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Retailing of fruits and vegetables in Machakos County, Peri-urban area of Nairobi Metropolitan Region

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Abstract:
Retailers of fruits and vegetables contribute to urban and peri-urban food security. Neighbourhood, institutional, commercial and open-air markets are all used as channels for marketing. This is a descriptive analysis of market gardens in relation to retailing of fruits and vegetables. A number of crops are sold without any specialization, with the most popular crop selling at various distances. The Time and distance differential model as well as the Cardinal Crop Market Theory are discussed. The study confirms that the best-selling price is a major determinant in selecting the retail market.

Key words: *Retailing, Fruits and Vegetables, Market garden, Time and Distance model, Cardinal*

1.0 Introduction

A market garden is a farm used for the production of crops for sale into the market. The market garden owner/farmer is the producer, processor, distributor and final retailer. Nearly two-thirds of urban and peri-urban households engage in agriculture, thereby making an important contribution to urban and peri-urban food security. This article is based on descriptive analysis of retailing of fruits and vegetables and market characteristics in Machakos County, a peri-urban area of Nairobi city using a sample of 200 farmers. It is assumed that market farmers sell their produce in markets where they get the best price for their commodities.

Some of the marketing channels in the study area include neighbourhood markets, institutional or commercial markets as well as open-air markets. Many fruits and vegetables are sold and there is no specialization as retailers display a mixture of fruits, vegetables, root crops, cereals, and even industrial products (table salt and honey). The popular crops sell both far and near a cross all distances.

A relationship between markets, crops and Time and distance is discussed together with a new theory: The Cardinal Crop Market Theory. The results from Key Informant Interviews provided success stories and lessons as well as challenges and their solutions in retailing of fruits and vegetables in urban and peri-urban areas. Part of the conclusion was that farmers take their products to markets with best-selling price and selected crops are those that retail and provide the best return. Further studies are recommended as only few literature resources are available on the subject.

2.0 Market Garden farming

A market garden is a farm or garden used for the production of crops for sale into the market. Farmers in Market Gardens produce for sale using a number of processes to enhance the efficiency of farm produce delivery to consumers (Livingstone 1958 and Williams 1976). The market gardens provide small-scale urban and peri-urban farmers with opportunity to act as the producer, processor, distributor and final retailer. In cases where the market gardener cannot perform the four functions, there is the possibility of middlemen to connect the market gardener with the retail market (Jasdanwalla 1977). Once the produce reaches the market, the market farmer cum retailer is not obliged to specialize (French 1958), but may transact several wares- vegetables and fruits, cereals, fuel sources, clothing, and many others, mainly to overcome the rigid

market structure and diversify the income base. According to FAO (2011), retailing is one of the important areas for development within developing world to promote and increase demand for small-scale agro-processing and peri-urban products as nearly two-thirds of the urban and peri-urban population engage in agriculture. Thus, securing market outlets is one of the important areas for prioritization in urban and peri-urban food security.

Despite the many drivers to peri-urban retailing, peri-urban market farmer also faces a number of challenges (for instance, the producers and consumers often get a poor deal, while the middle men control the market; there is massive in stage determination in quality and frequent mismatch between demand and supply both spatially and temporally; lack of efficient marketing system and appropriate infrastructure results in large post-harvest loses (due to perishability of vegetables and fruits)); as well as lack of information about market demands, sudden shortages and prices (Rohit, Singh, Singh, and Khumbane (2017), which require frequent innovation for sustainability in food security in urban and peri-urban areas.

The conceptual model is as shown in Figure 2.1.

