

**Tomato Commodity Chain Analysis in Kano River Irrigation Project,
Nigeria**
**A study commissioned by the Agricultural Development in Nigeria (ADENI)
Project, French Embassy/NAERLS, A.B.U; Zaria**
Conducted by
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INTRODUCTION

The Agricultural Development in Nigeria (ADENI) Project is a 3 year development project, sponsored by the French Government. The project implementation started in 2003 and is coordinated by a French – Nigerian team located at the National Agricultural Extension and Research Liaison Services (NAERLS) A.B.U., Zaria, Kaduna State. The ADENI project intends to contribute to poverty alleviation and food security in the rural areas of Northern Nigeria. It falls within the scope of the Federal Government strategy for rural development aimed at boosting the agricultural sector and contributing to significant reduction of poverty. The project operates in four sites across Kano, Katsina, and Bauchi and Jigawa states and is using some commodities as its main entry points and these include tomato, cotton, cattle and groundnut. These commodities were selected based on the varying farming systems within the project operational area. The projects dual purpose is to increase the productivity of small-scale farmers and improve their access to market and as such a commodity chain analysis for each of these commodities was commissioned by the project in the middle of 2003. Four research teams were mandated for each commodity. This report relate to the findings of the tomato commodity chain analysis team which was conducted in the Kano River Irrigation Project(KRIP) area being one of the ADENI project site.

Objective and Method

The broad objective of the study is to carry out a comprehensive tomato marketing chain analysis in the Kano River Irrigation Project Area of Nigeria. The specific objectives include;

- Analyse the tomato crop production performance at the farm level
- Assess the extent to which tomato farmers can adjust to price decline.
- Examine the tomato commodity flow chart in the area
- Assess the preference and consumption patterns of tomato consumers at the urban level
- Understand which reason make tomato paste industries collapse and their potential in Nigeria

- Analyse the potential for tomato paste cottage industries at the local level.

To achieve these objectives data on the production pattern, marketing and consumption were obtained from farmers, traders, and consumers using checklists and questionnaires. The data from farmers (small and large scale) was obtained based on focus group interviews. Secondary data were also obtained from FAO, Federal Office of Statistics and

some State Agricultural Development Projects (ADPs). Questionnaire was used to obtain data from consumers in four major cities in the country including the Federal Capital, Abuja. Discussion with three tomato processing companies was used to obtain information on tomato paste processing constraints and prospects in the country.

Issues identified

The main issues identified during the study include the following;

- Glut (excess supply) which affect all actors along the chain particularly the producers who usually received poor prices for their produce as a result. The question is does this increasing market glut corresponds to a conjunctural situation due to an inefficient coordination along the market chain or to a more structural adjustment of supply to a saturated tomato market.
- Another issue is that of non-functional tomato processing plants at the local and national level that can provide alternative outlet for farmers and traders.
- Stable per capita consumption of tomato among the Nigerian consumers in the face of increasing production.

Tomato Production Performance at the Farm Level

The performance of tomato production enterprise at the farmer level was assessed based on farm budget and sensitivity analysis.

Farm budget

The cost of production per acre for materials and labour inputs in the production of tomato among the farmers in KRIP were estimated as shown in the table1 and 2.

Table1

Labour	Cost in Naira
soil preparation	6000
nursery preparation	500
transplanting	2000
fertilizer application & watering	3000
pesticides application	600
weeding	9500
watering	2467
harvesting	6300
transportation	6300
Total	36667

In terms of labour inputs it can be noted that manual weeding operation takes the highest proportion of the total cost(26%) and followed by harvesting and transportation operations which account for 17.2% each of the total cost. The least costly operation was nursery preparation which account for only 1.4% of the total cost of labour operations. The high cost of weeding suggest the need to evaluate other means of weeding such as chemical weeding technology to see whether it can be less costly for the farmers.

In terms of material inputs costs it can be noted from the values in table 2 that fertilizers account for 78% of the total cost of material inputs and it was followed by pesticide and

seeds which account for about 10% and 7% respectively. Fertilizers is therefore a significant input in tomato production and as such any incentive, support or arrangement that can reduce its cost for farmers ' would help in enhancing profitability of production and performance of the tomato crop enterprise.

