 Theoretical literature

The role of agriculture in economic development of a country changes as the transformation proceeds. In the early stages, agricultural growth, particularly led by food staples and small farms, is a major engine of national economic growth and can play a most significant role in reducing poverty (Skoet at al., 2004). As the country develops however, the agricultural sector begins to take a secondary role as an engine of growth and the composition of its output and farm size structure changes. The key questions are whether this is true for Namibia today, and if not, what need to be done to enhance the production of agriculture in its primary growth role in the early stages of economic development.

Johnson et al (1961) offer five ways in which the agricultural sector contributes to the overall economic growth: Meeting the food demands of a wealthy and growing urban population; increased agriculture exports as a means of earning foreign exchange; providing labour for the expanding sectors of the economy; providing capital for investment in the growing industrial sectors of the economy, and increased cash incomes in the rural sector which serves to increase demand for the products of the industrial sector.

Hazell et al (1983) argued that with the dynamism of the "green revolution", agriculture came to be seen as a growth sector which could among other things, generate more food and raw materials at lower prices, release foreign exchange for the importation of strategic industrial and capital goods. Agriculture can also reduce poverty by increasing labour productivity and employment in rural areas and lowering food prices for all.

Johnson and Kirby, (1975), Mellor, (1976), and Mellor and Johnson, (1984) suggested that a growing agricultural sector demands non-farm production inputs and supplies raw materials to transport, processing, and marketing firms. Likewise, increase in farm income leads to greater demand for consumer goods and services. Besides stimulating national economic growth, these production and consumption linkages affect poverty, particularly when agricultural growth is concentrated on small and medium size farms.

Despite the overwhelming supporting evidence that the contribution of agriculture is vital to the overall growth of the economy, a paper by Harley and Crafts (2000) raises doubts about the contribution of agriculture. They argued that England imported a wide range of manufactured goods because agriculture was unable to provide enough food. In spite of a relatively good performance in terms of total factor productivity (TFP) growth, production growth was in fact hampered by diminishing returns to labour and capital.

2.2.2 Empirical literature

The study has drawn the following lessons from different case studies: In the countries of Malaysia, Kenya and Zambia, respective Governments intervened in the agricultural sector through various policies such as giving support to the small holder farmers, broadening access to finance, providing infrastructure and investing in research. Moreover, in Kenya the Government instituted a land distribution programme. In Malaysia the success of palm oil was also due to the comparative advantage of the country.

Despite these interventions, output in Kenya and Zambia increased initially but later started to decline. In the case of Zambia the decline in output was brought about by a host of factors such as the drought, privatization and the removal of subsidies on maize and fertilisers. It should however, be pointed out that recently, the growth in the agricultural sector has started to pick up in Zambia. This is on account of continued government focus on food security, diversification and the development of new agricultural productions areas. In Kenya, the decline in the growth of the agricultural sector could be attributed to inefficiencies in marketing, limited land expansion of small holder farming, limited development and use of new technologies, deteriorating infrastructure, low investment, and bad weather. Notwithstanding the decline in the growth rates, the agricultural sector remains imperative.

A number of researchers have investigated the relationship between the agricultural sector and the economy. Miller et al (1999), in their study on the contribution of agriculture to the Arkansas economy found that the agricultural sector had in 1996 accounted for 24 percent of the employment of the state, 41

percent of the manufacturing gross state product and 10 percent of value added in the economy of the Arkansas state.

Gardner (2003) investigated the relationship between growths in agricultural value added per worker and GDP per capita for 52 developing countries. He provided evidence of a positive relationship between these growth rates and poses the question: "What is the direction of causality?" Limited information was provided concerning the methods used to answer this question. It was however, concluded that agriculture did not lead growth. Tiffin (2004), however, used the Granger Causality test in the panel data analyzed by Gardner for 85 countries. He found overwhelming evidence which supported the conclusion that agriculture value added causes growth in both developed and developing countries. In Namibia Odada and Godana (2007) asserted that the agricultural sector is the largest employer supporting approximately 80 percent of the population.

In summary, evidence from both the theoretical and empirical literature supports the hypothesis that indeed growth of the agricultural sector might have a significant role to play in the economy. This may be in the form of providing food, employment, income, foreign exchange, and creating demand for capital investments and increasing productivity of workers. Agriculture also supports other sectors such as transport, manufacturing, plastic packaging. Based on this background, the importance of the agricultural sector within the Namibian economy cannot therefore be overemphasised.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Introduction

This Chapter will present the methodology used in the study. It will review the types and sources of data that will be used; also the techniques for data analysis and the expected contribution to knowledge generation will be explained in this chapter.

3.2 Types and sources of data

The study will employ yearly data of the variable production from 2004-2011, which include data from Namibian Agronomic Board (NAB) for controlled crops and horticultural fresh produce. For the total cereal productions for North Central Regions (NCRs), we obtained the data from the division of planning under the Namibia Early warning and Food Information Unit in the Ministry of Agriculture, Water and Forestry. This information was collected from available records at the centres since these bodies are responsible for promoting the agronomic industry, facilitating the production, processing, storage , marketing of controlled products and crop situations in Namibia. The study population comprise of controlled crops, horticultural fresh produce and cereal productions for North Central Regions (NCRs) in Namibia.

3.3. Study design, Data analysis and methods

This is a cross sectional quantitative study design using retrospective data. Regression analysis, Analysis of Variance (Anova), Correlation and Independent sample t- test were used to quantitatively analyse and explain production levels in Namibia. The independent variable were the different horticultural fresh produce, controlled crops(wheat, white maize and mahangu) and rainfall in millimetres for North Central Regions(NCRS) whereas the dependent variable is total productions in tons from the years 2004 to 2011.

Regression analysis was employed to establish whether rainfall in millimetres, actual area planted, years and North Central Regions exhibits a relationship with total cereal productions for the North Central Regions.

Underlying assumptions of regression model :

- Each value of *Xi* and of *Y* is observed without measurement error.
- Each conditional distribution of the error term has a mean of zero.
- The variance of the conditional distribution of *u* is constant for all such distributions;

this is the homoscedasticity assumption.

- The independent variables, *Xi*, are linearly independent of each other.
- The fixed *X* model requires that the conditional distribution of the disturbance term must be normal in form.

Controlled crops and North Central Regions (NCRs) (categorical variables) and total productions in tons (continuous variable) was analyzed using, analysis of variance (ANOVA). To see whether there exists a mean difference in total productions in tons for these controlled crops and North Central Regions (NCRs).

Underlying assumptions of ANOVA:

- the values in each of the groups (as a whole) follow the normal curve,
- with possibly different population averages (though the null hypothesis is that all of the group averages are equal) and
- equal population standard deviations

Import and export (categorical variables) and horticultural fresh produce in tons (continuous variable) will be analyzed using t-test to see the difference in mean between import and export for horticultural fresh produce.

Underlying Assumptions for the t-test

- Bivariate independent variable (A, B groups)
- Continuous dependent variable
- Each observation of the dependent variable is *independent* of the other observations of the dependent variable (its probability distribution isn't affected by their values). Exception: For the paired t-test, we only require that the pair-differences (A_i - B_i) be independent from each other (across i). [Note: "independent" and "dependent" are used in two different senses here. Just think of a "dependent variable" as one thing, and "observations that are dependent" as another thing.]
- Dependent variable has a *normal distribution*, with the same variance, σ^2, in each group (as though the distribution for group A were merely shifted over to become the distribution for group B, without changing shape.

The variables area planted in hectares and actual yield (production) both continuous variables will be analyzed by means of **correlation**. To see how the area planted and actual yield for the controlled crops relate to each other.

Underlying Assumptions for correlation

The distribution of the X scores is normally distributed in the population sampled.

- The distribution of the Y scores is normally distributed in the population sampled.
- For each X score, the distribution of Y scores in the population is normal.
- For each Y score, the distribution of Y scores in the population is normal.

Assumption 1: The correlation coefficient *r* assumes that the two variables measured form a bivariate normal distribution population.

Quantitative research method was the method of choice for this project. According to Oyedele (2003), quantitative research is hypothetical, particularistic, impersonal, experimental and stable. Usually, quantitative data is collected under controlled or rather monitored situations in order to manipulate the variables thus replicating the findings. It is the outsider's perspective of the problem and it is unbiased. The quantity-based category includes measurements of openness and restrictiveness in rainfall.

