Full Length Research Paper

Special Agriculture as a Tool for Sustainable Agricultural Industrialization in Nigeria: A Case Study of Niger State, Nigeria.

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Abstract
Over the years Agricultural-Industrialization has been a serious issue in agricultural development of any developing country particularly Nigeria. Siting Agricultural-Industries adequately has been bastardized by social driving forces that include political wheel, regional and tribal sentiments. This research has developed platform where establishing Agricultural-Industries are based on places with high production capacity of raw materials that will guarantee easy accessibility, reduction in transportation risk, reducing perishability and drudgery. It further categorized Agro-Industries into Mega, Mini and Minor, with Zone A comprising Gbako, Edati, Bida and Lavun Local Governments leading in rice, maize, sugarcane, melon and cassava production, Zone B has Shiroro, Rafi, Paikoro, Muyan and Bosso leading in yam and sorghum production only, then Zone C has Wushishi, Mashegu, Magama and Kontagora leading in groundnut and beans production. This implies that, to set-up any Agro-Industries for any of these commodities outlined above, the place of interest should be that with high production capacity than others i.e. for Mega Agro-Industrial category.

Key words: Comparative Advantage, Agricultural Potentials, Agro-Industries, Perishability, Estimated Marginal Means, Hypothesis, Significant Difference and R. Square.

Introduction

Agricultural industrialization refers to an effective operation mechanism in agriculture with the purpose of achieving agricultural modernization and sustainable development by integrating agro-production, processing and marketing following the market laws. Although the concept of agricultural industrialization varies among countries, because of differences in terms of local situations, development stages, directions, strategies and so on (World FactBook, 1999).

However, it is impossible for any country to develop its agricultural industrialization without strong footage of special agriculture. Special agriculture refers to a regional leading agro-industry in a certain area of agricultural development, whose development is based on the principle of comparative advantage through scale-production, competition and cooperation, following market economy and market rules, and combined with conditions of local resources (USAID MARKETS, 2010). Therefore, special agriculture is based on comparative advantage. This refers to advantages in production (such as unique biological resource, favorable nature conditions and so on).Advantages in products (such as lower costs, large quantities, pollution-free, nutrition-rich), and advantages in market (such as a certain market share, price advantages and quality advantages) are very important factors in any process innovation. Therefore, the industrialized operation of agriculture is a revolution to promote agricultural transition, and it is a way out of low efficiency and lack of self-development capabilities, while special agriculture is the foundation of agriculture industrialization.

Development of special agriculture guaranteed effective supply to meet total market demand. Through variety supply of agro-products that will provide consumers with more consumption choices, which, in turn, will improve consumer satisfaction (USAID MARKETS, 2010). Changes in consumption will definitely promote the development of agriculture because Products that consumers don't like do not have market, in the next farming season, farmers therefore won't grow these products (MOC, 2010).

Internationally, the concept of industrialization of agriculture was first proposed by Goldberg of Harvard Business School in the late 50's of the 20th century. It was refers to as the supply of agricultural materials, such as seeds, fertilizers and farm machinery, to agricultural products, food processing and food supply. It also encompasses a series of agricultural producers, food processing enterprises and professional associations as social unites, which consists of a chain of agricultural products (Kebbet et al., 2003).

Potentials of Agriculture in Niger State
Agriculture is still by far the back bone of Niger state economy, more than 80% of the population depends either directly or indirectly on it for their livelihood (NSG, 2010). By location, climate and soil, the state is one of the largest and most fertile agriculture lands in the country, with about 80% of the 74,244 sq.kmtotal land area of the state, and has the capacity to produce most of Nigeria's stable crops. Niger state has an estimated Fadama area of about 682,331 hectares good for lowland rice production of which only 25% of it has been put to use (NSFDP, 2013).

The Gbagyis, Koro, Kadara and Kambari mostly found in the northern part of the state are noted for yam and guinea corn production, while the Nupe that predominate the southern part are the major rice producers. The Hausa and Fulani in Mariga and Kontagora Local Government Area of the state (of the western part) are well-known for cowpea, groundnut and animal husbandry especially cattle. Despite the drudgery in the present agricultural practices that has made it unpopular among the youths, there exist ample opportunities in the State for the establishment of large scale (mechanized) farms.

Transformation of Niger state economy cannot be achieved without total overhauling of agricultural sector being the major employer of labour (80%). Mechanization of agricultural sector especially agro-based industrialization holds the key to a guarantee food security, reduction in rural poverty, creation of employment and numerous wealth creation opportunities.

This research is aimed at outlining villages, communities, local government areas and zones in the state with census crops and animals produced within them. The census data of these crops and animals shall be recorded based on areas with better comparative advantages than others. This shall be used to recommend appropriate agro industry/industries for these places.

