

Small Scale Horticultural farming along the Kenyan Highways and Local economic development: Exploring the effect of factor prices

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Abstract

The study investigates the effect of cost of seeds, labour, fertilizers, borrowing and leasing land on the economic livelihood of small scale horticultural farmers in Kenya. In carrying out the study, a stratified sampling procedure was used and both primary and secondary data were used. The study results established that high input prices greatly affect the income levels of small scale horticultural farmers and significantly influence their economic livelihood. Consequently these high input prices remain critical challenges to small scale horticultural farming. The study recommends that there should be deliberate policies aimed at cushioning the farmers against high input prices such as subsidies on fertilizer and seeds, availing relatively cheaper credit lines, encouraging farmers to use some level of farm mechanization, encouraging farmers to practice optimal land use due to high cost of either leasing or purchasing land and avail regular extension services on the use of certified seeds and fertilizers. Finally the study results call for provision of efficient road network and marketing and other support mechanisms for farmers to enhance their incomes (their economic livelihoods) and eventual realization of local economic development.

Keywords: *Economic livelihood, Horticultural farming and Local economic development*

1. Introduction

Kenya's horticultural sector produces fruits, flowers, vegetables, spices, root crops (Sweet and Irish potatoes) and herbs. Majority of these crops are produced by small-scale (below 10 acres) farmers who contribute about 50- 60% of the total production. Large-scale farmers (above 20 acres) dominate in commercial production (Ministry of Agriculture, 2010). The sector has continued to register increasing growth over the years with an average growth rate of 12% and contributes 13% of GDP. It contributes significantly to foreign Exchange earnings, second to tourism and employs close to two and half (2.5) million people in both formal and informal setups. The contribution to foreign exchange earnings is based on the 4% of the horticultural produce that is exported with less than 2% being contributed by the small scale horticultural farmers (Ministry of Agriculture, 2012). This is a small fraction of the overall horticultural sector produce in Kenya. The domestic market accounts for 90% of the total horticultural production. However taking note that the majority of the players are small scale farmers, it implies that, the sector plays an important role in wealth and jobs creation in rural areas (Ministry of Agriculture, 2010). It is therefore important to improve productivity and lower the cost of production for the sector by effectively increasing the area under cultivation and subsequently raise the incomes (Minot & Ngigi, 2002).

Indeed many of the small scale horticultural farmers operate with a focus on food security and poverty reduction as they produce and sell so as to buy or access basic needs and which makes this activity central to rural livelihoods and hence critical to poverty reduction. Most small scale farm production factors are not therefore utilized towards commercialization but to subsistence orientation with the farmers' objective being mainly food self-sufficiency. However, in the long run, subsistence agriculture is not a viable activity and is not likely to ensure sustainable household food security, welfare and livelihoods (Jaleta, Gebremedhin, & Hoekstra, 2009). This then calls for clear policy measures aimed at supporting the small scale farmers to move to some level of commercialization of their farming activities.

In Kenya, there is limited research and scholarly studies about the small scale horticultural farming. This is one of those micro economic activities which have gained prominence among many Kenyans and as Mead (1998) observes, the strength of an economy as a whole is a function of positive performance indicators of the micro and small enterprise sector. This then means that an understanding of the activities of the small scale horticultural farmers and with regards to the specific challenges facing the subsector is crucial to the development of a region and the whole economy. There is need therefore to establish empirical information regarding how and to what extent the critical aspect of input prices affect the earnings of the small scale horticultural farmers. The small scale horticultural

farmers' incomes do contribute to their well being and subsequent local economic development.

Kenya's devolution process requires that every County needs to identify and support growth stimulators in their jurisdictions. Indeed the study objectives are focused to suggesting appropriate interventions to support small scale horticultural farmers in terms of realizing increased incomes. The possible interventions are expected to increase the competitiveness of these farmers in Kenya and especially in areas with potential in horticultural farming. It is equally important to note that empirical evidence on the capacity of small scale horticultural farmers to play a positive role in local and national economic development needs to be established. This will harness the key economic and infrastructural activities at the local level so as to enable these farmers contribute effectively to local economic development.