3.5. Data Collection

Data was collected from the Namibian Agronomic Board and Ministry of Agriculture, Water and Forestry as secondary data, from 2004 to 2011). In this case this information includes records of total productions of controlled crops, horticultural fresh produce and cereal productions for North Central Regions. Secondary data refers to aggregated information compiled by a department over an extended period for its own use (Steppingstones) from 2005-2009. This is ready-made information.

Data was analysed using computer applications called SPSS and Excel. SPSS was used to organize plot graphs, carry out analysis of variance, regression analysis and hypothesis test.

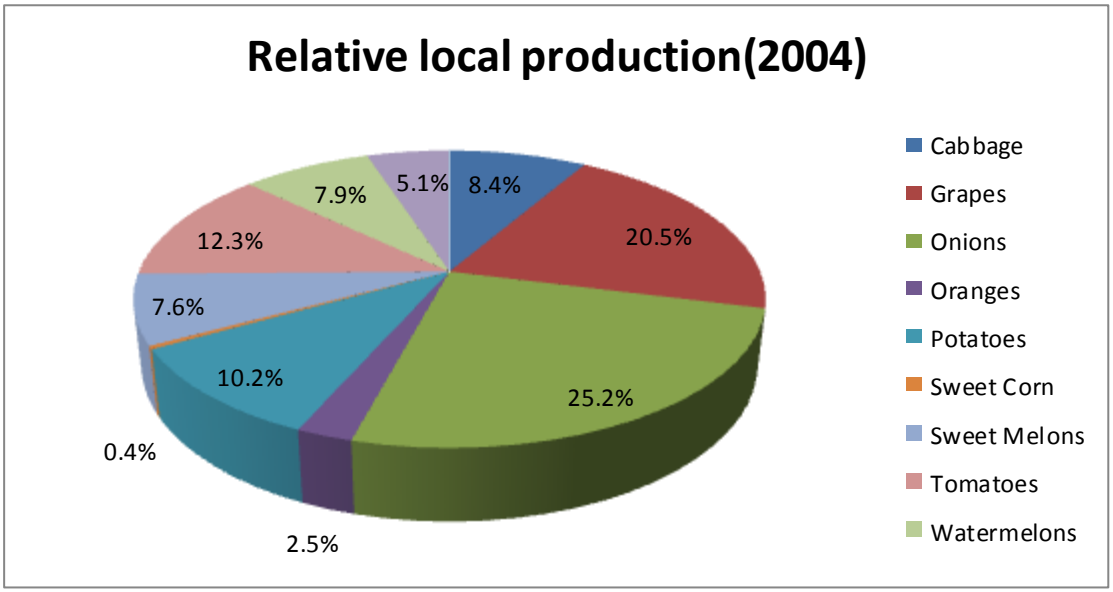
CHAPTER FOUR

4. RESULTS AND ANALYSIS

Horticultural fresh produce, controlled crops (mahangu, white maize and wheat) and North Central Regions (Kavango, Caprivi, Omusati, Ohangwena, Oshikoto and Oshana) were used in the analysis of data. Horticultural fresh produce category referring to others includes pumpkins, sweet potatoes, green mealies, butternuts, carrots and cauliflower. Moreover the variable total productions in tons was selected and analysed by using different statistical methods like: Regression analysis, Analysis of Variance, Correlation and Independent Sample t-test in relations to the years under review of 2004-2011. A 5% level of significance will be used in the analysis.

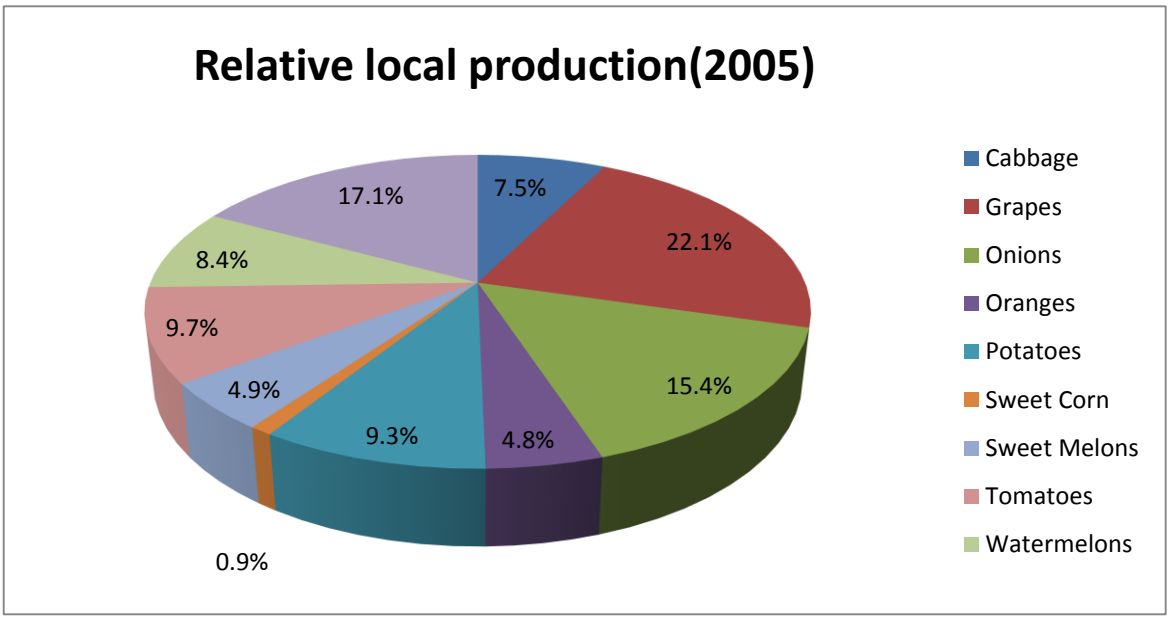
4.1 Horticultural fresh produce performance overview per year

Figure 1



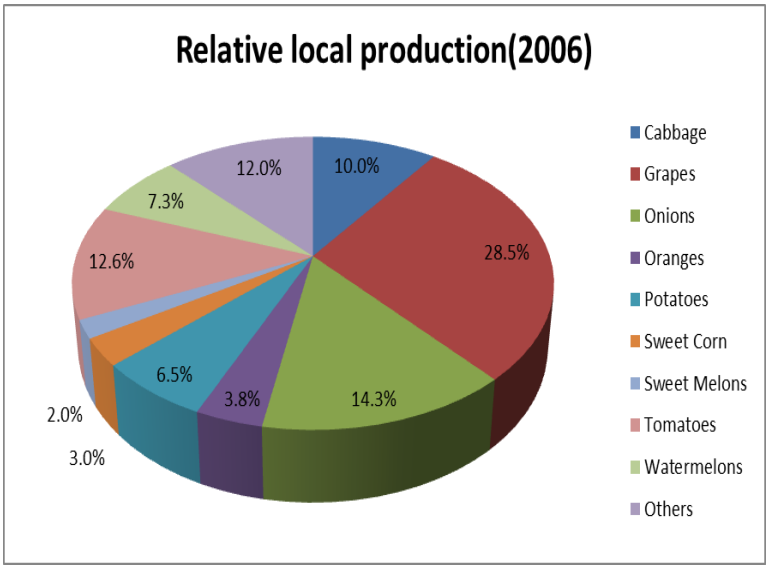
In 2004, onions contributed the highest production of 25.2% of all locally produced horticultural fresh products, followed by grapes with 20.5% and a low production of 0.4% for sweet corn.