Table 2

Material inputs	Cost in Naira per acre
Fertilizers	26,800
Pesticides	3000
Fungicides	1000
Herbicides	1000
Seeds	1500
Water	1000
Total	34,300

Gross and net revenue per acre

This was estimated based on the predominant price per standard farmer basket (30kg) during the season and average output per acre. The average productivity per acre of tomato among the farmers was found to be 430 baskets and the predominant price was 100 naira per basket. Table 3 gives a summary of the cost and return components per acre of tomato in the area. From the cost benefit analysis it can be seen that at the predominant price of one hundred naira per basket farmers were not getting positive net return per acre. Hence tomato production last season was generally unprofitable and this serves as a significant disincentive to farmers.

Table 3

Type of farm	Tomato farm (an acre)		
Location	KRIP		
Date of information collection	of	Nov; 04	
Modalities of collection	of	interview	
Yield			
Local unit		basket	
Local unit metric equivalent	30	kg	
Production unit	loc	430	basket
Production metric	12900	kg	
Local unit price	100	naira per	basket

Categories of cost	Quantity	Unit	Unit price	Total value	Years of utilization	Percentage of utilization	Depreciated value	Value per output
Metric unit price	3.3	naira per	kg					
Fixed cost								
equipment								
Variable cost								
Commodity in process								
Labor								
soil preparation	10	days	600	6,000				0.465
nursery preparation				500				0.039
transplanting				2,000				0.155
fertilizer application and watering				3,000				0.233
pesticides application				600				0.047
weeding				9,500				0.736
watering				2,467				0.191
harvesting				6,300				0.488
transportation				6,300				0.488
Sub-total 1				36,667				2.842
Intermediate inputs								
fertilizers				26,800				2.078
pesticides				3,000				0.233
fungicides(rare)				1,000				0.078
herbicides(rare)				1,000				0.078
seeds				1,500				0.116
water				1,000				0.078
Sub-total2				34,300				2.661
Total cost(1+2)				70967				5.5
Revenue								
tomato sale	12900	kg	3.3	43,000				3.3
Net revenue								-2.2

Sensitivity analysis

The predominant price at which farmers sold their tomato last season was 100 naira per basket. Other selling prices include 500 naira and 200 naira per basket which were obtained at some days or weeks within the harvesting season particularly towards the end of the season when supply from farmers had drastically reduced. A sensitivity analysis was conducted to see how the gross and net margins per acre will vary under the different price regimes. It can be noted that farmers will obtain a positive net return per acre at the price of 200 and 500 naira per basket and the break even price was around 155 naira per basket. Therefore below 155 naira per basket of tomato, farmers will only receive negative net return per acre and this will affect the sustainability of the tomato production

enterprise because many farmers would tend to change to a more promising enterprise. Table 4 gives the result of the sensitivity analysis under different price regimes.