Materials and Methods
Study Area
Niger State is located between Latitude 8°22'N and 11°30'N and Longitude 3°30'N and 7°20'E. The area making up Niger State today comprised of the old Nupe and Kontagora Kingdoms, Abuja (Suleja) with link to the famous kingdom of Zauzau and host of other political entities. Niger State was excised from the defunct North-Western State and made a full-fledged State in the Federation in April 1976.

The State is bordered to the North by Zamfara State, to the Northwest by Kebbi State, to the south by Kogi State, to southwest by Kwara State; while Kaduna State and Federal Capital territory border the state to northeast and southeast respectively. The state further shares international boundary with the Republic of Benin at Babanna in Borgu Local Government area of the state. Currently the state covers a total land area of 74,244 sq.km, or about 8% of Nigeria's total land area. This makes the state the largest in the country; with 25 local government areas (MOC, 2010). The state experiences an average rainfall of 2000mm to 2500mm per annum, an average temperature of 23°c, an average relative humidity of 68% and an average solar radiation of 5.5hr. The state is dissected by three major rivers (River Niger, Kaduna and Gurara), these contribute immensely to the development of agriculture especially dry season farming and it's blessed with rich agricultural soil and fadamas that support agriculture too. Its lays with guinea savannah region of sparse trees, tall grasses and shrubs that is good for livestock production (Metrological Station Report, 2015).

Niger State had a total population of 2,482,367 people in 1991. The 2006 population put population figure at 3,950,249. With a total land area of 74,244sq.km, this gives the State a population density of about 33 per sq km; the lowest in the country. It should be noted, however, that this low population density conceals local variations, particularly in some of the largest local government areas such as Wushishi, Borgu, Mariga and Shiroro where population density is below the state average. (NPC, 2006).

Data Collection
Staple crops grown in Niger state are enlisted as shown in table 1 below; questionnaires were developed and circulated around the three geo-political zones of the state. These were used to capture the type of crop/s grown, hectarage covered and the yield of these areas. The captured information was statistically analyzed to provide the crop with the highest comparative advantage in the area of application in-terms of yield per hectare. The cumulative of the findings within zones were compared with others to come up with crops and areas that have higher comparative advantages over others. The data deriving from the questionnaires were compared with data gotten from Niger State Agricultural Development Programme (NSADP) and other available journals for compatibility.
In the process of administering questionnaires thorough physical examinations of markets and farmlands were carried out to authenticate what were captured in the questionnaire.

Data Analysis methods
SPSS version 16 was used for the analysis; it run significant difference analysis on various crops at various local governments and zones for three subsequent years (SPSS, 2008).

Results
Data analysis.
Maize Production
Three (3) years maize yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 1 & 2 below:
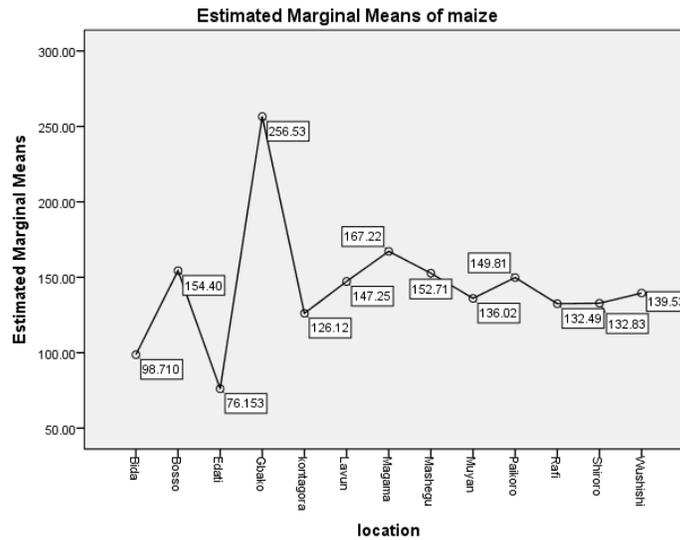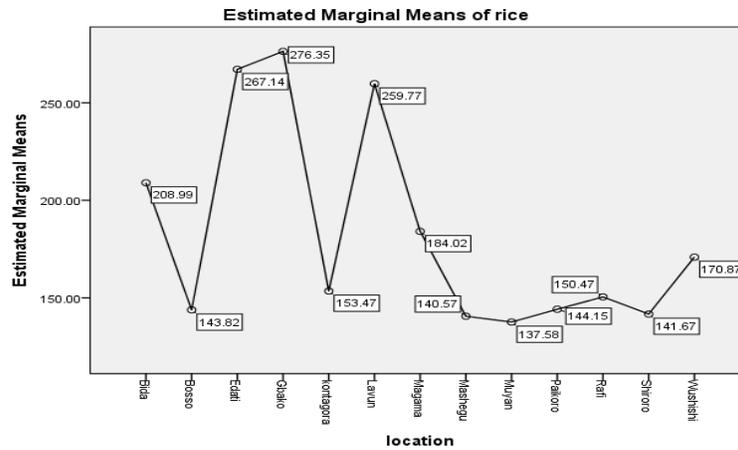