Figure 2



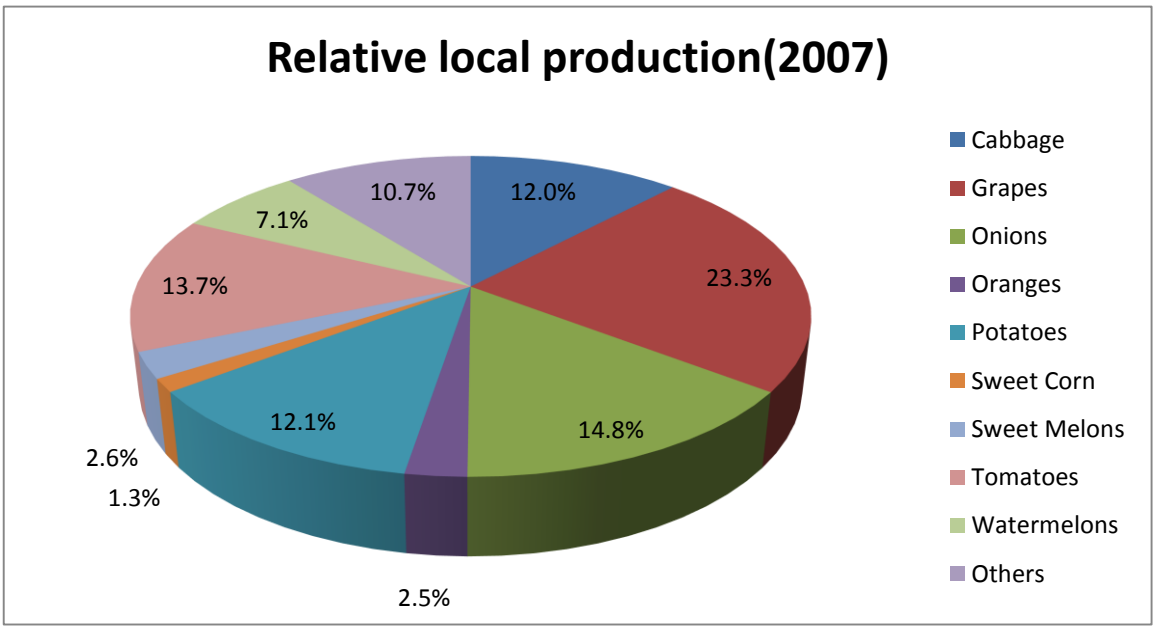
In 2005, grapes contributed the highest production of 22.1% of all locally produced horticultural fresh products, followed by others with 17.1% which includes pumpkins, sweet potatoes, green mealies, butternuts, carrots and cauliflower and a low production of 0.9% from sweet corn.

Figure 3



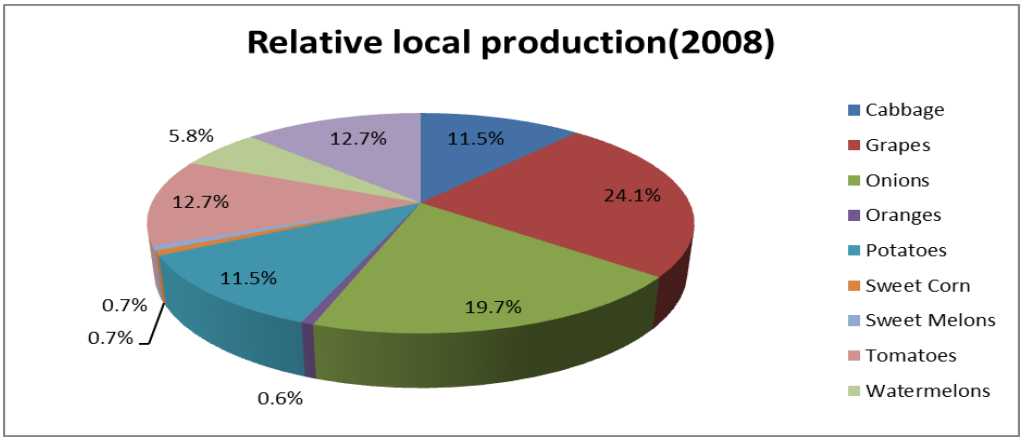
In 2006, grapes contributed the highest production of 28.5% of all locally produced horticultural fresh products, followed by onions with 14.3% and a low production of 2.0% from sweet melons.

Figure 4



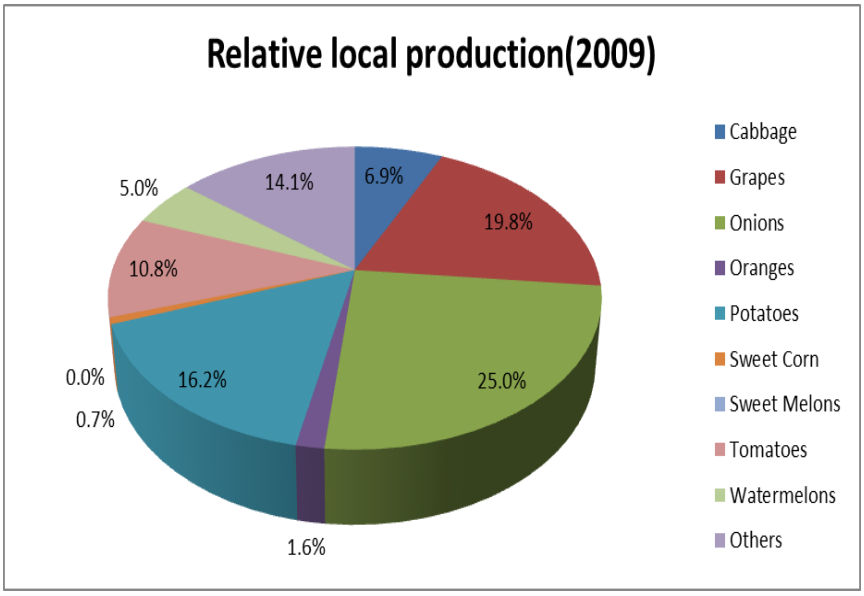
In 2007, grapes contributed the highest production of 23.3% of all locally produced horticultural fresh products, followed by onions with 14.8% and a low production of 1.3% from sweet corn.

Figure 5



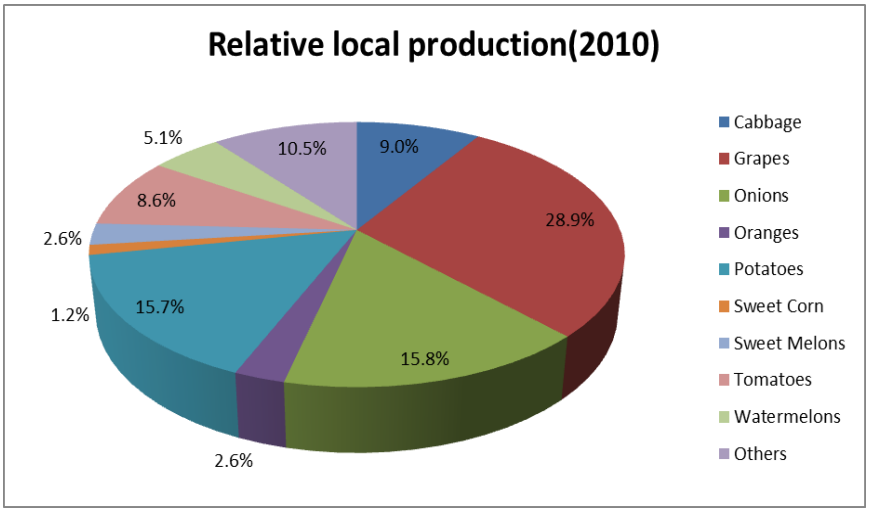
In 2008, grapes contributed the highest production of 24.1% of all locally produced horticultural fresh products, followed by onions with an increase of 19.7% and a low production of 0.6% from oranges.

Figure 6



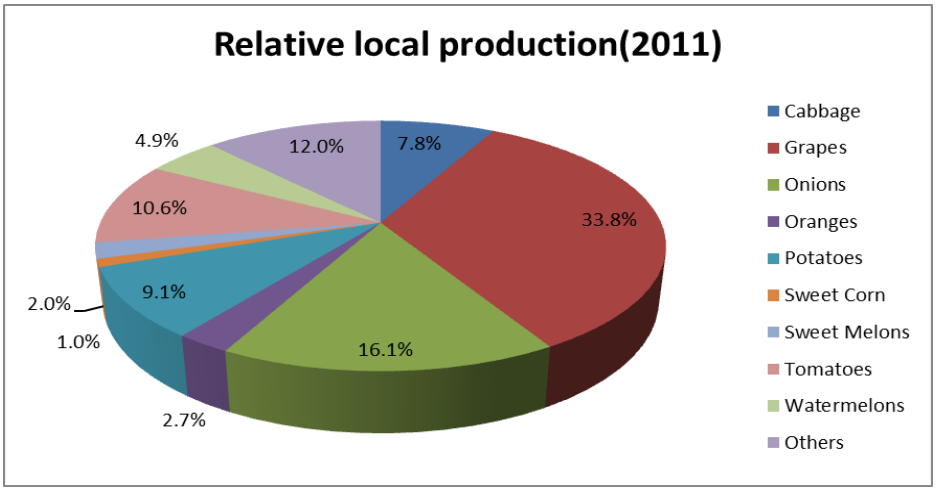
In 2009, onions contributed the highest production of 25.0% of all locally produced horticultural fresh products, followed by grapes with a decrease of 19.8% and a no production for sweet melons.