In recognition of the importance of this sector in the rural economy of Kenya, this study investigated the impact of input prices on the small scale horticultural farmers in Nyandarua County of Kenya. The study was motivated by the fact that small scale horticultural farming is experiencing significant growth, especially along the Kenyan highways and the fact that this is an economic activity which largely benefits the low income groups in society living along these highways. The growth of this agriculture subsector has the potential of spearheading other developments at regional level through processes such as technological advancement, employment creation and other infrastructural developments.

The principal objective of the study was therefore to determine the impact of input prices on the small scale horticultural farmers' incomes. Incidental to this objective were the research concerns which included; finding out the critical inputs which are used by the small scale horticultural farmers; finding out the extent to which the input prices affect the small scale horticultural farmers' incomes; finding out the common strategies employed by small scale horticultural farmers in managing the challenges they face and the possible policy measures necessary to improve the performance of small scale horticultural farmers.

1.1 Organization of the Study

Essentially this study is organized in six sections. Section one provides the foregoing introduction with section two giving the study setting. Section three deals with the specific literature review about the subject matter of the study while section four provides the methodology and data used for the study. The study findings are given in section five with the subsequent conclusions out of the study findings and conclusions being provided in section six.

2. Study Setting

The study was carried out in Nyandarua County of Kenya which is characterized by dominance of organized small scale horticultural activities. This was an exploratory case study which used both secondary and primary data for the purpose of the study objectives. Specifically the study targeted those small scale horticultural farmers along the Dundori-Olkalou-Njambini road. This zone was of interest as it presented active and organized small scale horticultural activities principally due to market access hence the essence of a developed road network in local economic development, a process by which all sectors work together to create better conditions for economic growth and employment generation.

Nyandarua County is located on the northwestern part of the Central Province, west of the Aberdare ranges. The County has a bimodal rainfall which decreases rapidly from east to west with annual rainfall varying from 1,400 mm in the Aberdare Ranges to about 700mm in the lower areas bordering the rift valley. The temperatures are moderate but can concessionary drop to as low as 7.10 C in the cold seasons of July. This may result in frosts which adversely affect horticultural crop growing (Pouw, Braun, & Sombroek, 1982) however; the county is an ideal natural environment for horticultural crop production in the country.

Horticultural farming in Nyandarua County is largely embraced by the farmers due to the high returns from the local and export markets (Ministry of Planning, National Development and Vision 2030, 2009). Existing flower farms in the district have proved to be a major source of employment for the large labour force. Due to the high capital requirements involved, local individuals and groups of farmers are supported to start horticultural ventures. Horticultural crops grown in the County include Irish potatoes, carrots, vegetables and fruits. Vegetables include such crops as kales, onions, cabbages, leeks, and capsicum (MOPNDAV2030, 2009). The County was one of the top producers of vegetables in the country as per the 2012 Ministry of Agriculture records.

Due to the perishable nature of the horticultural crops, good road network is critical to the development of the sector. Significantly large parts of Kenya do not generally enjoy good network of roads and especially the rural areas. Indeed access to infrastructural services plays a key role in helping reduce income inequalities (Lederman, Maloney, & Servén, 2005) which should be the focus of the Kenyan Counties. Before the year 2007, Nyandarua County had about 197 kilometers of bitumen roads (Ministry of Roads and Public Works, 2004). The Gilgil-Olkalou-Nyahururu road was the only tarmac road traversing the County. The 100 kilometers Dundori-Ol-Kalou-Njabini road was completed in December 2010. This increased the bitumen road network in the county to 297 kilometers (Ministry of Roads and Public Works, 2004). This has greatly improved the County's road accessibility network and

enhanced agricultural farming activities in the County. It connects to the old tarmac road that runs from Fly Over on the Nairobi-Nakuru Highway at Njambini. Along this road, there are observable heightened horticultural and entrepreneurial activities. The road has facilitated farmers' access to various markets for the horticultural produce. Farmers tend to scramble for the available land along this particular road due to easy sale of their produce to either wholesale trades or direct market especially to Nairobi and externally.