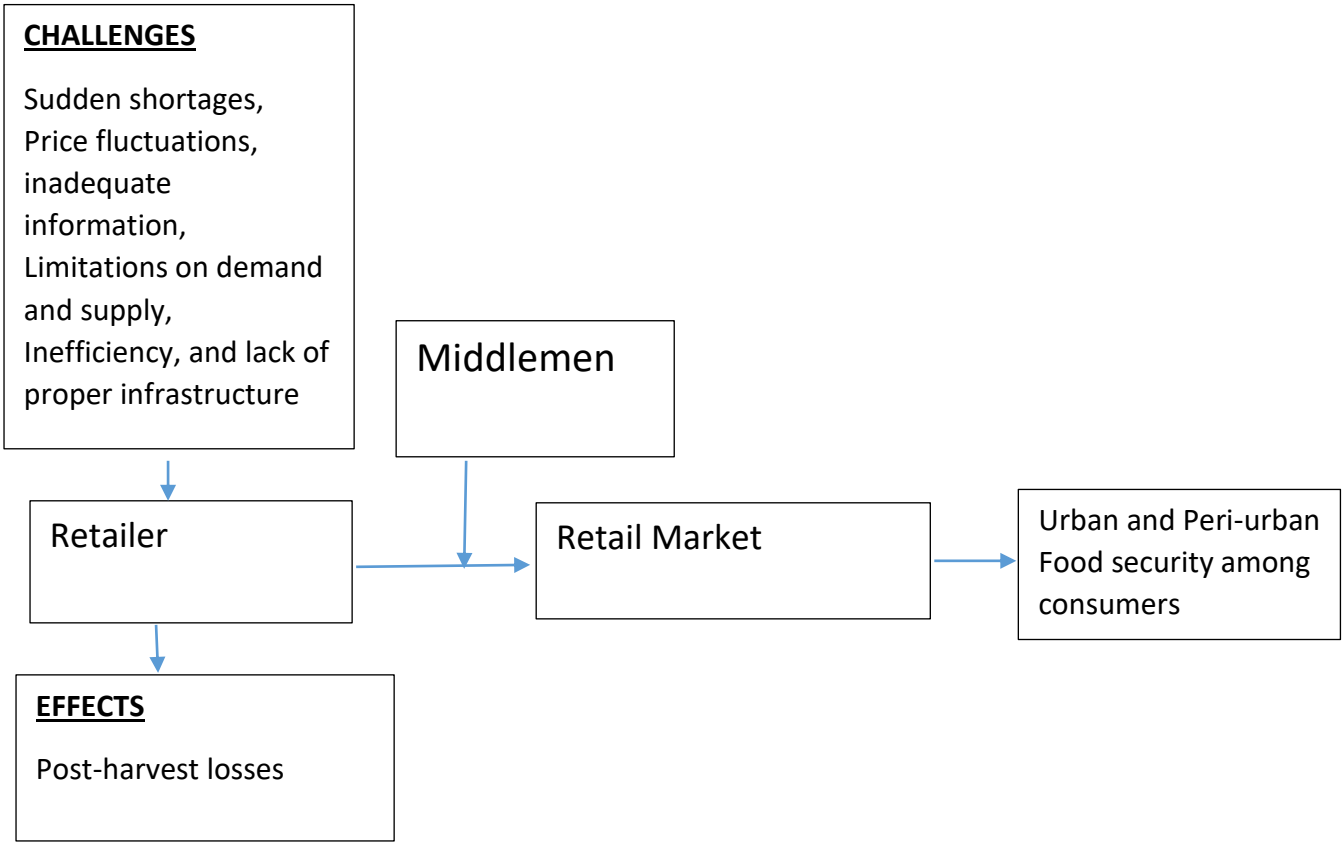


Figure 2.1: Relationship between Retailer and consumers in Peri-urban retailing of fruits and vegetables

(Source: Author)

3.0 Methodology

This was a descriptive study of the various markets in Machakos County, a peri-urban area of Nairobi. The data was acquired through questionnaires, Key Informant interviews and Focus Group Discussions using probability sampling techniques and a sample size of 200 market gardens. The data was analysed descriptively and presented in graphs and charts. The main objective of the study was to examine the typologies of the various fruit and vegetable markets, their characteristics and the role of farm income and time and distance to market in influencing fruit and vegetables retailing in peri-urban areas of Nairobi City. Specific objectives were to: Identify the various market typologies and characteristics of such markets (the areas/regions producing such crops and their geographical dispersal in different locations as an approach to find out which one dominates the market, which could indicate the price and other benefits. For instance, is one market preferred more than the others? (something that could indicate market inefficiency), Map out the

spatial location of markets and factors determining the location of such markets, Investigate the role of farm income in influencing the retailing of fruits and vegetables in the study area, and Study Time and Distance differentials regarding retailing of fruits and vegetables in the area.