Figure 7



In 2010, grapes contributed the highest production of 28.9% of all locally produced horticultural fresh products, followed by onions with a 15.8% and a low production of 1.2% for sweet corn.

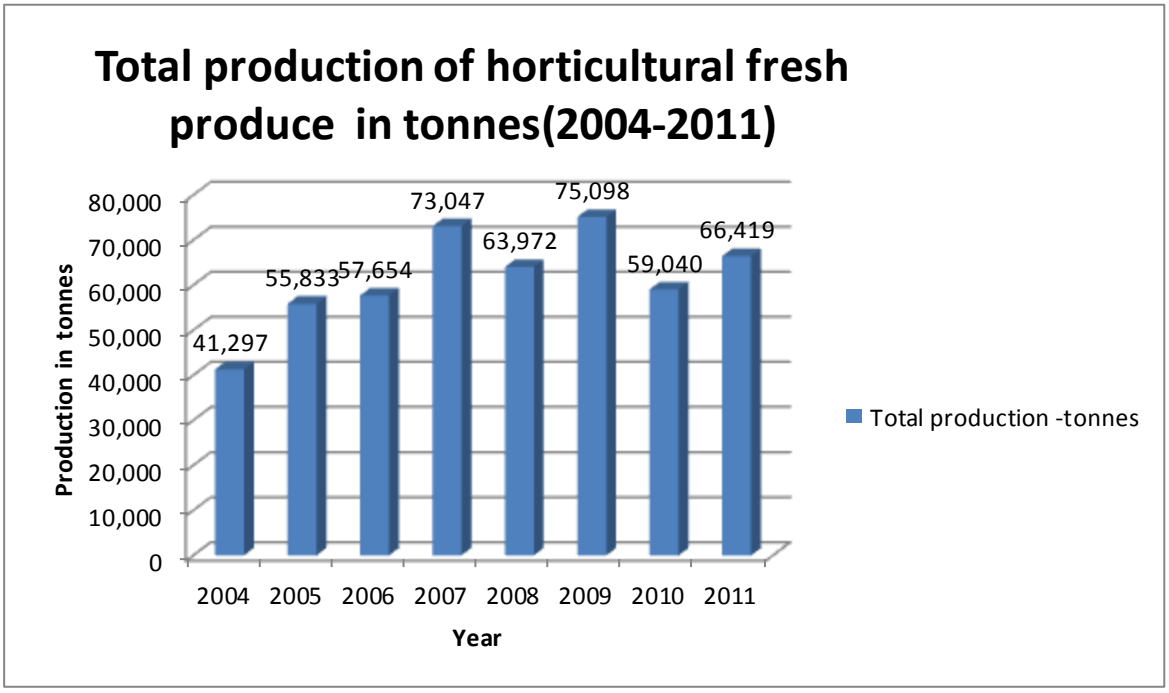
Figure 8



In 2011, grapes contributed the highest production of 33.8% of all locally produced horticultural fresh products, followed by onions with a 16.1% and a low production of 1.0% for sweet corn.

4.2 Relative volume of Horticultural production (2004 – 2011):

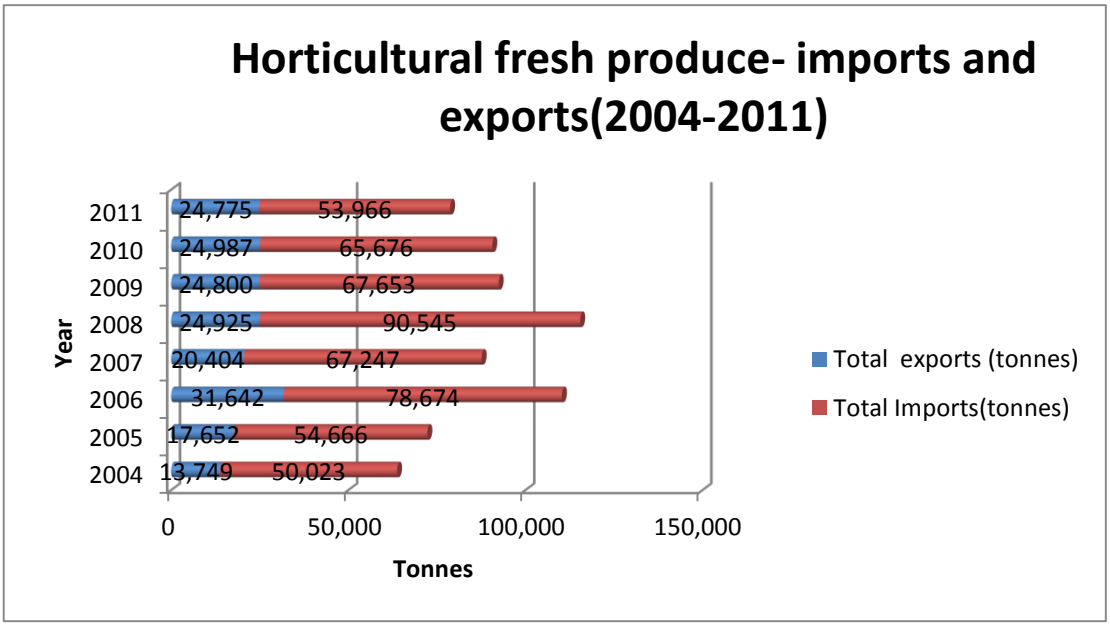
Figure 9



The graph depicts a steadily increase in the production of horticultural fresh produce from 2004 to 2007. From 2008 to 2011 it fluctuates with the highest production recorded in 2009 of 75,098 tons.

4.3 Import and Export for horticultural fresh produce

Figure 10

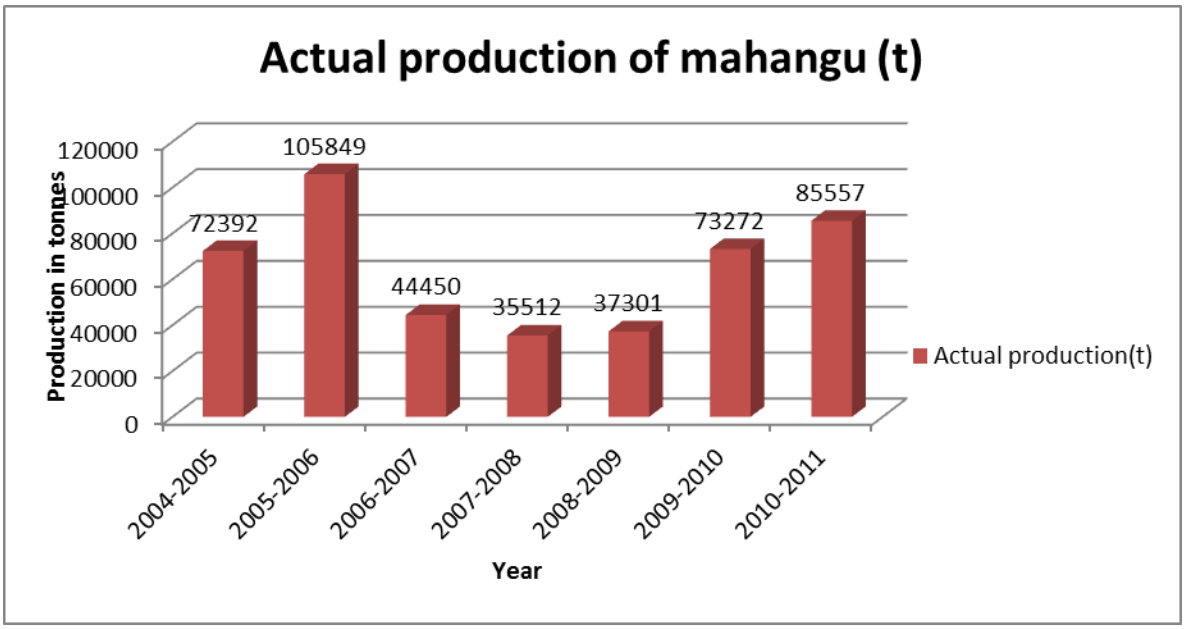


The graph clearly depicts that Namibia imports more horticulture fresh produce than it exports. In 2008 a total of 90,545 tons were imported, while the largest exported is 31,642 tons in 2006. There was not a year were exports exceeds imports.

