

Fruits and Vegetables Handling and Transportation in Nigeria

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Abstract

An appraisal of the current practices used in the transportation of fresh fruits and vegetables in Nigeria was conducted to identify the inherent problems involved. This is with the view to generate useful information necessary to curtail the losses. The Investigative Survey Research Approach (ISRA) was used, thus structured questionnaire were administered to the handlers and transporters in ten major markets across the country through personal interviews. Measurements of the dimensions and weights of some handling devices were also taken in addition to loss assessment in one of the markets. The results showed that the current system is bedeviled with a lot of problems. Virtually all the transporters interviewed do not own the vehicles they use. One major problem is the non-availability of the desired vehicles when needed, which usually caused delay, and subsequent decay of the product. An average of 13.89% of the consignment of fresh tomato delivered in Ipata market was damaged. The packaging containers being used are unsuitable to the modern transport system. The results of the study can be utilized to conceptualize appropriate handling devices that will minimize the current losses being encountered.

Keywords: *fruits, vegetables, handling, transportation.*

Introduction

Fruits and vegetables are of great nutritional value. They are important sources of vitamins and minerals, thus, essential components of human diet. Consequent upon this, there had been increased trade/commerce activities surrounding these commodities (Egharevba 1995). Vegetable production forms a substantial percentage (about 25%) of the major food crops cultivated in the tropics and so it is the source of livelihood for a considerable section of the population (Kra and Bani 1988).

In spite of their importance in the diet, per capita consumption of vegetables and fruits in the developing world is only 100 g compared with 220 g in the more advanced countries (Messian 1992). In the continual fight against hunger and malnutrition, significant increases in food production have been achieved through the use of improved seeds, fertilizers, improved production practices etc.

In Nigeria, enormous quantities of fruits and vegetables are produced and staggering figures are sometimes given as estimated annual production. For example, figures like 3.8 million tonnes of onions, 6 million tonnes of tomatoes, 15 million tonnes of plantain and 35 million tonnes of citrus have been quoted as annual production levels for some fruits and vegetables, which are really large quantities of food crops (Oyeniran, 1988; Erinle 1989). However, it is the amount of the produce available to the consumer rather than the level of production that is more important.

Fruits and vegetables in their fresh forms contain high percentage of water. They are living and hence carry out their physiological function of respiration thereby absorbing and releasing gases and other materials from and to their environment. These activities lead to their deterioration in transit and storage, which is more rapid under conditions of high temperature and humidity. As a result, heavy losses are encountered in these crops.

No one knows exactly how much food is lost between harvest and consumption. The supplied figure for post-harvest loss estimates for fruits and vegetables are difficult to substantiate except on limited, controlled experimental basis. Nonetheless, it is noted that losses as high as 50% are common in fruits and vegetables between rural production and town consumption in the tropics (Oyeniran, 1988). These losses, it is noted, occurred during transportation, storage and marketing (Daramola 1998; Okhuoya 1995).

Several factors are responsible for these damages and losses in the fresh produce. One of these factors is vibration resulting from the transport vehicles as they traverse undulation and irregularities on the roads (Jones *et al.*, 1991). Another factor is attributed to the use of unsuitable packaging containers. To curtail or minimize these damages require detail studies to identify the specific parameters involved. Until the locations of handling losses in the system are identified, opportunities to reduce them would be limited. In this study, a survey was conducted to identify and assess the various vehicles and devices currently being used to distribute fresh fruits and vegetables in Nigeria. This is with the view to observing the existing mode of handling and transportation and identifying the stages where losses occur along the path from the producers to consumers.

Materials and Methods

The materials and equipment used for the survey exercise were: bath room weighing balance, measuring tape, photographic camera.

Methods

A total of 100 persons identified as regular handlers and transporters of fresh fruits and vegetables were interviewed in ten (10) markets across the country. The survey was conducted using the method of Investigative Survey Research Approach (ISRA), (Anazodo *et al.*, 1986) as quoted in Chukwu (1994)). The markets were Yankaba and Ngwa Huku in Kano State; Barkin Dogo and Mogadushi in

Kaduna State; Gwadabe and Central market in Minna, Niger State; Ikpata in Ilorin, Kwara State; Sasa in Oyo State, Mile Twelve in Lagos State and Wuse market in Abuja, FCT.