3. Literature review

3.1 Horticulture in Kenya

Horticultural crops are rich in vitamins, carbohydrates and other nutrients which constitute a major portion to a Kenyan daily dish mix. Indeed some nutritional vitamins like A and C, and iron can be derived from eating selected vegetables and root crops as well as fruits. Root crops particularly potatoes and sweet potatoes are used as staple food in some areas of the country. These crops often serve as security food crops in several regions of the country. Root crops and vegetables are sold at various open markets, supermarkets and along the Kenyan highways. Open market sales of these crops in small and medium urban centres at the rural areas indeed constitute a major source of the small scale farmers' incomes. Therefore, the small scale horticultural farming is substantially critical in enhancing rural incomes in the country.

Notwithstanding the importance of this sector, horticulture production in Kenya, and in particular in those Counties with the potential, has been hampered by the generally poor road network. State of the road network has a spillover effect on all the other associated challenges. Better roads obviously lead to reduction of inputs prices such as fertilizers, seeds, and enhances extension services (Hossain & Ahmed, 1990, Dercon, Hoddinott, & Woldehanna, 2007) due to reduced transport costs. On the output side better roads increases direct on-farm investments which again raise horticultural production (Khandher, Rosenzweig, & Binswanger, 1993) which further translates to high incomes and better living standards in a predominantly rural setting. Poor road networks lead to inaccessibility by the small scale horticultural farmers to the market. Other than the problems associated with the state of the road network, the small scale horticultural growers also face even more challenges which include; inadequate or lack of rainfall resulting to low yields or total crop failure, inadequate or inaccessibility to the market information, leading to poor timing of crop production, lack or inadequate capital coupled with increased cost of production due to the rising cost of production inputs, inaccessibility to credit facilities from financial institutions due to lack of appropriate collaterals and lack of storage facilities. All these challenges affect the economic livelihood of these growers in terms of low or no incomes.

Horticultural production has been indicated as a sector that can provide real opportunities for enhancing farm incomes and reducing poverty in developing countries. The sector provides good opportunities for increasing rural area incomes, improving nutrition of the people, diversification of exports, provision of raw materials for agro-based industries and creation of employment especially for the youth and women. The horticultural sector has great potential for making significant contribution to a country's foreign exchange earnings (Bafokuzara , 1990). Effectively, the sector is particularly important in enhancing national food security and income generation for the small scale horticulture growers who are in the rural areas. The ability of the small scale horticultural farmers to earn from horticulture production has a direct bearing on their economic livelihood in terms of enhanced incomes. This therefore implies that those factors which determine successful performance of this sector should be examined with a view of finding appropriate positive intervention measures. It should be noted that other than the critical issue of availability of good road network, availability and affordability of factor inputs is essential to the farmers.

Therefore for the purpose of this study, specific factor inputs were examined in terms of their importance to the horticultural sector development in Kenya. Seed and planting materials are the most important inputs in agricultural production (Tschirley & Ayieko, 2008). Horticultural farmers in the Country often receive their seed requirements through two seed systems. There is the formal seed production system, which is controlled through a government regulatory authority; Kenya plants Health Inspectorate Services, (KEPHIS), and the informal seed system. Whereas the formal seed system is an important source of high quality certified seed, it is usually not able to meet the farmers' demand. Majority of farmers therefore rely on the informal seed system for seed and planting materials for most of their agricultural commodities. Access to quality and affordable seeds and planting materials is indeed critical as evidenced by the Kenya's Strategy for Revitalization of Agriculture (SRA) report which shows that one of the six activities aimed at improving performance of the agriculture sector is to improve access to quality inputs (seeds and fertilizers), and financial services (Ministry of Agriculture 2004) to the farmers. Basically the key issues considered when analyzing the contribution of seeds to horticultural production are the availability, price and quality. Seeds have to be available at the right time and should be affordable to enhance quality horticultural production (Nyoro and Ariga, 2004).