4.4 Controlled crops:

Mahangu (2004-2011)

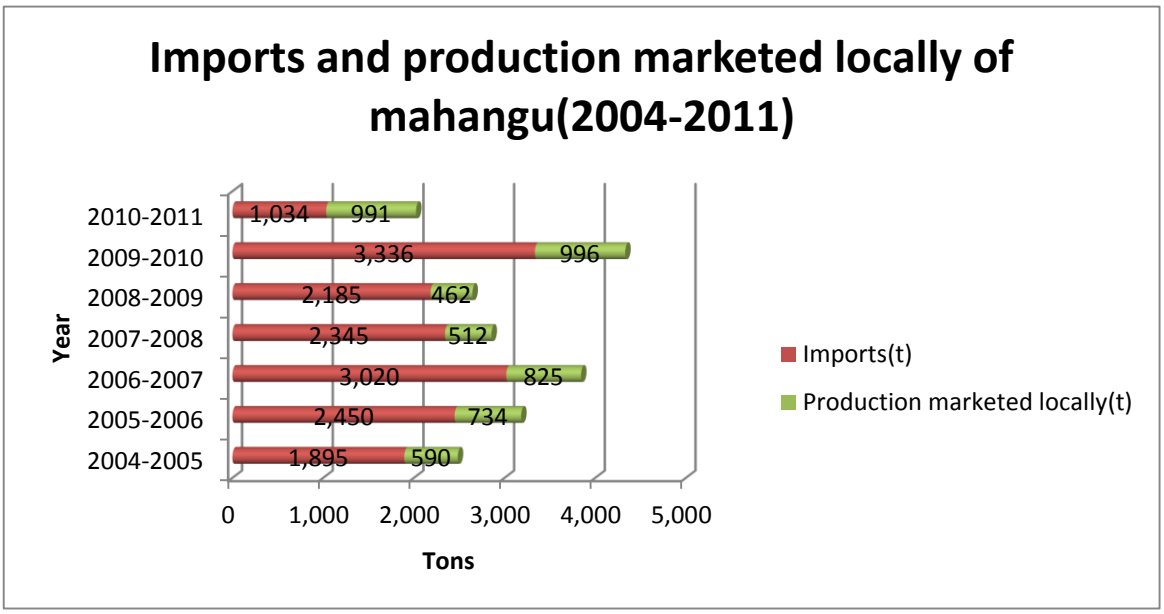
Figure 11



The graph depicts in 2005-2006 the highest production of mahangu was recorded of 105,849 tons. The years 2006-2007, 2007-2008 and 2008-2009 saw fluctuations in production but eventually started increasing gradually from 2009-2010 and 2010-2011. The dropped in mahangu production is attributed to the floods that were experienced in the North as mahangu is mainly produced in this areas.

Imports and production marketed locally for mahangu:

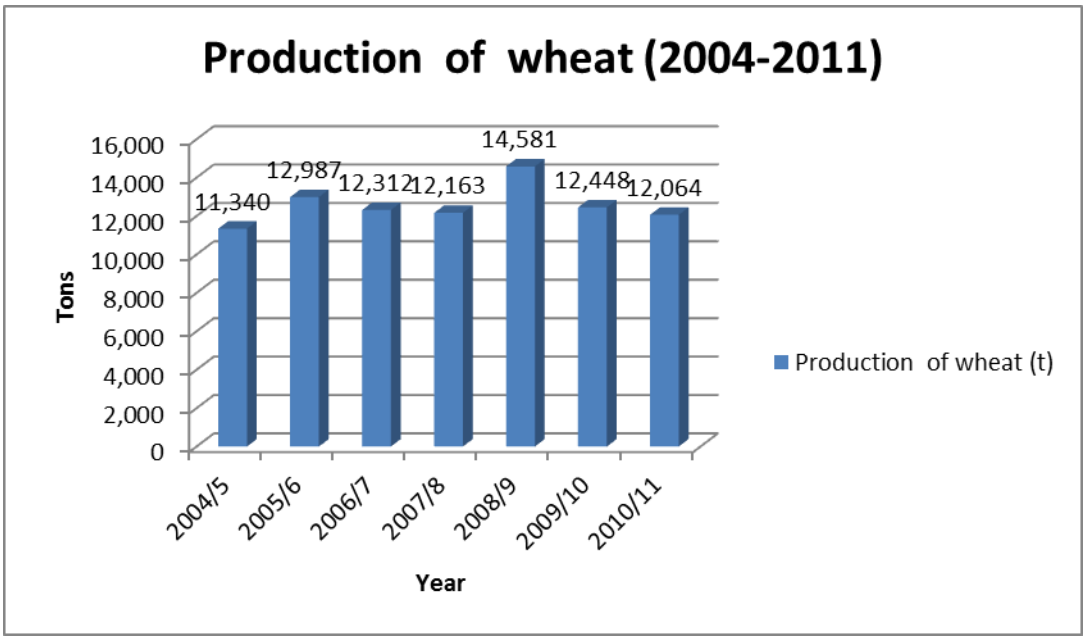
Figure12



Mahangu imports remained high throughout the years compared to what was marketed locally. The year 2009-2010 recorded the highest import of 3,336 tons compared to a high of 996 tons for production marketed locally in the same year. Relatively as imports on mahangu increased so does the production marketed locally.

Wheat:

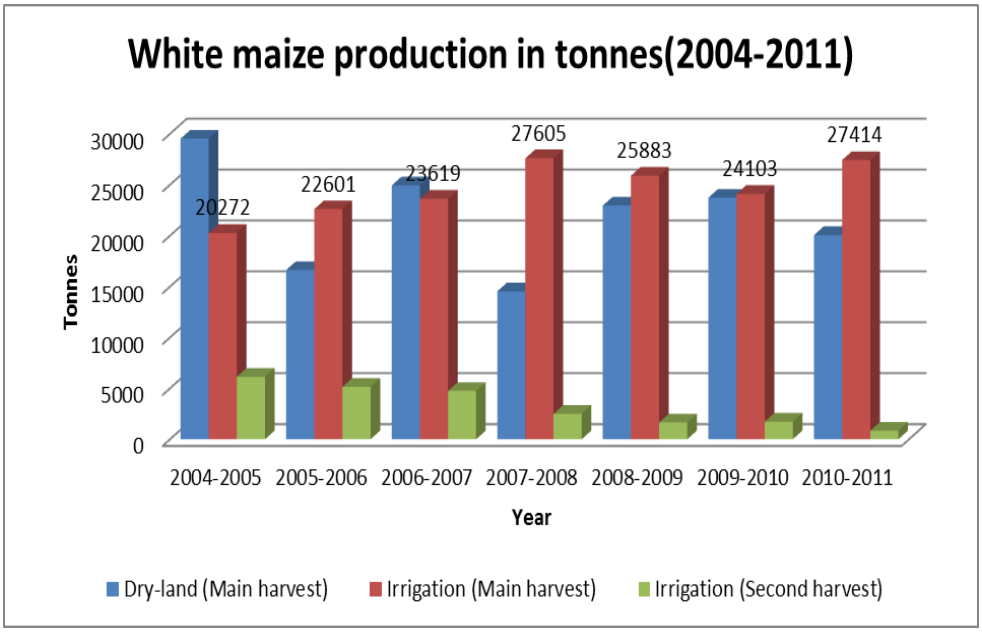
Figure 13



Production of wheat was the highest in 2008/9 with 14,581 tons and with a low in 2004/5 of 11,340 tons. Wheat production tends not to fluctuate much over the years as the graph depicts the production over the years. Production of wheat is relatively small due to the fact that it is a winter crop.