Table 4

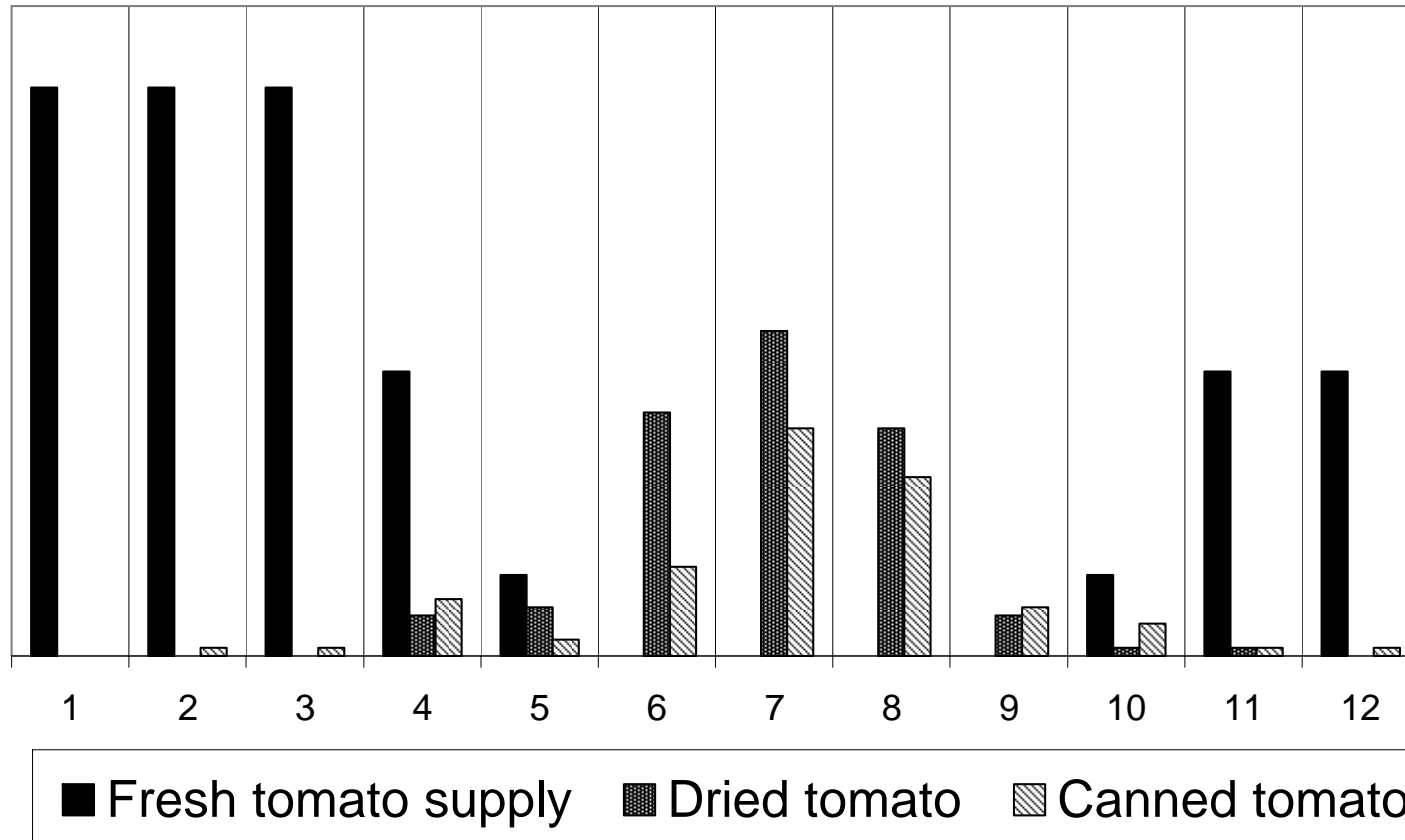
Prices per basket Naira	Cost of production per acre	Output per acre in basket	Gross revenue in naira	Net revenue in Naira
100	70967	430	43000	-27,967
166	70967	430	71380	413
200	70967	430	86000	15,033
500	70967	430	215000	144,033

Seasonality and Price instability of tomato

The tomato product seasonality can be analyzed by looking at figure1. The figure is explaining the relationship between the supply of fresh tomato within a year and the magnitude of dried and canned tomato consumption among urban consumers in the country. Between January and April the supply of fresh tomato is adequate and thus consumers' rarely used the other forms. However, from April to September the supply of fresh tomato drastically decline and thus representing the off-season period for the crop and during such period consumers turns to the other forms. Seasonality of the fresh tomato product causes price to fluctuate and thus affecting consumption patterns of the consumers. Generally consumers used other form of tomato (dried or canned) when the fresh is not very much available due to seasonality.