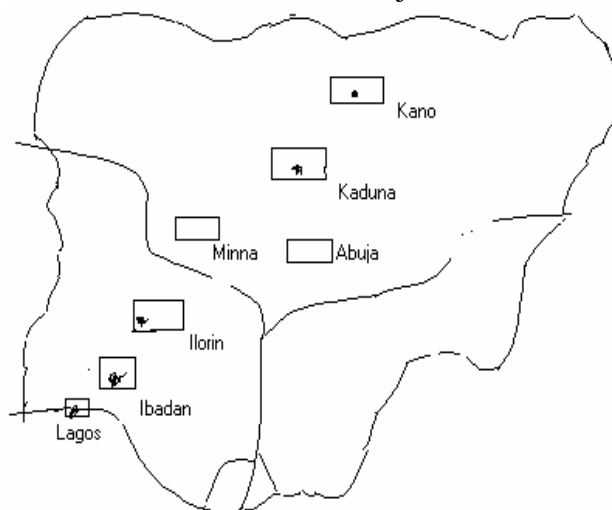


Fig.1. Map of Nigeria showing the study areas.

The prepared questionnaire sought for the following information among others: Sources and destination of the fresh produce, travel distances from sources to destinations, the routes/modes of transportation and packaging systems and materials being used to package the produce. Others are: vehicle types being used, users' assessment of the current system, handling and transport period (duration in transit).

The study also took some measurements of the dimensions of the handling devices, quantified some losses and on- the- spot observations of the loading and off-loading of the produce. A ride was taken in a lorry loaded with tomato produce from *Yankaba* in Kano State to *Ikpata* in Ilorin in order to have a first hand experience of the system.

Results and Discussion

Transporters' Experience

The results of the responses as to how long the transporters have been in the business of fresh produce handling and transportation show that about 82% of the handlers have been in the system of fresh produce distribution and handling for over 16 years. This is an indication that they are experienced and vast in

the system and so the information obtained from them are true reflections of the system.

Types of Fruits and Vegetables Involved

The results obtained as presented in Figs.1 and 2 show the various types of fruits and vegetables being transported over long distances across the country. The major types of fruits being handled by the long distance distributors include orange, pineapple, mango, banana and pawpaw. On the other hand the kinds of vegetables popularly transported include tomatoes, pepper, onion and okra. The results show that more than two-thirds of the people involved had at one time or the other handled and transported oranges, tomatoes, pepper and onion. Some of these fruits and vegetables can be seen in Plates 1 and 2,

Origin of Fruits and Vegetables and their regular destinations

It is clear from the responses that there are no clearly defined routes for any particular produce. In other words, the market forces dictate the handlers' choice of market. However, while most of the fruits are grown in the southern part of Nigeria, a large majority of the vegetables, especially, tomatoes, onions and pepper are grown in the northern part of the country. This results agree with other studies (Oyeniran, 1988; Erinle, 1989; Ibrahim *et al.*,2000). There is therefore a well established North - South trade route in this produce.

Delivery Period

On the average the produce normally spends four to five days in transit, out of which two days are spent on movement from Kano to Lagos and the remaining days are spent at the source markets. It was observed that this period is actually too long especially if the conditions under which the produce is usually kept are considered, because there are no provisions for pretreatment facilities as obtained in the developed countries of the world. Some of the transporters therefore suggested that cold sheds

could be provided at the major produce markets or collection centers where the produce can be temporarily stored before being shipped to their destinations.

Modes of Transportation

There are two main modes of transportation available to domestic transporters and handlers of fresh produce in Nigeria, the rail and the road systems. However, transporters complained of the non-availability and unusual delays in the rail system, so all the handlers interviewed used the road system for their regular and long distance haulage. The major types of vehicles used in transporting their produce are shown in Table 1 and Plates 3-7.