White maize:

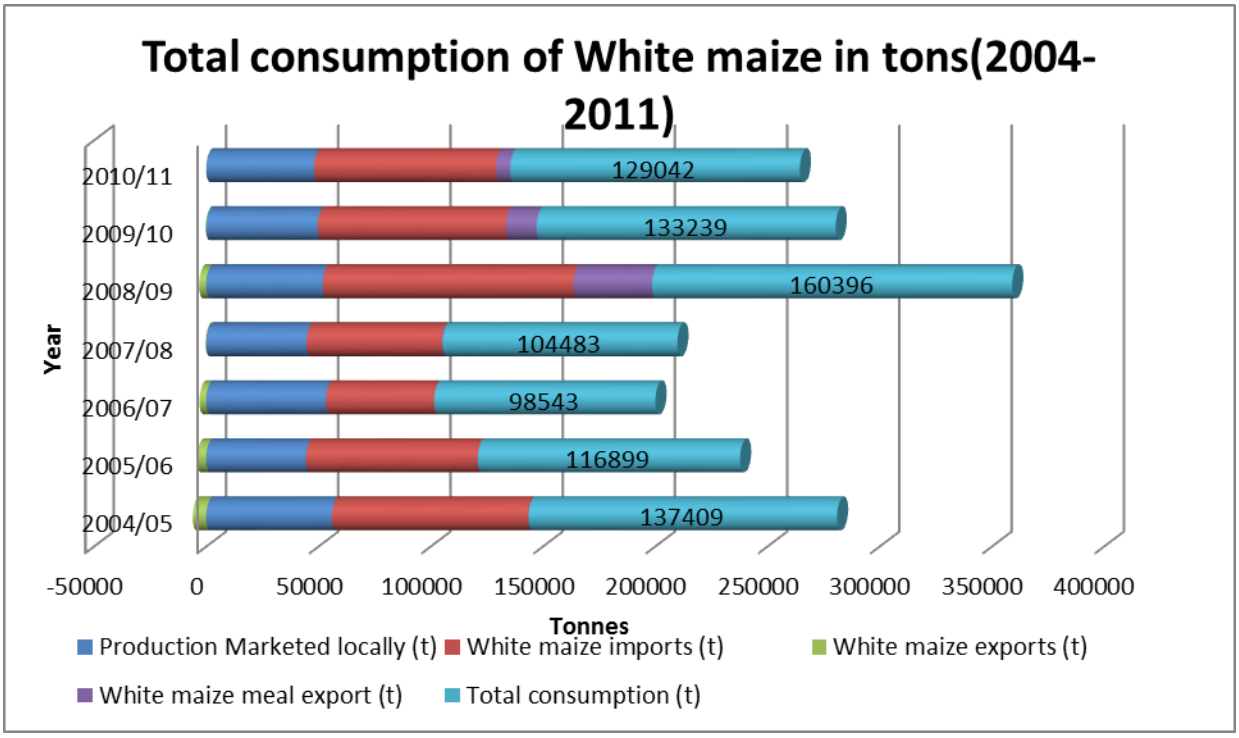
Figure 14



In 2004-2005 the highest production of white maize of 29,526 tons was recorded for the dry-land terrain and then dropped in production from 2005-2006 to 2010-2011. The irrigation terrain picked up a peak production of white maize in 2007-2008 of 27,605 tons and then leading in terms of production for the remaining years from 2007-2008 to 2010-2011. While the production of the second harvest of irrigation has been dropping from 2004-2005 to 2010-2011.

Consumption of White maize:

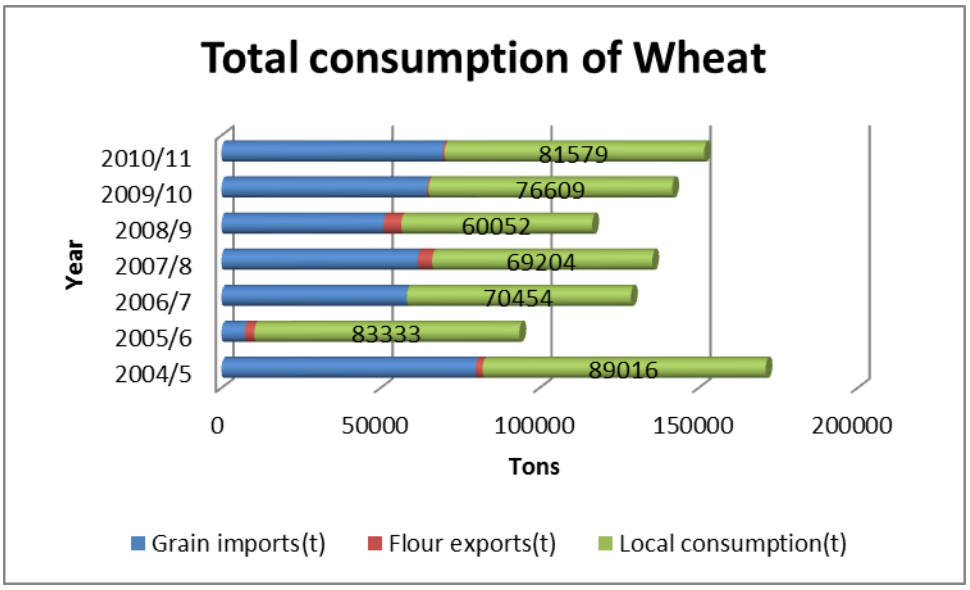
Figure 15



The graph on local consumption of white maize depicts that the total consumption was high in 2008/09 with 160,396 tons, while export of white maize was low compared to imports of the commodity. Production marketed locally decreased from 2004/05 to 2010/11.

Consumption of wheat (2004-2011):

Figure 16



The consumption of wheat in Namibia was high in 2004/5 of 89,016 tons then dropped from 2005/6 to 2008/9 before picking up in 2009/10 to 2010/11. The graph depicts more grain imports then what is exported as finished products in the form of flour.

4.5 HORTICULTURAL FRESH PRODUCE:

Testing hypothesis:

It is wished to compare the Horticultural fresh produce value in tons between import and exports of these horticultural fresh produce for years 2004 to 2011. To test this, one must first test the equality of variances for the two samples.

Equality of variances:

i) Null hypothesis (H_0): The variances of two samples are equal

Alternative hypothesis (H_a): The two sample variances are not equal

Alpha (α) = 0.05

Decision rule: Reject H_0 if p – value is less than (<) 0.05

From the table p – value = 0.091 is greater than 0.05, therefore the null hypothesis cannot be rejected. Now the comparison test of the means can be done since the equality of variances of the two samples has been established.

Table 1

	Levenes Test for Equality of Variances	t-test for Equality of Means
	Sig.	Sig.(2-tailed)
Horticultural fresh produce: Equal variances assumed	0.091	0.000
Equal variances not assumed		0.000

Mean test:

ii) Null hypothesis (H_0): The total mean horticultural fresh produce value in tons is the same for imports and exports for 2004 – 2011

Alternative hypothesis (H_a): The total horticultural fresh produce value in tons for imports and exports for 2004 – 2011 differ.

Alpha (α) = 0.05

Decision rule: Reject H_0 if p – value is less than (<) 0.05

From the table p – value = 0.000 is less than 0.05(0.00< 0.05), therefore we reject the null hypothesis. This leads to the conclusion that there is a difference in imports and exports of horticultural fresh produce in tons during the years 2004 to 2011.

Statistics

Table 2

Horticultural fresh produce in tons	**Mean**
Import	**66 056. 25**
Export	**22 866.75**

The Table clearly depicts that we imported 66 056.25 tons of horticultural fresh produce and exported merely 22 866.75 tons for the period 2004-2011. It shows that we still dependent on South Africa for fresh produce which could easily be produced in Namibia. This is an indication that Namibia is still not self-sufficient with regards to horticultural fresh produce.

4.6 Controlled Crops

(National level)

Correlations of Wheat, Mahangu and White maize with respect to actual area planted in hectares and actual production in tons.

H_0:There is no correlation between actual area planted in hectares and actual production in tons for these controlled crops

H_a: There exists a correlation between actual area planted in hectares and actual production in tons for these controlled crops

Alpha = 0.05

Table 3

Controlled crops		
Mahangu(pearl millet)	Pearson Correlation	.546
	Sig. (2-tailed)	.205
White maize	Pearson Correlation	.607
	Sig. (2-tailed)	.148
Wheat	Pearson Correlation	.325
	Sig. (2-tailed)	.476

From the table, p-values = 0.205, 0.148, 0.476 which are greater than 0.05, thus we fail to reject H_0 and conclude that there is no correlation between actual area planted in hectares and actual production in tons for these controlled crops of mahangu, wheat and white maize.