Figure1

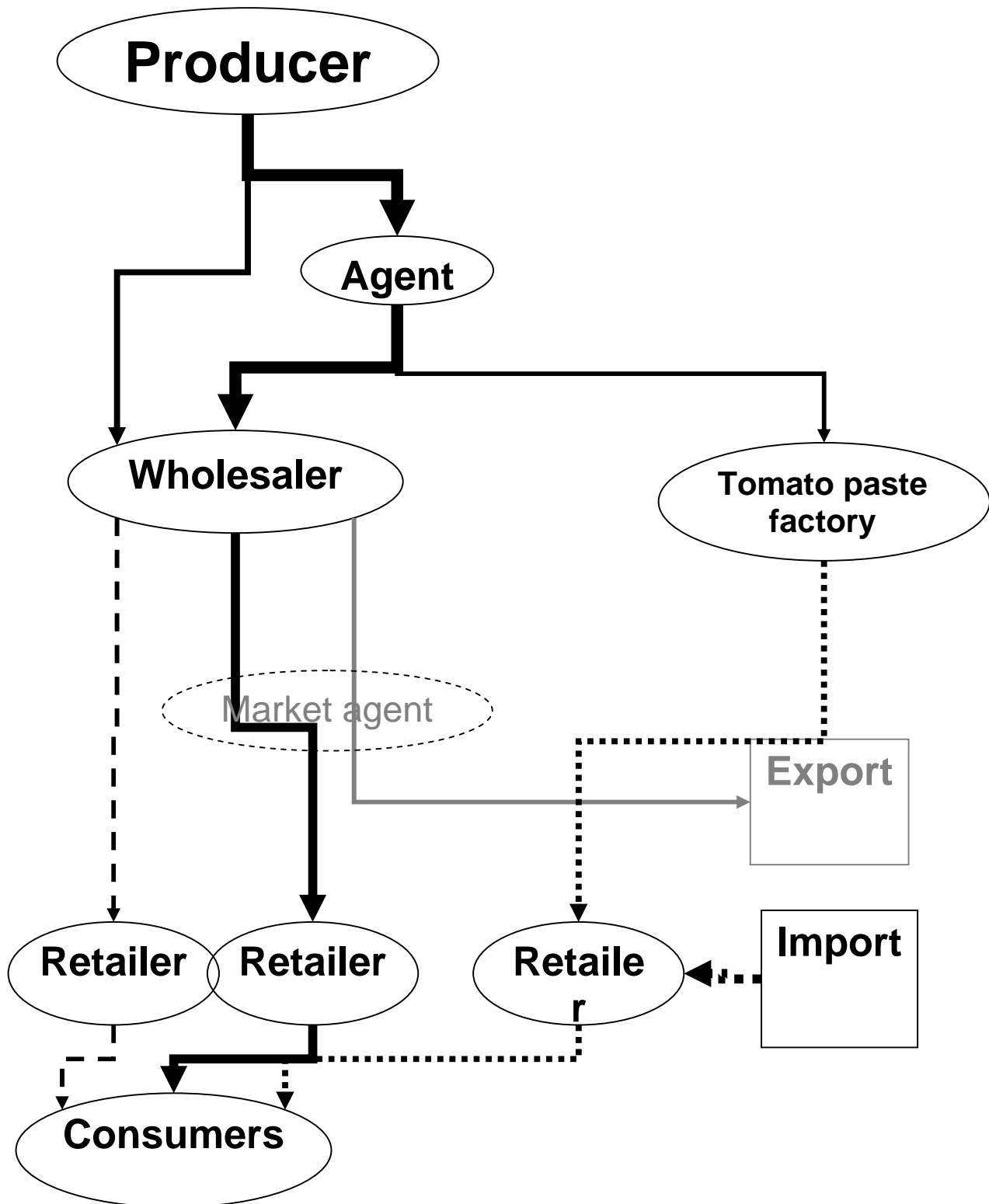
Tomato product seasonality



Organization of the commodity chain

Flowchart

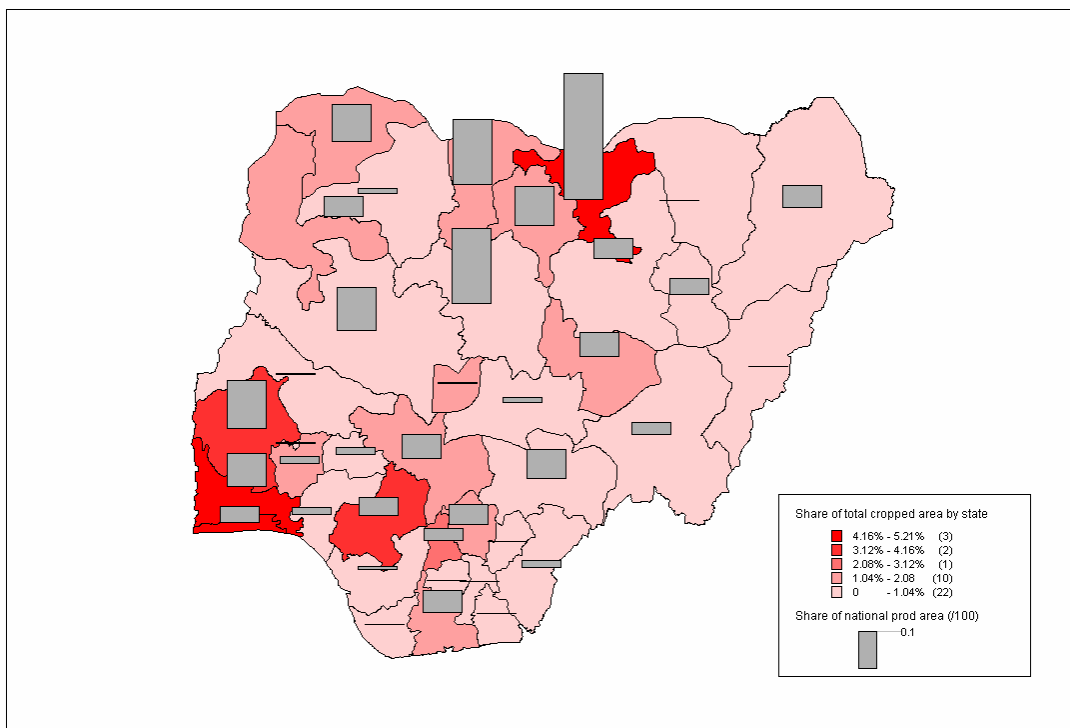
The chain is characterized by somewhat complex interrelationship and interaction between various actors and enterprises involved in the tomato production, distribution, and processing and consumption chain. The chain also shows the position of the consumers as the end users whom all the actors are targeting and thus their consumption pattern and preferences is important in explaining how the chain functions.



Main Production and consumption areas

The map below shows the areas of production in order of importance across the country. From the map it can be seen that the bulk of tomato production lies in the northern part of the country especially areas around Jigawa and Kano states. Some places in the southern parts also produce tomato. The urban centres especially those in the south constitute the major consumption areas and thus markets in those areas were the common outlets for all the production zones.

Map Showing the Production Areas for Fresh Tomato across Nigeria



Modalities of Exchange

The main channel of distribution involves the producers, the commission agents, the assemblers or regional wholesalers, the urban wholesalers and retailers and finally the consumers. The producers sell to the assemblers in the rural assembly market through the commission agents who received a commission per basket of tomato sold. The assemblers or regional wholesalers moved the product to the urban markets where they sell to the urban traders through the commission agents in the urban markets and finally the produce reach the ultimate consumers. At any level along the chain of distribution commission agents exists who play the role of intermediation between the market middlemen for a fee.

Tomato product consumption and preferences

The result of the consumer survey shows the consumption pattern and preferences among the urban consumers of tomato in Nigeria.

Type of product consumed, pattern of consumption and preferences

Among the urban consumers three different form of tomato were consumed and these include: Fresh, dried and canned tomato products. The pattern of consumption among the consumers interviewed indicated the following:

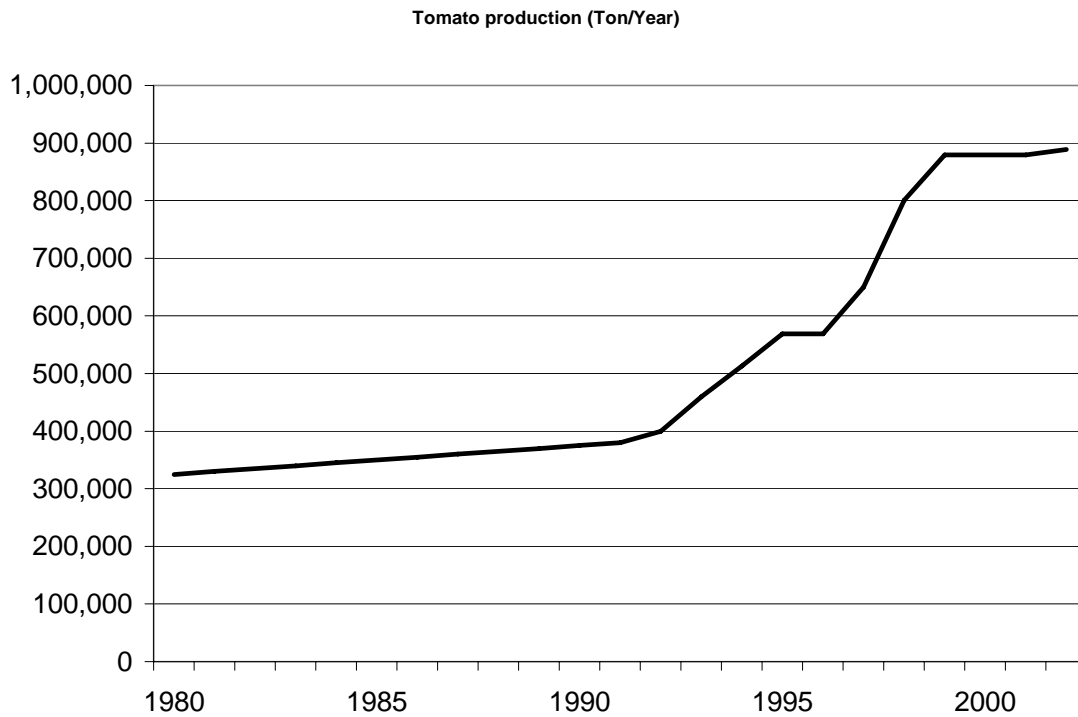
- 25% used fresh tomato only
- 29% used fresh and dried only
- 24% used fresh, dried and canned tomato
- 22% used fresh and canned tomato only.

This pattern is showing that all the consumers used fresh tomato and thus is most preferred among the urban consumers. Consumers used other form of tomato (dried or canned) only when the fresh tomato is not very much available and thus its price is relatively high compared to the other forms of tomato. This can be further confirmed if we look at figure 1 which is showing the magnitude of dried and canned tomato consumption in relation to fresh tomato supply over a year.

Trend in the tomato sector

Local production, demand and import for major tomato product

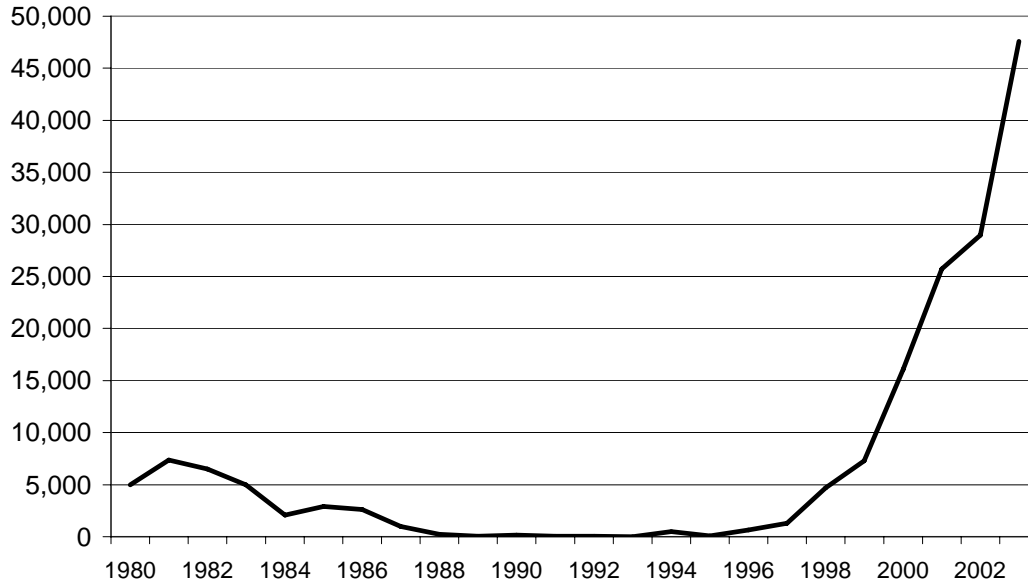
The local production trend of fresh tomato in the country is illustrated in figure3, which shows the apparent production trend from 1980 to 2000. From the figure it can noted that the production of fresh tomato was almost stable (i.e. not increasing) from 1980 up to around 1990, but from 1990 up to 1999 an increasing trend can be noted and from 2000 onward the production tends to stabilize.