The study assumed that retailers take their fruits and vegetables to markets where consumers pay the best price.

4.0 Results and Findings

4.1 Market Typologies, Characteristics and Crops

Some of the marketing channels for urban and peri-urban products include: neighborhood markets (door-to-door distribution and community sales points), Institutional or commercial sales (products are sold to health and youth centres, schools, supermarkets and hotels, based on producer-consumer agreements, with organized fewer associations). Some of the interventions for securing markets include: stimulating consumer demand by highlighting the quality of origin of produce as well as the health benefits of diversified diet (including fruits and vegetables); developing opportunities for processed goods and in full compliance with rules for hygiene and quality standards; intervening at school level, with nutrition education in conjunction with school garden programmes to promote healthy diet. Open-air markets in peri-urban areas of Kenya are the most convenient sources for fruits and vegetables for many households (Cherono and Otieno 2016. A personal communication with FAO Programe Officer for Machakos County in 2017 emphasized that special focus should be paid to market-driven production (market gardens). He further recommended that crops should be vegetables and fruits that can be harvested throughout the year (for instance kales, spinach, coriander, amaranthus and indigenous vegetables (most preferred by middle class)). Figure 1 shows the popularity of the types of markets in Machakos County. Since most markets were located in Institutional Lands, it is important to ask 'what are the factors determining the location of market gardens?