This is a preliminary that shows that actual area planted in hectares and actual production in tons for these controlled crops are not related, as one increases the other decreases and vice versa, which provides an insight that production of these controlled crops might not perform as well as anticipated not only due to factors as of climatic conditions, but also due to our soil conditions.

Anova Test for Controlled Crops (mahangu, wheat and white maize)

Null hypothesis: All total mean productions of controlled crops is equal

Alternative hypothesis: At least one of the total mean productions differs for the controlled crops

Alpha = 0.05

Table 4

	Mean Square	Sig.
Between groups	5413310459.619	0.000
Within groups	250785921.651	

From the Table p-value = 0.000 < 0.05, thus we reject H_0 and conclude that the means differ for these controlled crops. (mahangu, wheat and white maize).

Multiple Comparisons

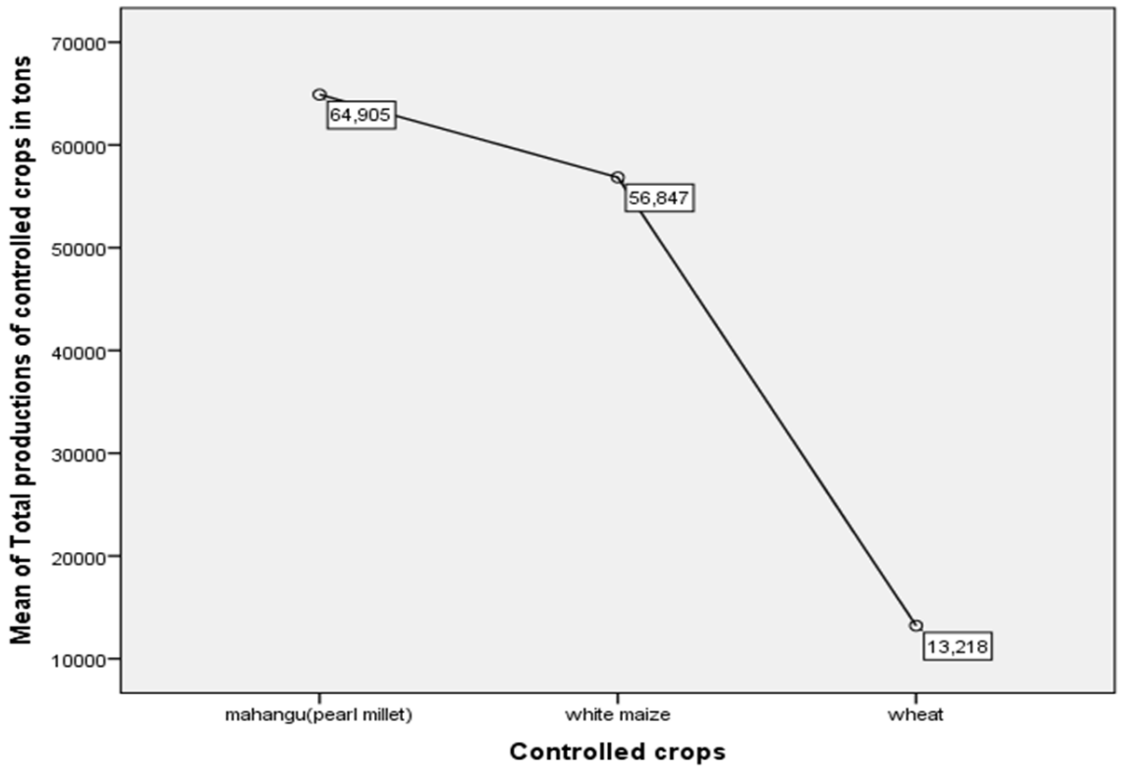
Table 5

(I) Controlled crops	(J) Controlled crops	Mean Difference (I-J)	Sig.
mahangu(pearl millet)	white maize	8057.429	1.000
	Wheat	51686.857*	.000
white maize	mahangu(pearl millet)	-8057.429	1.000
	Wheat	43629.429*	.000
Wheat	mahangu(pearl millet)	-51686.857*	.000
	white maize	-43629.429*	.000

The table depicts that mahangu (pearl millet) and wheat have a significant mean difference in their total productions in tons for the period 2004-2011. White maize and Wheat also have a significant mean difference in their total productions in tons for the period 2004-2011

Means plot

Figure 1



Mahangu shows an average production of 64 905 tons from the period 2004-2011. Wheat shows a relatively small production on average of 13 218 tons. Pattern of interest is that on the overall average for these controlled crops is quite low for a seven year comparison from 2004-2011, which is a sign of low productions of these controlled crops.

4.7 North Central Regions(Cereal productions)

Regional level

Proposed model: Total cereal production in tons(dependent variable) = Rainfall in millimeters for the North Central Regions+Year of production+Actual area planted in hectares+North Central Regions of production.

Standardized Z-score values were used in these regression analysis.

Model 1: Total cereal productions in tons(dependent variable) and Actual area planted in hectares(independent variable).

Model 2 : Total cereal productions in tons(dependent variable) and Total rainfall in millimeters for the North Central Regions(independent variable).

Model 3: Total cereal productions in tons(dependent variable) and Year 1, Year 2, Year 3, Year 4, Year 5 and Year 6(independent variable).

Model 4: Total cereal productions in tons(dependent variable) and Region 1, Region 2, Region 3, Region 4, Region 5(independent variable).

Table 6

Model 1(Actual area planted in hectares)	R Square
Actual area planted in hectares	.497
Model 2(Total rainfall in millimeters)	
Total rainfall in millimeters for North Central Regions	0.098
Model 3(Years)	
Year 1	0.367
Year 2	0.363
Year 3	0.361
Year 4	0.313
Year 5	0.268
Year 6	0.231
Model 4(North Central regions)	
Region 1	0.418
Region 2	0.414
Region 3	0.410

The table depicts variation explained by the R squared differs for each independent variable related individually to total cereal productions in tons or the effects of R squared when measured individually for each independent variable against the dependent.

Combined effects of the dependent variable and independent variables.

Table 7

Model	R Square
1	0.885

The table of the combined independent variables of total rainfall in millimeters, Regions of production, actual area planted in hectares and the years of production had an R square of about 88.5% compared to the individual models with the dependent variable total cereal productions.

H_0: There is no relationship between total cereal production in tons and the independent variables (rainfall, actual area planted, years and regions)

H_a: There exists a relationship between total cereal production in tons and the independent variables (rainfall, actual area planted, years and regions)

Alpha = 0.05

Table 8

Model	Mean square	Significant
Regression	2.790	0.000
Residual	0.169	

Since the p-value = 0.000< 0.05, therefore we reject the null hypothesis and conclude that there is sufficient evidence at 95% to conclude that there is a relationship between total cereal production in tons and the independent variables (rainfall, actual area planted, years and regions).

Model Building:

Table 9

Model	B	Sig.
(Constant)	-.072	.829
Zscore: Total rainfall per region in millimeters	.325	.002
Zscore: Total area planted in hectares	.779	.011
Year1	.491	.071
Year2	1.549	.000
Year3	-.088	.780
Year4	.194	.552
Year5	-.541	.040
Year6	.171	.512
Year7	0	0
Region1	-.006	.991
Region2	-.033	.948
Region3	-.239	.379
Region4	-.681	.030
Region5	-.130	.707
Region6	0	0

The significant independent variables are total rainfall per region, total area planted in hectares, Year2, Year5 and Region4. It showed be known that Year7 and Region6 are reference point and thus they are equal to 0.

It can be seen from the table that Year 5 decreased from to -0.541 due to the years that the northern parts were experiencing floods lowering the production levels in tons, where it was positive digits before. Thus it can be seen that production increased for Year2 and then decreased for Year 5, where Year 5 can be attributed to the years where floods occurred in the Northern regions, lowering total cereal productions in tons.

Region4 is the region that shows the highest decrease of -.681 for total cereal productions in tons for North Central regions which can be attributed as the region that was hit the hardest by the floods experienced in the Northern regions.

Total rainfall per region had a positive value of 0.325 on total cereal productions in tons and actual area planted in hectares had a value of 0.779 on total cereal production in tons showing that total rainfall per region and actual area planted increased total cereal production by the units specified above.

The model thus becomes: Total cereal production in tons = $0.325X_1+0.779X_2+1.549X_3 -0.541X_4 - 0.681X_5$, Where X_1 is total rainfall per region , X_2 is actual area planted in hectares, X_3 is Year2, X_4 is Year5 and X_5 is Region4.