**Fig 1:** Estimated Marginal Means for Maize Production across Thirteen Local Governments
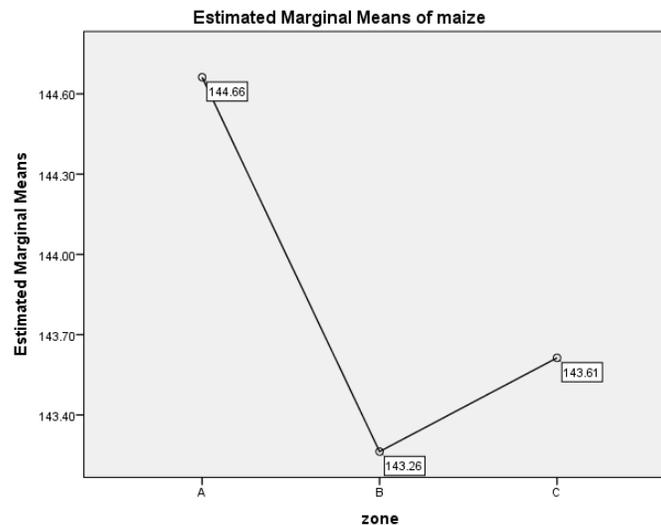
Fig 2: Estimated Marginal Means for Maize Production across the Three Geo-Political Zones

Hypothesis

$$H_O: \mu_{ma} = \mu_{mb} = \mu_{mc} \quad Vs \quad H_1: \mu_{ma} \neq \mu_{mb} \neq \mu_{mc}$$

$$H_O \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of maize in the three zones.

Rice Production
Three (3) years rice yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 3 & 4 below:
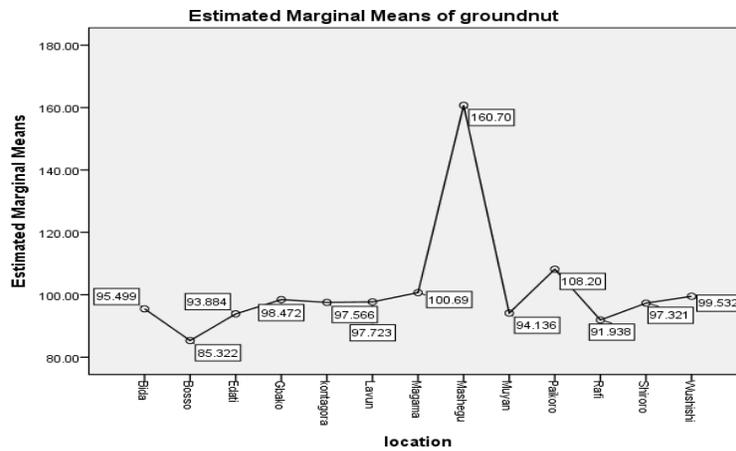

Fig 3: Estimated Marginal Means for Rice Production across Thirteen Local Governments
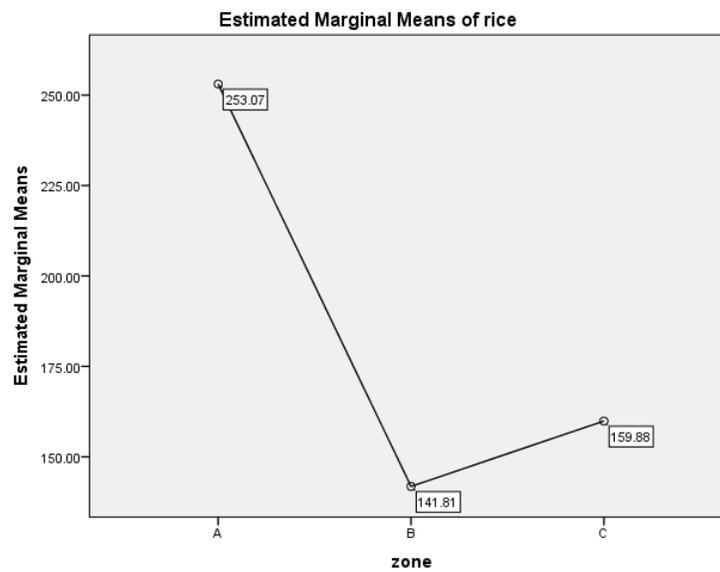
Fig 4: Estimated Marginal Means of Production for Rice across the Three Geo-Political Zones

Hypothesis

$$H_O: \mu_{ra} = \mu_{rb} = \mu_{rc} \; Vs \; H_1: \mu_{ra} \neq \mu_{rb} \neq \mu_{rc}$$

$$H_O \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of rice in the three zones.