Labour is also one of the factors of production which includes both physical and mental human labour. In Kenya notably small scale horticultural production is a labour intensive venture. According to Humphrey, (2006), some horticultural produce are attractive to small scale horticultural farmers because they are labour intensive and may largely rely on family labour which is less costly. This may mean that even though in most cases, the households

provide the labour, the overall expected gain in labour savings may not be sufficient enough to make the small scale horticultural farmer competitive against the large scale farmer. Nevertheless, labour gain in terms of cost savings, is an important factor which may influence the small scale horticultural farmer's economic livelihood. Indeed during the production phase, there are instances when production is high and labour demand is high which necessitates hiring of extra labour from outside the family. Sources for this hired labour, is largely from neighboring households or immigrants from other geographical areas. Small scale horticultural farmers are constantly faced with the choice of either to work in the farm or off farm, and as Christopher, (1977) observes, the earnings for agricultural labour is often lower than for other sectors which implies that when there is competition for labour between the horticultural production and other sectors outside the agricultural sector, there are high chances that horticultural sector will be affected in terms of the number of workers willing to work in the sector.

Use of certified fertilizers and agrochemicals also contribute significantly to the increase of horticultural output and obviously the cost of these inputs constitutes a sizable component of the cost of horticultural production. A study by the ministry of agriculture in Kenya, (Ministry of Agriculture, 2010), indicated that fertilizer and agrochemical stockists cited high costs of these inputs as one of the constraints leading to low stock levels and subsequently low intake by farmers due to insufficient stocks. Consequently the farmers resort to the use of manures and uncertified fertilizers which results to low production or crop failure. This significantly affects the output levels for the farmers and hence experience low incomes which evidently illustrates the importance of fertilizers as a factor input for this sector.

Inadequate capital and limited access to affordable credit hampers development of the small scale horticulture farming in the country with consequential effect of low productivity. High interest rates make it difficult for the small scale horticultural farmers to access the necessary credit. Therefore the need for these farmers in Kenya to access affordable credit is vital if positive development of this sector is to be realized. Largely this is a major constraint to the small scale horticultural farmers in the Country who tend to seek the required funds from the informal sources including village lenders and relatives which often is unavailable amid minimal or no personal savings by these farmers.

Availability of adequate land size is an essential factor of production in any production process. Land is a resource used in farming, like other inputs like labour and capital and as Cowling, Metcalf, & Rayner (1970) observes, land as factor of production is fixed in supply. Agricultural land is obviously in constant competition with ventures such as urban development, and is affected by continuous deterioration due to climate change and poor farming systems. As a result of such circumstances, there is a high demand for agricultural

land which effectively leads to a rise in the value of land. The Kenyan experience is that land which is appropriate for horticultural activities (with adequate rainfall) is in high demand and is therefore a major challenge. Land with inadequate or lack of rainfall for the horticultural activities results to low yields or total crop failure.

Notwithstanding these challenges, it should be noted however that, because of their high perishability and quality loss, horticultural crops require more efficient marketing systems. Horticultural crops like other crops are basically marketed through wholesale and retail markets. Wholesale markets are mostly located in the urban centres where vegetables and potatoes are sold to retailers and individual consumers. The retail markets basically involve supplying the horticultural crops to the various segments of consumers in the urban areas and according to Harman and Shawl (1985), these selling outlets include road side places (Kiosks) and open markets. Supermarkets in urban centre also act as retail outlets not forgetting that hawkers also sell the produce by walking around streets in the urban centres. Horticultural crops are also marketed by individual farmers who produce and pack the produce then sell to individual consumers, retailers or wholesalers. The other marketing channel involves brokers who enter into contacts with individual farmers allowing the farmers to sell to them who in turn sell to the retailers and wholesalers in urban centres or may sell to exporters.