Anova test for North Central Regions by total cereal productions in tons

Null hypothesis: All total mean cereal productions of the different northern regions (NCRs) is the same.

Alternative hypothesis: At least one of the total mean cereal productions is different for the northern region.

Alpha = 0.05

Table 10

	Mean Square	Sig.
Between groups	180514666.667	.001
Within groups	34929761.905	

Since p-value = 0.001 < 0.05, therefore we reject the null hypothesis and conclude that there is sufficient evidence at 95% to conclude that at least one of the total mean cereal productions is different for the northern regions.

Multiple Comparisons

Table 11

(I) North Central Regions in Namibia	(J) North Central Regions in Namibia	Mean Difference (I-J)	Sig.
Caprivi	Kavango	2828.5714	1.000
	Omusati	-8828.5714	.124
	Ohangwena	-8185.7143	.206
	Oshana	514.2857	1.000
	Oshikoto	-6700.0000	.613

The table depicts that the average total cereal productions was not different for Caprivi and the rest of the other North Central Regions.

Table 12

(I) North Central Regions in Namibia	(J) North Central Regions in Namibia	Mean Difference (I-J)	Sig.
Kavango	Caprivi	-2828.5714	1.000
	Omusati	-11657.1429*	.011
	Ohangwena	-11014.2857*	.020
	Oshana	-2314.2857	1.000
	Oshikoto	-9528.5714	.070

The table depicts that the average total cereal productions was different for Kavango and Ohangwena.

Table 13

(I) North Central Regions in Namibia	(J) North Central Regions in Namibia	Mean Difference (I-J)	Sig.
Omusati	Caprivi	8828.5714	.124
	Kavango	11657.1429*	.011
	Ohangwena	642.8571	1.000
	Oshana	9342.8571	.082
	Oshikoto	2128.5714	1.000

The table depicts that the average total cereal productions was different for Omusati and Kavango.

Table 14

(I) North Central Regions in Namibia	(J) North Central Regions in Namibia	Mean Difference (I-J)	Sig.
Ohangwena	Caprivi	8185.7143	.206
	Kavango	11014.2857*	.020
	Omusati	-642.8571	1.000
	Oshana	8700.0000	. 138
	Oshikoto	1485.7143	1.000

The table depicts that the average total cereal productions was different for Ohangwena and Kavango.

Table 15

(I) North Central Regions in Namibia	(J) North Central Regions in Namibia	Mean Difference (I-J)	Sig.
Oshana	Caprivi	-514.2857	1.000
	Kavango	2314.2857	1.000
	Omusati	-9342.8571	.082
	Ohangwena	-8700.0000	.138
	Oshikoto	-7214.2857	.426

The table depicts that the average total cereal productions was not different for the North Central Regions compared to Oshana.

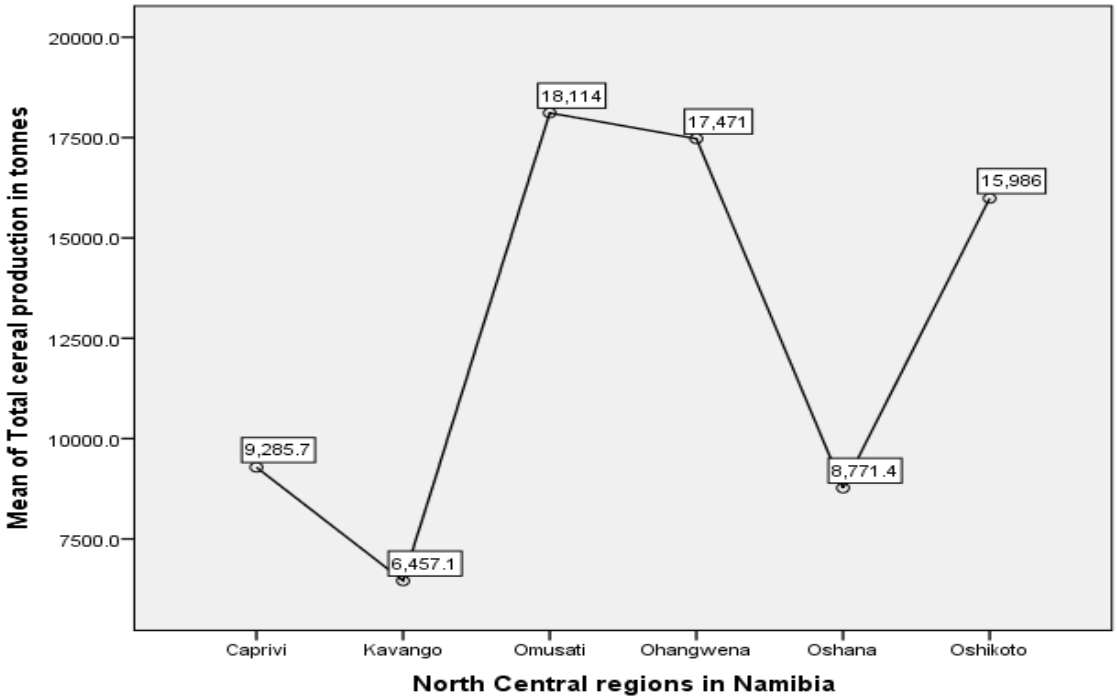
Table 16

(I) North Central Regions in Namibia	(J) North Central Regions in Namibia	Mean Difference (I-J)	Sig.
Oshikoto	Caprivi	6700.0000	.613
	Kavango	9528.5714	.070
	Omusati	-2128.5714	1.000
	Ohangwena	-1485.7143	1.000
	Oshana	7214.2857	.426

The table depicts that the average total cereal productions was not different for the North Central Regions compared to Oshikoto.

Means plot

Figure 2



Kavango had the lowest average production of cereals compared to the rest of the North Central Regions. Omusati had the highest on average of 18 114 tons. On overall average productions were low which can be attributed to floods experienced in the Northern parts of Namibia during these periods.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 **Conclusions**

The main objective of this research is to assess the overall performance of these horticultural fresh produce and controlled crops (mahangu, white maize and wheat) at national level and a crop situation for the North Central Regions was also look at.

The study found that the agricultural sector namely crop farming is constrained by low productions as under horticultural fresh produce we import more than half of what we export to meet our demands, indicating lack of food self-sufficiency. Controlled crops tend to fluctuate in production levels which can be attributed to erratic climatic and weather conditions. The North Central Regions low production of cereals was caused by the floods experienced in the Northern regions as these affected the outcome of the produces.

Products with potential for growth in the agricultural sector include the following: mahangu (pearl millet) is well suited to the Namibian climate. Mahangu was declared a controlled product in 2006 and this is expected to increase its marketing and production, given its adaptability to the climate and grapes has the potential to increase the output and depends on the establishment of new markets, and the processing of raw grapes into brandy and grape juice. Potential markets for grapes include the USA, the Middle East and the Eastern bloc. It has to be noted that considerable progress has been achieved in attempt to export grapes to the USA under AGOA.

5.2 Recommendations

The study recommends that Namibia should further concentrate on import substitution of fresh produce as a production strategy. To increase production levels current efforts of the Green Scheme to increase the production of agricultural products though irrigation based methods is commendable. It is however, recommended that the emphasis should rather be on the production of crops particularly horticultural and controlled crops in which Namibia has a comparative advantage.

In addition, marketing as well as the promotion of products in new markets might also play a significant role in terms of increasing the output of the sector. This refers for instance, to products such as grapes which are in dire need of new markets. Since the potential for growth in the sector lies much in the rural areas, modernization of the rural areas might aid to the growth of the sector. This could be achieved by putting in place proper infrastructures, marketing facilities and incentives. In addition, increasing research and extension services might unlock the hidden potential of the sector.

The lessons drawn from the case studies are as follows: In all the countries of Malaysia, Kenya and Zambia, their respective Governments have intervened in the agricultural sector through various policies such as giving support to the small holder farmers, broadening access to finance, provision of infrastructure and investing in research. In Kenya the Government instituted a land distribution programs. In Malaysia the success of palm oil was also due to the country's comparative advantage. Despite these interventions, the agricultural output in Kenya and Zambia increased initially but later started to decline. In Zambia however, it has started to pick up in recent years. Notwithstanding the decline in the growth rates, the agricultural sector remains imperative as a creator employment, an earner of foreign exchange and contributor to GDP in these countries.

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