Groundnut Production
Three (3) years groundnut yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 5 & 6 below:

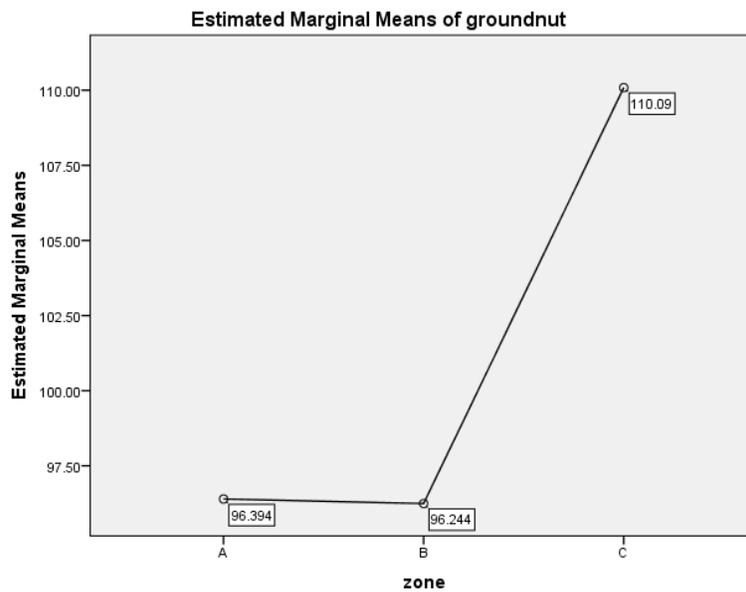**Fig 5:** Estimated Marginal Means for Groundnut Production across Thirteen Local Governments

Fig 6: Estimated Marginal Means of Production for Groundnut across the Three Geo-Political Zones

Hypothesis

$$H_0: \mu_{ga} = \mu_{gb} = \mu_{gc} \quad Vs \quad H_1: \mu_{ga} \neq \mu_{gb} \neq \mu_{gc}$$

$$H_0 \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of groundnut in the three zones.

Sorghum Production
Three (3) years sorghum yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 7&8 below:
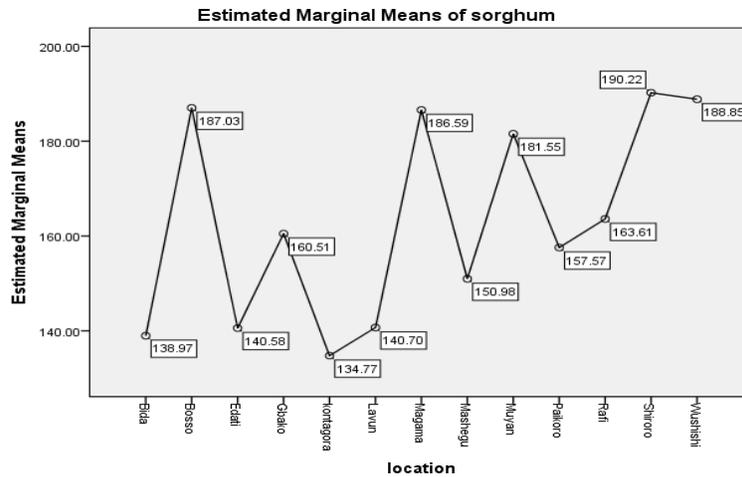
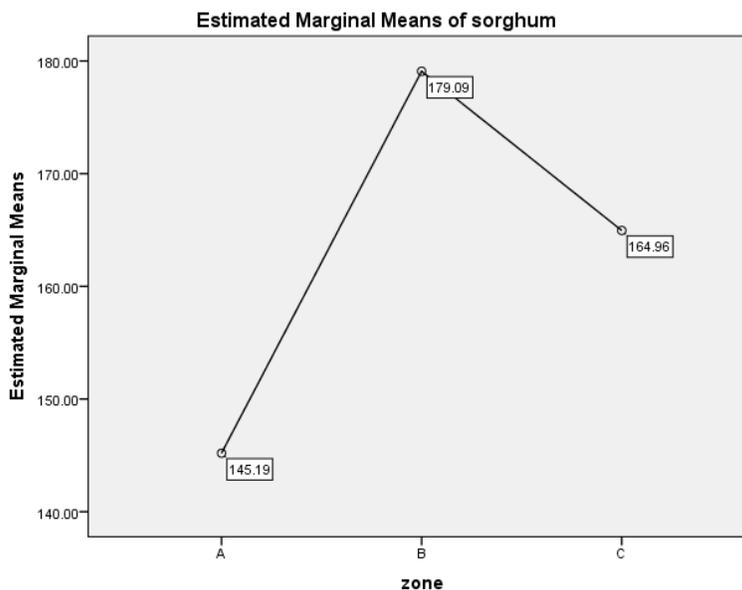**Fig 7:** Estimated Marginal Means for Sorghum Production across Thirteen Local Governments