Tomato paste importation

Figure 4 below shows the trend in tomato paste importation from 1980 to 2002. From the figure it can be noted that from 1988 to 1996 there was no importation of tomato paste and at such period production and marketing of local tomato was therefore encouraged. From 1998 up to 2002 the quantities of import have increased significantly and such could have an effect on the production and marketing of fresh tomato at the local level.

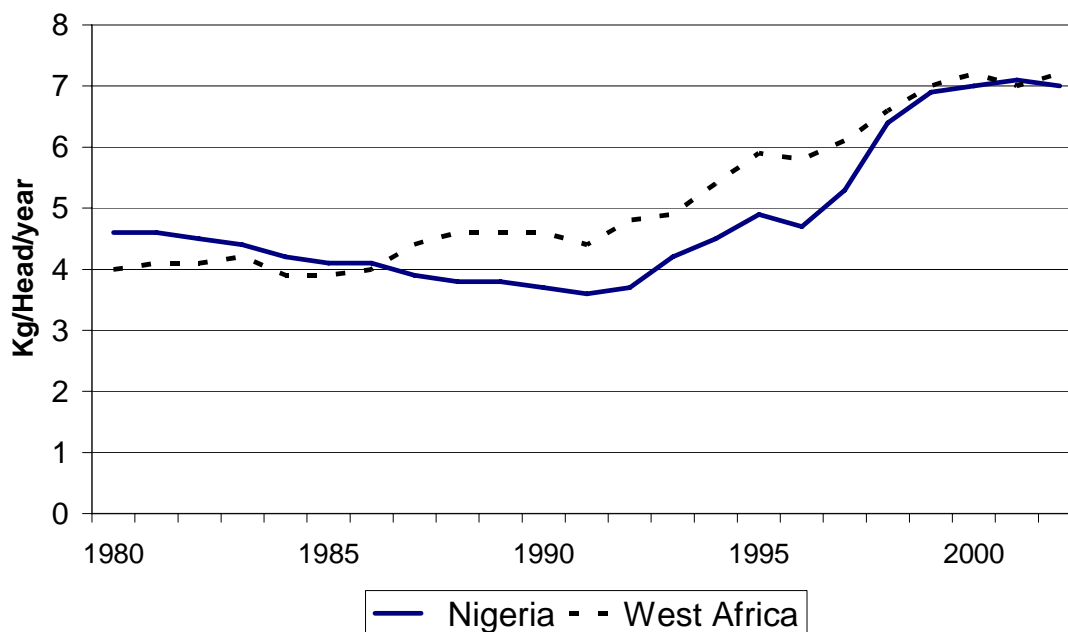
Tomato Paste Importation (Ton/year)



Per capita consumption of fresh tomato

The graph in figure 5 below shows the apparent consumption of fresh tomato in the country over some years (1980 to 2000). It is important to note that while production is increasing in recent years (figure3), but the per capita consumption on the other hand is stabilizing as shown in figure 5 below, such a scenario is leading to an imbalance between demand and supply of fresh tomato and this could serve as one of explanation of glut along the tomato commodity chain.

Tomato apparant consumption (FAO)



Collapse of the tomato paste industries

The local tomato paste industries operating in country served as important alternative outlets of fresh tomato and thus their operation provides a lot of encouragement and incentive to farmers and other actors involved in the tomato marketing chain. Currently most of these industries are not operating. This study visited some prominent processing industries to find out the reasons for their collapse and the following were found to be the main constraints in general.

- High cost of packaging, which was mainly due to non-availability of the packaging materials locally. Packaging takes about 50% of the total cost of processing.
- Lack of effective internal policy that can provide some form of protection from the foreign influx of processed tomato products and
- Inadequate and non-functional infrastructures such as electricity, roads and water. Most of the industries were using diesel generators during their period of operation because public source of electricity was not efficient and in some cases unavailable.