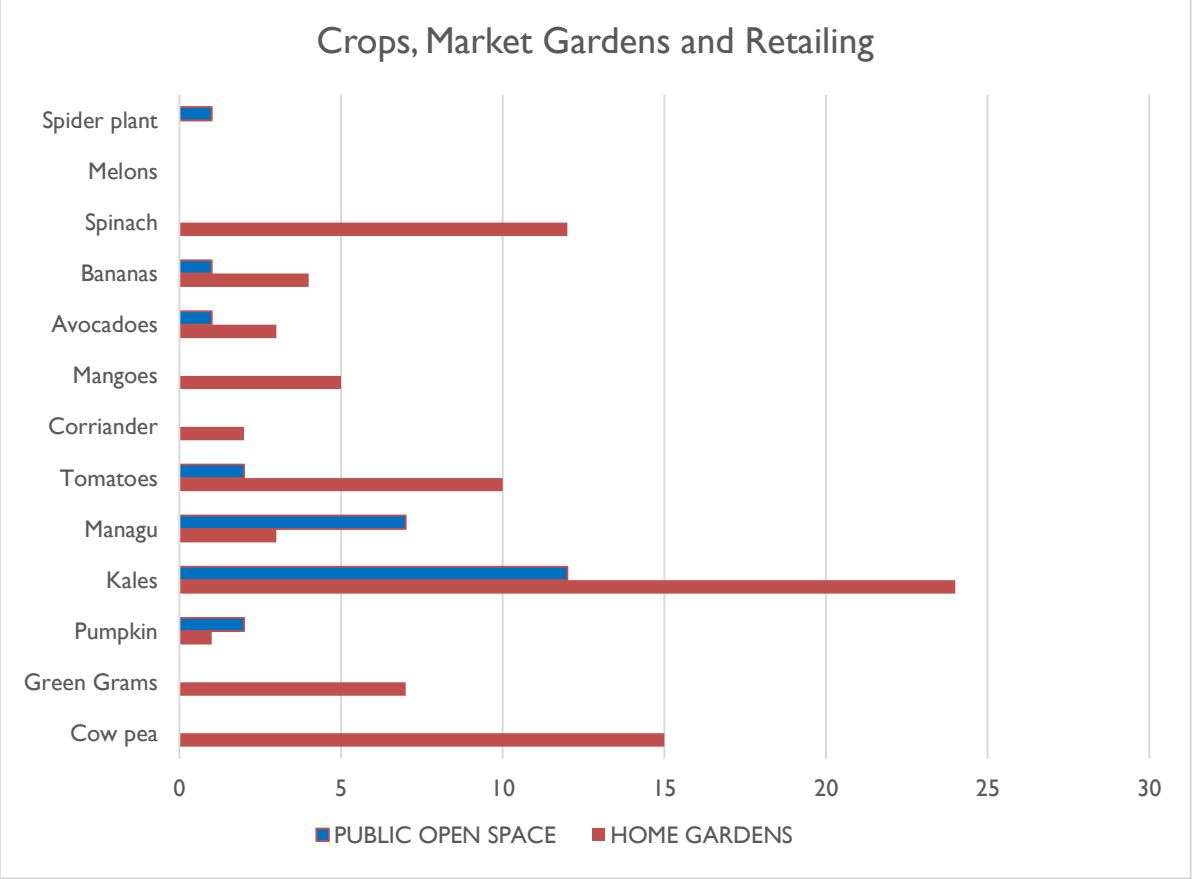


Figure 1: Crops, Market Gardens and Retailing (Source: Field data)

Cow peas, onions, spider plant and tomatoes, Terere and Managu (indigenous vegetables) were also popular. Most vegetables traveled for less than 1km though for these popular crops, the distance is not an issue. The fruits and vegetables are located in market gardens mostly 10km to 20 km away and relatively few traders

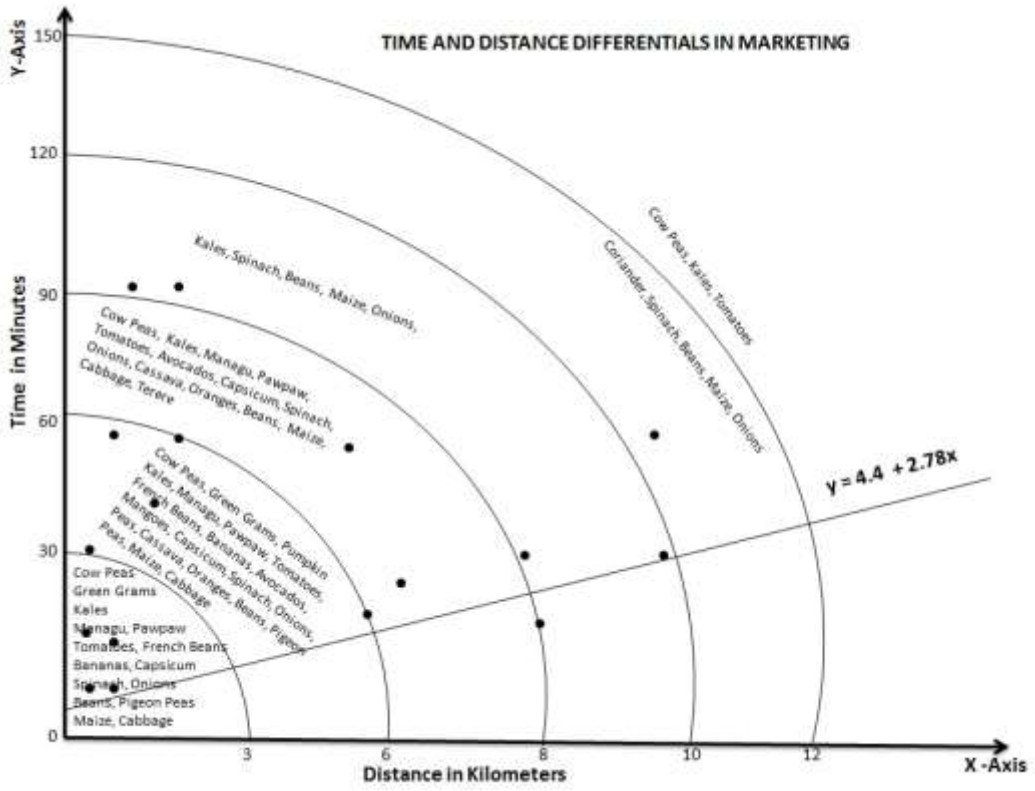
handle them. The position of Spinach and kales as the leading vegetable being retailed is interchangeable, followed by, then cabbage, cow peas, onions, spider plant and tomatoes.

4.2 Fruits and Vegetables Retailing versus Distance and Time

The fruits and vegetables travel/ retail at 0 to 20 km. A majority are within 2-5 Km and more than 20Km. The journey lasted from less than 10 minutes to over 2 hours (120 minutes). The fee ranging from Ksh. 20 to more than Ksh. 500, for instance, 70 percent of the retailers paid more than Ksh. 500 for transport. About 25 percent paid between Ksh. 200 and Ksh. 500. Markets located in Institutional lands (like the Kenya Meat Commission) were the most popular and retailers traveled from below 1 km to over 20Km.