Fig 8: Estimated Marginal Means of Production for Sorghum across the Three Geo-Political Zones

Hypothesis

$$H_0: \mu_{sa} = \mu_{sb} = \mu_{sc} \quad Vs \quad H_1: \mu_{sa} \neq \mu_{sb} \neq \mu_{sc}$$

$$H_0 \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of sorghum in the three zones.

Yam Production
Three (3) years yam yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 9&10 below:
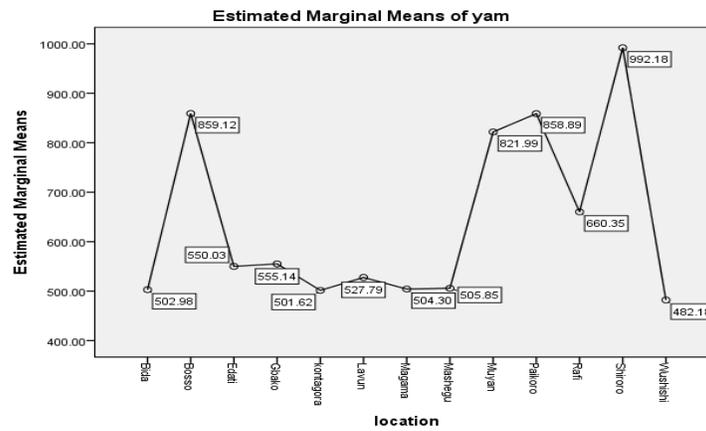
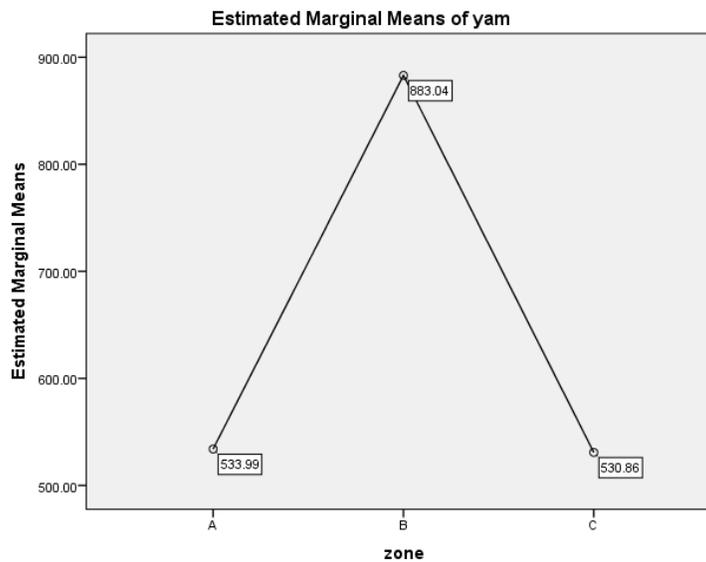**Fig 9:** Estimated Marginal Means for yam Production across Thirteen Local Governments

Fig 10: Estimated Marginal Means of Production for Yam across the Three Geo-Political Zones

Hypothesis

$$H_O: \mu_{ya} = \mu_{yb} = \mu_{yc} \quad Vs \quad H_1: \mu_{ya} \neq \mu_{yb} \neq \mu_{yc}$$

$$H_O \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of yam in the three zones.