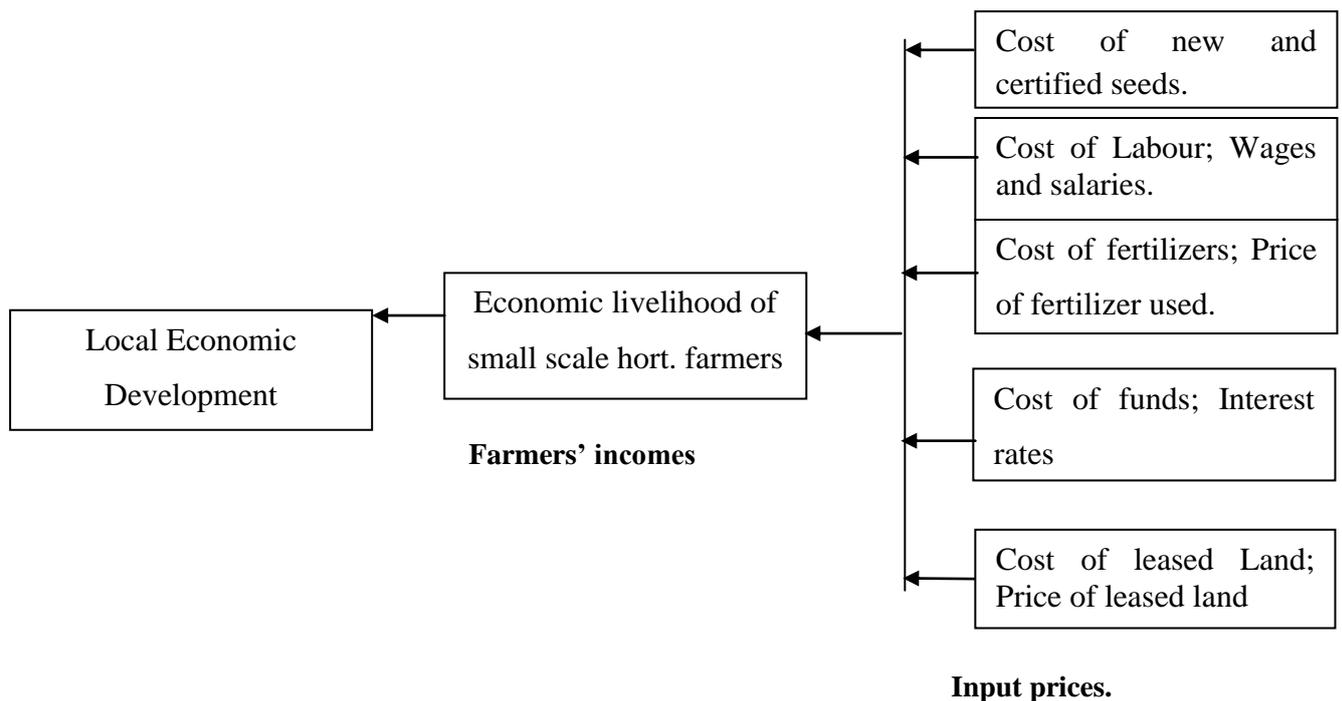
Effective production, processing and marketing systems of horticultural crops, like any other crops in Kenya, are critical to the sector's development. The small scale horticultural farming is of particular interest in terms of its development which allows minimal initial startup investment. The subsector plays a significant role in enhancing the income earnings capacity and to some extent the nutritional status of the people. Further, the subsector provides employment opportunities for the locals as it is mainly labour intensive and enhances the livelihoods of the people and especially the rural population. Small scale horticultural farming in Kenya is continually gaining prominence along the highways due to the easiness to market access which implies that good road net work is an essential developmental stimulus for the sector. It is also a fact that availability of affordable factor inputs such as certified seeds, fertilizers, human labour and appropriate funding play a critical role to the subsector's development. This therefore forms an appropriate and viable investment opportunity for the Kenyan Counties with good climatic conditions for small scale horticultural activities for the rural population.

In conclusion the literature presented here does show the importance of the horticultural sector as an economic activity and the challenges faced by the farmers. Successful performance of this sector means that farmers will experience effective and efficient production, processing and marketing processes of horticultural products. Consequently, farmers will in turn receive enhanced incomes from the horticultural farming activities which

then will enable them enjoy good life in terms of access to the basic family needs. Therefore the economic livelihoods of small scale farmers as measured in terms of the farmers' incomes can be experienced at the local level as a result of such small scale horticultural activities. The levels of the farmers' incomes have a consequential effect on the peoples' quality of life which also impacts on the local economic development. This study therefore explores this relationship by way of looking at the impact of the input prices in horticultural production on the small scale farmers' incomes and by extension their economic livelihoods. This relationship can be viewed within a conceptual framework which illustrates the effect and impact relationship in which the identified input prices affect the income levels of the farmers (livelihoods) which in turn impacts on the local economic development.