4.3 Retailing, Crops, Time and Distance

The relationships between the Markets, Crops, Time and Distance, have been summarized in Oluoko-Odingo (2019) as shown in Figure 3 below:



Relationship between Markets, Crops and Time and Distance Differentials in marketing (Source: Oluoko-Odingo 2019)

According to Oluoko-Odingo (2019):

- Home gardens are the Primary retail contacts with peri-urban farmers due to their availability, accessibility and minimal time-Distance relationships;
- The number of Marketable crops (fruits, vegetables and cereals) decrease with increase in distance and time from the farm;
- The most popular/marketable crop travels the longest distance and to close proximity with the urban fringe market;
- The most marketable crops are sold irrespective of time-distance differentials, and;

- These time-distance relationships in crop marketing (fruits, vegetables and cereals) can be modeled in the algebraic equation: Y=a + bX, where Y represents time taken to reach the market, a is constant (4.44), b is regression coefficient (2.78) and X is the distance between the farm and the market.

These relationships are very important in the development of new crop varieties that would remain relevant for various markets irrespective of location. The model is also useful in management of post-harvest losses by determining appropriate/strategic locations for storage facilities, among other benefits.

On the basis of this model, the Author proposes a theory: The Cardinal Crop market theory as follows:

The Cardinal Crop Market Theory

According to this theory: The marketing of Crops ripple out or radiate from the Market garden in concentric zones, with the Cardinal crop linking the market garden with the Commercial/Institutional or Supermarkets. The nearer the Concentric zones to the market garden, the more the market crops. As the distance between concentric zones or ripples and commercial market/Institutional/Supermarket reduces, the more likely will the Cardinal crop (s) emerge. Each concentric zone represents cardinal crops which are more concentrated nearer to the market garden, and reduces in number with increasing distance of concentric zones or ripples from the market garden, and the number of concentric zones would be determined by the popularity of the Cardinal crop (s) and its ability to penetrate the distance from the market garden right through into the Commercial/Institutional or Supermarkets.

These cardinal crops are important for a number of reasons: First, the Cardinal crop (s) are relevant in agricultural development (infrastructure- roads and storage facilities); development of new crop varieties that would be embraced by the entire community- urban, peri-urban and rural, and in agricultural innovation (design of transportation and markets; agro-processing and agro-industrial products as well as crop breeding). The Cardinal crop (s) are also vital for national food security by supplying food to several regions, thus emerging as a staple crop with other supplementary crops, that through agricultural research can be development to address all aspects of food security. Similarly, the Cardinal crop (s) can provide an indication of the associated agricultural infrastructure and related developments, necessary in meeting agricultural development challenges (Bio-physical environmental limitations (soil, climate/water and energy), financial and human resource scarcities, the social capital, and research challenges, among others), necessary in ensuring food security, poverty eradication and sustainable development in line with the 2030 and African 2063 Agenda.

The Theory assumes that:

i) There must be a real distance between the Home garden and the Commercial/Institutional or supermarket which takes time to cover
ii) There should be a series of at least one medium-sized market between the Home garden and the Commercial or Institutional market/Supermarket.
iii) Price differentials exist between lower order markets (like Home gardens) and higher order markets (medium- sized markets or Commercial or Institutional markets or Supermarkets) with increase in prices being directly proportional to the distance between the home gardens and the Commercial or Institutional markets or Supermarkets.

For future developments, the Cardinal Crop Market Theory can assist in the following: In developing Commodity Price instrument that indicates price of commodities/produce along the Regression line and at the intersection of each concentric cycle at the County, National or International level. This means that stakeholders are able to forecast market situation using available climatic data, agricultural variables- labour, storage, cost of inputs, among others) as well as risks and determine both the production price and selling price in advance so that farmers can decide on what crop to grow. The risk element allows the government to involve private sector to handle risks in case the forecast below a certain level of expectation. Such endevours can assist in avoiding farmer exploitation while also protecting consumers. Farmers will also develop/invest on crop of choice and individuals, County or National Government can choose which crop to support each year/season based on the price, risks and other variables. Besides, the farmers will be aware of

their Profit margins and so can make the right decisions, while the government can also determine the returns/taxes on the Cardinal crop(s) so that on the basis of revenue, the correct decision is made.