Priority identification and discussion

Cropping calendar and diversification

In order to manage the versatility of the tomato market two immediate possible options were identified; cropping calendar adjustment and diversification to other more viable

crop enterprise. These options were discussed with the farmers, extension facilitators and other relevant stakeholders. This options can be pursued if the farmers organization, irrigation agency and the ADENI project scientists can work together to bring out a realistic plan or schedule of tomato cropping.

In terms of processing the farmers believe that they can pursue a collective action for the establishment of cottage processing plants at their level (i.e. farmer's organization level) provided the necessary information and support is given.

Possible follow up activities

1. Formation of task force to draw and concretize action plan especially with regards to cottage industries for processing and cropping calendar.
2. Advocacy at governmental and private level for establishing a processing plant in the area.
3. More in-depth analysis of possible alternative crops and the likely implication of such option to the actors involved in the distribution and consumption of fresh tomato.

Appendix 1

Summary of stakeholders meeting report

Introduction

The meeting was held with the following stakeholder' farmers, traders, irrigation agency staff, ADENI site team leader, NGO, processors, input suppliers, and staff from the state ministry of commerce and industries. The objective of the meeting was to present the major findings of the study conducted with the aim of stimulating discussion and analysis of major issues (problems and opportunities) among the stakeholders so as to understand possible action and or solutions that can be pursued particularly at the level of the farmers' organization.

Methodology

The major findings and issues identified from the study were presented in a simple and illustrative ways such as charts, graphs and tables. The local vernacular (Hausa) was use as the medium of communication in the presentation. The sequence of the presentation was as follows;

- 👉 Cost of Production Per Acre
- 👉 Gross and net revenue per acre(sensitivity analysis)
- 👉 Tomato commodity flow chart
- 👉 Consumption pattern and indices
- 👉 Processing industries
- 👉 Major issues

The process of the presentation was quite participatory in the sense that farmers and other stakeholders had the opportunity to discuss their problems and exchange views and ideas of how to go about solving the problems. The study team and other project staff only act as facilitators with very little contribution in the discussion and analysis process; this was adopted in order to get the real views of the stakeholders in addressing the main issues identified by the study.

Main issues identified

- 👉 Glut which affect all actors within the chain including the consumers
- 👉 Non functional Processing plants
- 👉 Stable per Capita consumption in the face of increasing production

Stakeholders Responses and Discussions

After the presentation of the results to the farmers and other stakeholders a discussion and responses session began. This section, presents a summary of the discussion including the recommendations/actions propose by the stakeholders.

- 👉 The study reveals the problem clearly and one of the solution or recommendation that can be pursued is that of organizing a workable production calendar and this can be done together with the irrigation agency and the ADENI Project.
- 👉 Collective action for the establishment of cottage processing plant at farmers' level. The farmers discuss this and believe that their associations can pursue such plan, if the project (ADENI) and other stakeholders can provide the necessary information and support.
- 👉 Since the local processing plants are not functional some of the stakeholders are of the view that foreign investors should be invited to establish processing plant that can work. But other stakeholders see this as non viable option since new

entrants whether local or foreign will be affected by the same factors which hinder the operation of the existing ones.

- ☞ The farmers are of the view that government and input suppliers should do something that will reduce the costs of inputs particularly the fertilizers so as to reduce their costs of production.
- ☞ Since large scale tomato paste processing plants cannot survive, the stakeholders discuss the possibilities of having alternative options in terms of simple and cheaper technologies of processing. One of the stakeholder give an information about such alternative technologies of processing which he said the machineries are locally fabricated and they can be used in processing fresh tomato into dried pellets packed into a cellophane bags for sale to consumers. This technology needs to be evaluated for possible dissemination and promotion among the farmers.

Appendix2

List of stakeholders contacted

1. Tomato farmers in KRIP
2. Traders of tomato in Kwanar- Gafan rural assembly market in the KRIP area.
3. Consumers of tomato products in four major cities(Kano, Zaria, Kaduna and Abuja)
4. Tomato processing industries in Kano, Gombe and Borno states.

Appendix 3

Sources of information

- Focus group interviews with farmers and traders in KRIP
- Individual interviews with consumers using a structured questionnaire
- Secondary data from FAO, KRIP and ADPs