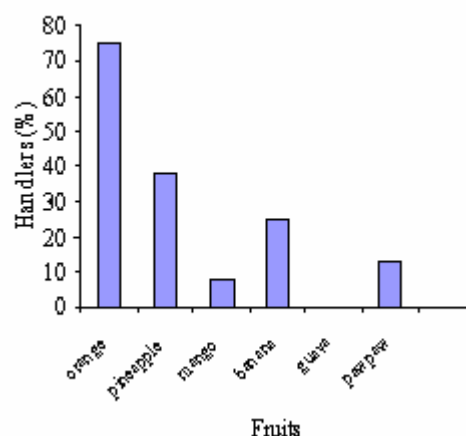


Fig. 1. Types of fruits handled.

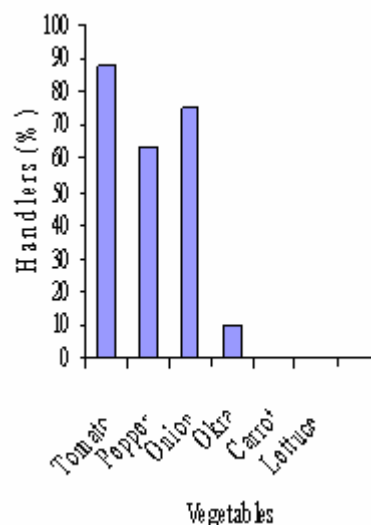


Fig. 2. Types of vegetables handled.



Plate 1. Orange fruits packed in jute bags and displayed in Kano (Nngwa Huku).



Plate 2. Tomato fruits in baskets at Ilorin in Ipata market.

Table 1. Types of vehicles currently used for transporting fresh fruits and vegetables in Nigeria.

Vehicle types	Number of axles	Span			Capacity rating (kg)	Percentage involved (%)
		Length (m)	Width (m)	Height (m)		
Mercedes 911 lorry	2	5-6	2-3	3-4	7500	50
Canter	2	5-6	2-3	3-4	4500	15
Fuel tanker	3	8-15	2-3	3-4	3000	10
Pick-up van	1	4-5	2-3	2-3	1000	8
Buses	1	4.5	2-3	2-3	400	2
Articulated truck	4	8-15	2-3	2-4	7500	15



Plate 3. Baskets of tomatoes loaded inside a bus about to be transported.



Plate 4. Baskets of loaded tomatoes tied outside a truck being off loaded at Ipata market (Ilorin).



Plate 5. A Canter vehicle loaded with baskets of tomatoes in Yankaba market (Kano).



Plate 6. A 911 lorry waiting to be loaded in Mugadushi market in Kaduna.



Plate 7. Canter vehicles waiting to be loaded in Yankaba market.

The results show that none of the transporters owned the vehicles. The vehicles are usually rented at the market where the fresh fruits and vegetables are purchased. It is the desire of most of them to use the 911 lorry. This is because of its capacity and its superior ventilation. Usually, a group of handlers would rent a vehicle if one transporter could not utilize all the available space because of the cost. However, even with this joint effort, the transporters pay as much as N 200 per basket or bag of produce from Kano to Ibadan or Lagos. They are of the view that this is one area the Government or private organizations could come to their aid through provision of loans or appropriate vehicles at reasonable costs.

The 911 lorry and other articulated trucks could carry between 250 to 300 baskets or jute bags load of fresh produce (about 7,500 and 9,000 kg). The major problem normally encountered is the non-availability of the vehicle when most needed. In order not to lose their produce, they resort to the use of any kind of available vehicle even passenger bus, Plate 3. It is because of this problem that some consignments of this produce are also tied on the outside of fuel tankers and other articulated vehicles as shown in Plate 4. Those tied outside the vehicle are highly susceptible to accidental fall off during the course of transportation and these losses could be heavy, though not usually quantified.

The containers (baskets) are usually arranged in 5 to 6 layers inside the vehicle with planks (wood) in between these layers. In other words, direct stacking of the baskets is not possible. Some transporters use leaves to separate the layers, which normally do not prevent compression of the produce from the weight (load) of those on top. This practice is thus one of the sources of mechanical damage to the produce.

In the case of those produce packed in jute bags, for instance, onion and oranges, the bags are usually stacked on each other inside the vehicles. One problem observed here is the restriction of ventilation, which usually results in produce rot due to high level of

physiological activities of the produce. This observation agrees with that of Kra and Bani (1988) who stated that these restrictions result from the shaking of the transport vehicles during transport.