A communication devise/instrument can also be developed- that would provide market variables, farmer education, alternative choices, with a forecast and advice at each intersection of the concentric zone. With the information, the famers will be empowered to invest accordingly. Note only will the Cardinal Crop Market Theory can be applicable in Agricultural crop production, but the approach can be equally relevant in disease epidemiology, to control both crop, livestock (zoonotic) or human diseases and their epidemics.

Lastly, the theory can be applied in management of natural disasters by mapping out the impacts and scheduling the emergency and post disaster management operations.

According to time-distance differentials, Kales was the most retailed crop, followed by spinach, then manage/African Night Shade. Tomatoes, onions and cow peas scored the same, with the majority of the retailers having an income of less than Ksh. 25,000 per month. Retailing of fruits is less common than that of the vegetables.

4.4 Effects of Farm Income/Price on Retailing of fruits and vegetables

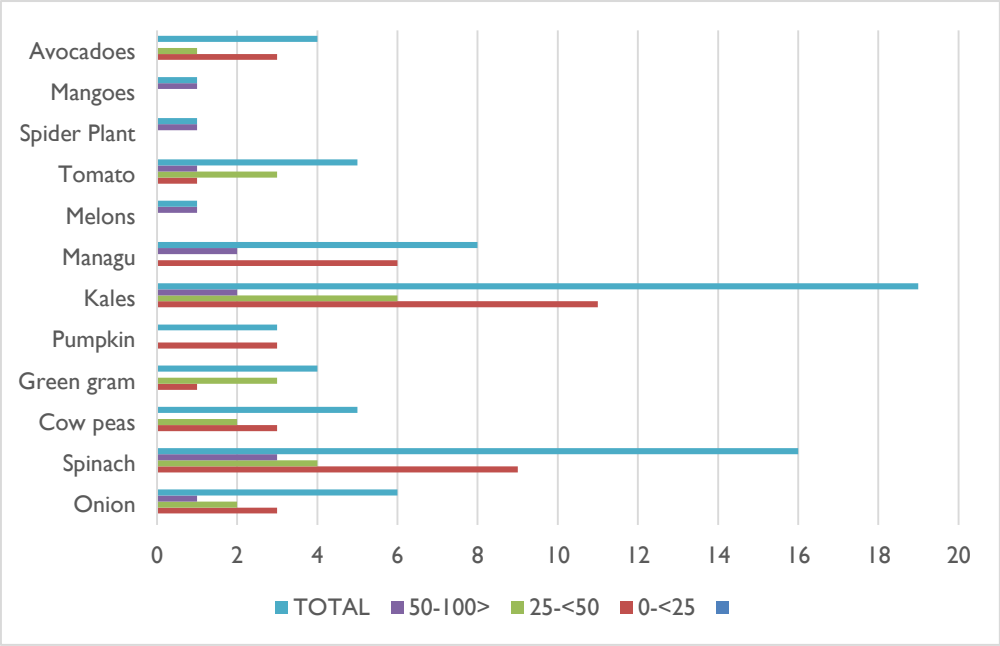


Figure 4: Retail of Crops versus Income (Source: Field data)