Beans Production
Three (3) years beans yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 11&12 below:
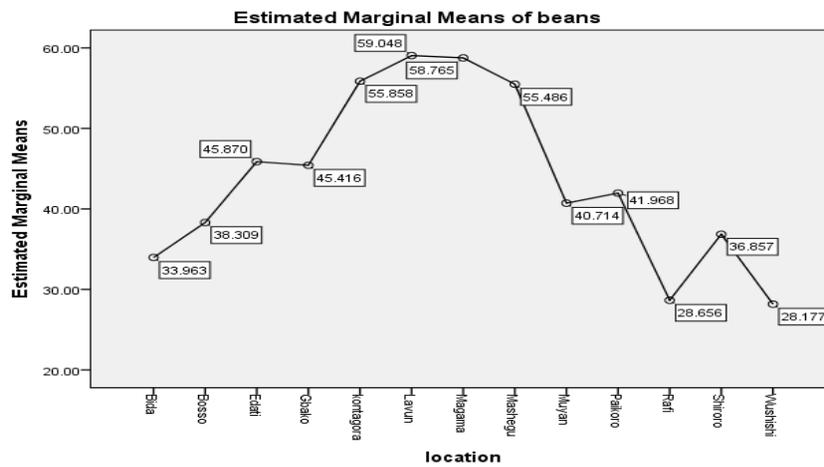
Fig 11: Estimated Marginal Means for Beans Production across Thirteen Local Governments
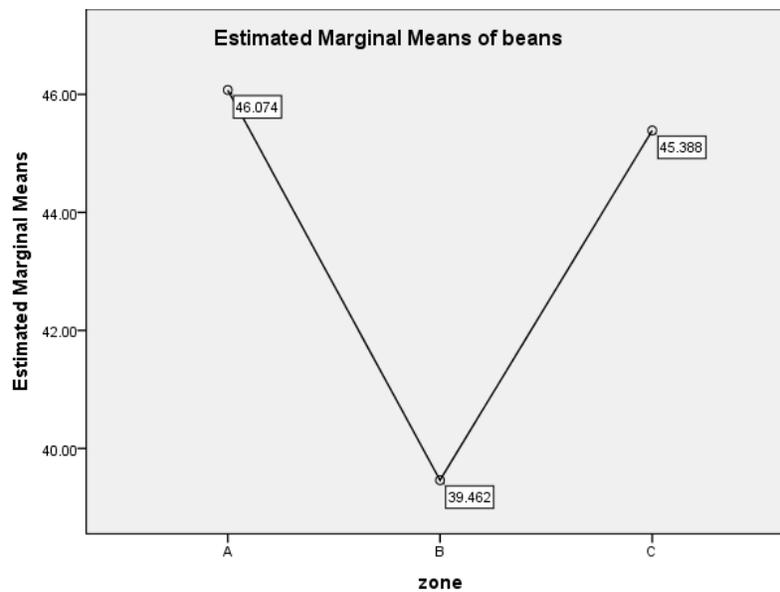

Fig 12: Estimated Marginal Means of Production for Beans across the Three Geo-Political Zones

Hypothesis

$$H_0: \mu_{ba} = \mu_{bb} = \mu_{bc} \quad Vs \quad H_1: \mu_{ba} \neq \mu_{bb} \neq \mu_{bc}$$

$$H_0 \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of beans in the three zones.

Sugarcane Production
Three (3) years sugarcane yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 13&14 below:
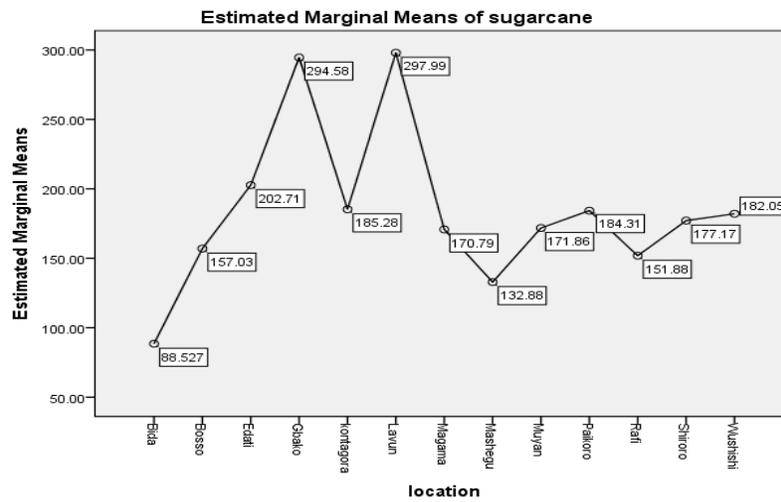
Fig 13: Estimated Marginal Means for Sugarcane Production across Thirteen Local Governments
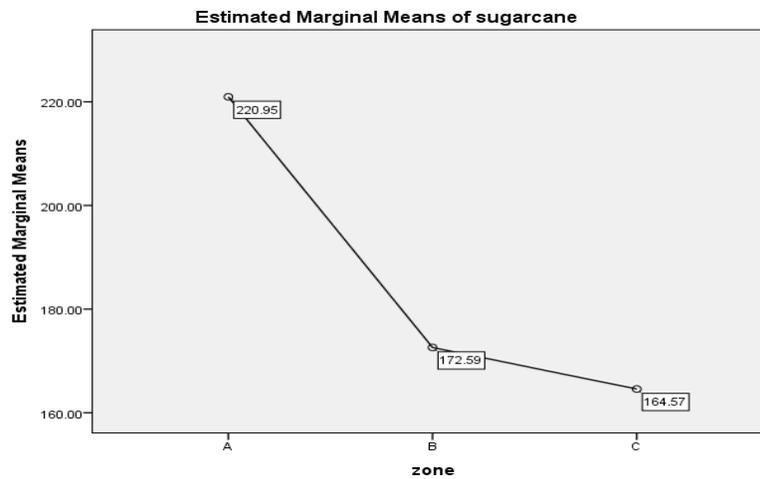