In an assessment carried out at the *Ipata* market in Ilorin, an average of 5 kg of fresh tomato fruits out of the 36 kg basket load were damaged. In other words, in consignment of 7,500 kg (lorry load), an average of 1041.67 kg or 13.89% of the fresh tomato fruits were bad. The damage mainly consisted of bruised, rotten, compressed and water soaked fruits. In terms of money, for an average price of N200.00 per kilogramme, the losses due to this damage is about N20,000.00 per lorry load if such damaged fruits are completely discarded, which is really substantial.

Packaging Containers

Though there are several packaging containers used for packing fresh produce for long distance transportation, it was observed from this study that baskets, jute bags/sacks are the most common transport containers used. The baskets woven from the palm are used for transporting tomatoes for long distances while in some cases they are used to package and transport okra for short distances. Oranges, onions and pepper are usually transported using the jute sacks or bags woven from polypropylene. The baskets are categorized according to their sizes, which also serve as pricing unit in the marketing of the produce (Table 2).

The result shows that 58% of the handlers believed that the baskets are not effective while 42% believed otherwise. In the case of bags, 65% agreed that the bags are effective as far as the produce being packaged in them are concerned, while 35% of the handlers believed otherwise.

On the whole, none of the handlers or transporters uses the plastic container as packaging container, being more expensive and not readily available. There are so many plastic companies now in the country unlike in the past.

Table 2. Measured dimensions of the baskets and weight at full load.

Dimensions	Small (range)	Average	Medium (range)	Average	Large (range)	Average
Top diameter (cm)	40.97-50.61	46.32	50.96-52.75	51.31	52.90-55.07	54.10
Bottom diameter (cm)	23.00-35.20	33.50	36.85-39.60	37.5	39.90-42.90	40.10
Depth (cm)	23.00-27.00	26.50	27.50-32.50	37.50	39.90-35.50	33.70
Volume (x10 ⁻³ m ³)	20.36-41.90	33.90	42.00-52.61	46.10	52.85-59.15	55.15
Weight at full load (kg)	20.00-27.35	23.25	30.00-35.00	32.00	35.50-37.00	36.18

So if the plastic crates are designed like the local baskets and constructed about the same sizes, they could be used alongside the baskets to compare their performances, the handlers will be able to judge and convince themselves whether to adopt the plastic containers or not.

The results show that about 63% of the handlers interviewed would like the baskets replaced if the alternative would be affordable, while about 37% prefer to continue with the present containers. However, in the case of the jute bags, 75% of the handlers agreed that the bags should not be replaced while 25% would prefer it replaced with any better alternative. On the whole, it was observed from the study that there is the need to introduce some other alternative containers into the system. Virtually all the handlers and transporters interviewed accepted that they do suffer losses in the process, but the losses are not usually quantified because they still dispose the produce eventually though at less prices due to poor quality. These losses are usually in form of produce decay due to heat. Some of the handlers are of the view that cold system of transport as used in the case of other products could be introduced into the fresh fruits and vegetable distribution system in Nigeria if the cost would not be too much.

Most of the mechanical damage to fresh fruits and vegetables result from the vibrations and impacts received by the produce (Singh and Singh, 1992). These vibrations and impacts are excited from the irregularities of the road surfaces and are transmitted through the suspension systems of the vehicles to the produce.

Conclusion

Based on the results and the observations made during study, it seems the current transportation system for fresh fruits and vegetables in Nigeria are inadequate. The people involved are actually helpless and so they are living with the inherent problems. However, there is room for improvement in the system so as to ensure deliverance of quality products and reduce the losses and also promote markets both locally and internationally for these produce. This study revealed some of the problems, such as lack of suitable containers, non-availability of vehicles and lack of pre-shipment and pretreatment facilities at the collection centers.

Based on the observations made, the following recommendations are made in order to improve the post harvest handling of fruits and vegetables in Nigeria:

1. Palm baskets should be woven with the smooth side of the material turned inward.
2. There is need to introduce plastic containers designed exactly like the current baskets into the system to conduct some trial tests. This will help the handlers to evaluate the performances of the two and take appropriate decision.
3. Packing houses for the pre-treatment and adequate sorting should be provided at the major collection centers to minimize adverse effects of the environment.

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