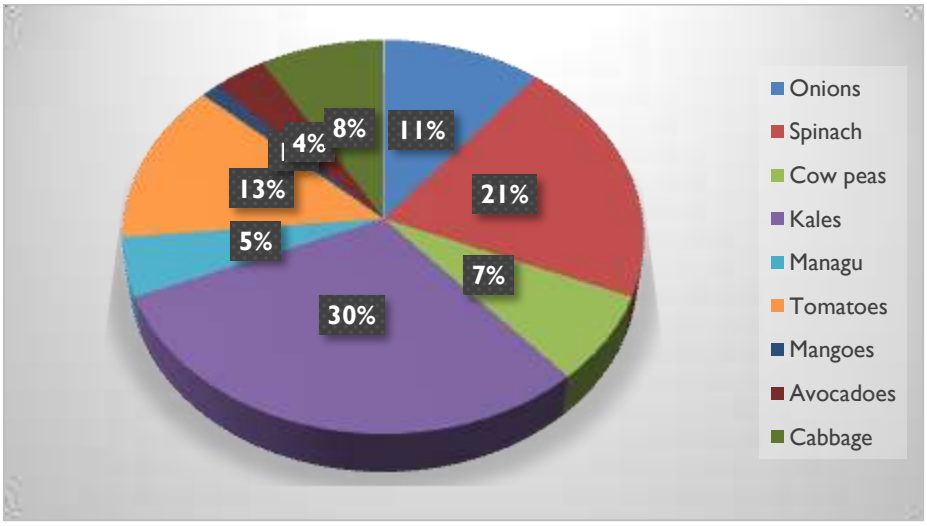


Figure 5: Retail Time Frequency (Source: Field data)

4.5 Success stories, Challenges and Lessons

Table 1: Success Stories and lessons

Retailer	Success Story	Lesson
1	Has good customer relations, has the products needed by the clients, has permanent customers that can get credit and so the sales have been increasing	It is good to have good relationships with customers
2	Located next to a petrol station, and with good branding, the shop is visible. The need for fast foods is also high	It is important to have good customer services and make the working place visible. Also add more services like wifi, TV, et cetera
3	They have been able to open 9 new branches in different locations	The organization is popular
4	From a small shop, opened a bigger shop and then much bigger shop, bought a plot and now wants to buy own track for transport	Sale of produce is a good business and one needs to be patient and consistent
5	The farmer has been able to pay school fees and sustain her family	Selling produce is a profitable business
6	The trader has been able to furnish her house with household items	The business is paying
7	Being the only source of income, the business has provided for basic needs-food, clothing shelter and school fees	Purchase commodities when in plenty and store and the final returns are good
8	Started with 3 branches and now has 42 branches- has created employment. There is great increase in consumption of farm produce	The organization is popular, with great growth
9	The business is not as it used to be in the past when we had great profits. It is now bad due to political instability in the country	When politics is stable in the country, there is stability in business. Businesses collapse when there is no stability
10	The business has grown from small to a big store	Never despise your humble beginnings
11	The profit made has helped increase stock, feeding family, educating siblings in high school and colleges and universities. The business had enabled me lead a descent life	In business, one has to be optimistic. Apart from success sometimes one fails to reach his/her targets and this should not discourage one from pushing on.

Source: Field data Interviews with Retailers

Some of the constraints faced by farmers recorded during field interviews include: Few customers, returns are low, poor working conditions during bad weather-sunny/rainy, people buy from vendors near home and not market; Limited packaging bags, Price variation as sales go down depending on the season, Low turn up of customers, Suppliers fail to supply, Low prices due to competition and difficulty in transport during the rainy season. Some of the responses to these challenges were: expanding the market and discourage suppliers from retailing products to safeguard traders in the market, Improving on quality to attract customers, engage somebody to guard the produce; encourage more farmers to engage in greenhouse production, using good storage facilities for perishables, selling products that are in high demand and having quality or diversifying products for sale while also only stocking; what consumers demand; and Providing the required inputs and water supply to farmers, reducing transport costs and establishing more greenhouses.

5.0 Summary of findings and Conclusions

The study has shown that Market gardens in Machakos County include Public Open space, Home gardens, Institutional markets, Tins and Pots and Own farm, some being very small and require further study with respect to their profitability. Home gardens play a major role in peri-urban fruits and vegetables production, hence retailing, thus showing an important policy area. Location of markets is determined by time and distance to market, income from retailing and consistency in the supply of produce by market gardens. There is no specific specialization as many retailers tend to sell several products as was observed by Jasdanwalla (1977). Fruits and vegetables are retailed with other crops, mostly cereals in different markets, and this could be to allow: a) Income sources diversification and b) To deal with complex rigid structure of the market as observed by French (1958). The most retailed crops are affordable to both low and high income consumers. It is therefore possible to conclude that market farmers take their produce to markets with best retail price. The selected crops are those that retail and provide the best returns, and the resultant price accommodates all the farmers' expenses within the best profit margin. More studies are needed in this sector as only handful of literature resources are available.

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