Fig 14: Estimated Marginal Means of Production for Sugarcane Across the Three Geo-Political Zones

Hypothesis

$$H_0: \mu_{sa} = \mu_{sb} = \mu_{sc} \quad Vs \quad H_1: \mu_{sa} \neq \mu_{sb} \neq \mu_{sc}$$

$$H_0 \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of sugarcane in the three zones.

Melon Production
Three (3) years melon yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 15 & 16 below:
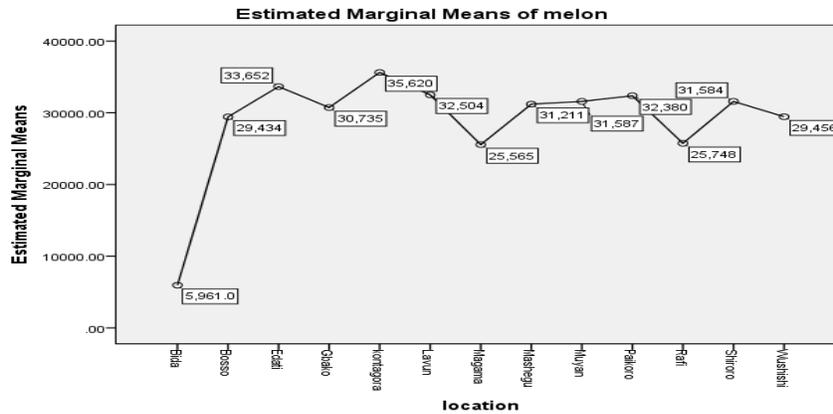
Fig 15: Estimated Marginal Means for Melon Production across Thirteen Local Governments
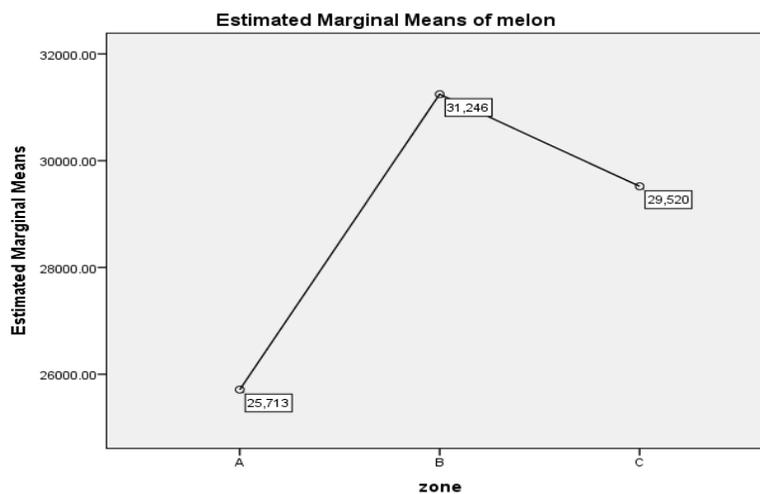

Fig 16: Estimated Marginal Means of Production for Melon across the Three Geo-Political Zones

Hypothesis

$$H_O: \mu_{mla} = \mu_{mlb} = \mu_{mlc} \quad Vs \quad H_1: \mu_{mla} \neq \mu_{mlb} \neq \mu_{mlc}$$

$$H_O \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of melon in the three zones.

Cassava Production
Three (3) years cassava yield data were collected across the three geo-political zones and were statistically analyzed for significant difference. The results of the analysis are hereby presented as figure 17 & 18 below:
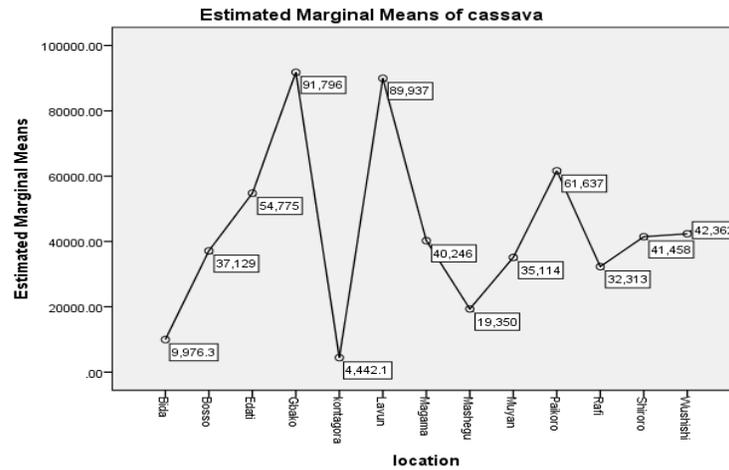
Fig 17: Estimated Marginal Means for Melon Production across Thirteen Local Governments
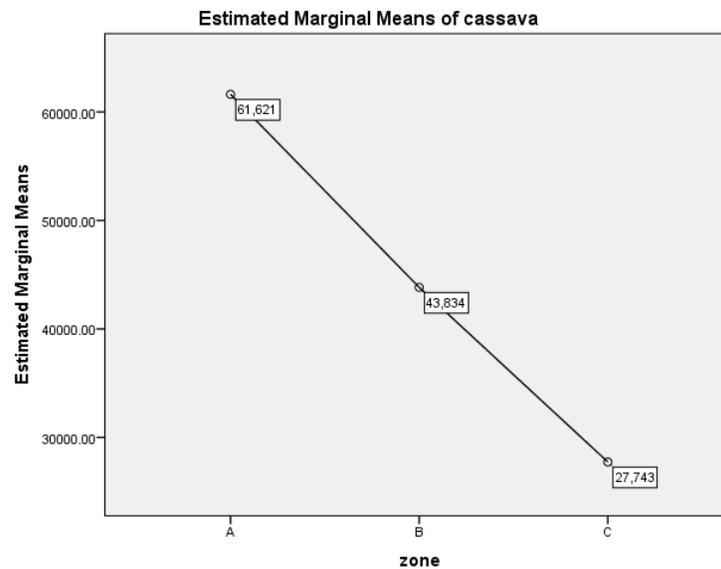

Fig 18: Estimated Marginal Means of Production for Cassava across the Three Geo-Political Zones

Hypothesis

$$H_0: \mu_{ca} = \mu_{cb} = \mu_{cc} \quad Vs \quad H_1: \mu_{ca} \neq \mu_{cb} \neq \mu_{cc}$$

$$H_0 \neq H_1$$

The computed significant level of 0.00 is less than the alpha value (α) of 0.05, hence we reject the null hypothesis thereby concluding that, there is statistical significant difference in the production of melon in the three zones.

Results
The proposed processing industries for the selected crops were classified using Marginal Means of Production of thirteen selected local government areas in the state. Three (3) categories of industries were identified as Mega, Mini and Minor industries based on the local government with highest production rate for the particular crop/s. This is further classified on Zone/s of which the local government with the highest production rate. This is outlined in the table 10 below:

Table 1: Classification of Agro-Industry based on Production Capacity

S/N	Crop/s	Local Government Areas			Zones
		Mega Agro-Industry	Mini Agro-Industry	Minor Agro-Industry	
1	Maize	Gbako Local Gov't	Magama	Bosso	A
2	Rice	Gbako, Edati and Lavun	Bida	Magama and Wushishi	A
3	Groundnut	Mashegu	===	Magama and Paikoro	C
4	Sorghum	Shiroro, Magama, Bosso and Wushishi	Gbako and Munya	Rafi and Paikoro	B
5	Yam	Shiroro and Bosso	Paikoro and Munyan	Rafi	B
6	Beans	Kontagora, MasheguMagama and Lavun	Paikoro, MunyaGbako and Edati	Shiroro	C
7	Surgacane	Gbako and Lavun	Edati	Kontagora and Magama	A
8	Melon	Edaqti and Kontagora	Lavun	Mashegu and Munyan	A
9	Cassava	Gbako and Lavun	Edati and Paikoro	Wushishi and Shiroro	A

Conclusion

This study has provided intended Agricultural-Industrialists ample opportunity in selecting convenient location to establish any kind of agro-processing industry of a particular interest in the state. These intended agro-processing industries shall be established in any of the outlined local government areas based on their comparative advantage over others in terms of their capacity of production.

Recommendations

It is therefore recommended that this study should be up-scaled to cover the remaining thirty five states and the Federal Capital Territory for the development of Agro-Industrialization document for the country.

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