The conceptual framework basically summarizes this relationship between the changes in input prices and the small scale farmers' incomes. The input prices are the explanatory variables (independent variables) while the farmers' incomes are the explained (dependent variable) in this causal relationship as shown in the diagram below.

Figure 1: Effect and Impact relationship



Source: Author's illustration based on the literature and study objective.

4. Methodology and Data

This study was an exploratory research using a case study to investigate and understand the impact of the input prices on the small scale horticultural farmers' incomes. The objective of a case study is usually aimed at obtaining multiple perspectives of a single organization, situation, event or process at a point or over a period of time (Cooper and Schindler, 2006).

The research used descriptive research design. A stratified random sampling procedure was used in selecting the respondents. A total of 480 respondents of small scale horticultural farmers, input dealers, agricultural officers and Horticultural Crops Development Authority (HCDA) officers were identified for this survey with 426 positive responses which represents a response rate of 89 percent. Out of the 426 respondents, 91.1 percent were small scale horticultural farmers, and the remaining 9.9 percent were other stake holders (Agricultural officers, input dealers and HCDA). The small scale horticultural farmers' proportion constituted 62.3 percent females and 38.7 percent males of which 82.6% were residents along the highway. The study also used interview schedules and focused discussions to collect data from government and institutional officers at the area of study. Data which was collected using questionnaires was both quantitative and qualitative. Quantitative data was analyzed by descriptive statistics while qualitative data was analyzed through content analysis. The data analysis was done using Statistical Package for Social Sciences (SPSS).

5. Results

Given that the study focused on exploring the impact of the input prices on the small scale horticultural farmers' incomes, it is important to note that the critical household characteristic considered was whether a farmer was male or female. Cost of horticultural farming from the perspective of the input prices is not influenced by other household characteristics like education, gender, age and household size amongst the common ones. The proportion of farmers who were identified as male or female however illustrated a consistent trend where more women than men are involved in small scale horticultural farming. This confirms the common feature on the ground where more women are involved in horticultural activities especially vegetables and root crops such as potatoes in the Kenyan case. This explains the cultural aspects of society where women tend to be more involved in vegetable farming within their homesteads which is a basic concern for them in terms of sustaining vegetable security in homes. This also points to the fact that habit or hobby would be an effective source of an income generating activity such as small scale horticulture farming.

Based on the principal objective of the study, the study results showed that 109 (29.3%) of the small scale horticultural farmers paid a total of Kenya shillings 1,500 for a 110 Kg of potatoes seedlings, 82 (27.6%) paid shillings 200 per kilogram of garden peas, 76 (21.2%) paid 3,200 shillings per kilogram of cabbage seeds, 60 (13.8%) paid shillings 3,300 per a kilogram of carrot seeds while 49 (8.1%) paid a total of 50 shillings for a bunch of 10 green house tomato seedlings as shown below;

Table 1: Average Amount Paid for certified Seeds

	Frequency	Percentage
Ksh1,500 for a 110 Kg	109	29.3
Ksh 200 per kilogram of garden peas	82	27.6
Ksh 3200 shillings per kilogram of cabbage seeds	76	21.2
Ksh 3,300 per a kilogram of carrot	60	13.8
Kshs 50 for a bunch of 10 green house tomato seedlings	49	8.1
Totals	376	100

Source: Field data

This response was corroborated by the District Agricultural officer for the area who gave similar results on the prices for the horticultural crops seeds and seedlings. The officer also concurred that the average price of the seeds sold to the small scale horticultural farmers was high. This implies that farmers tend to use of uncertified seeds which they themselves preserve from the previous crop harvests. This was particularly so with farmers who were employing between 1 and 5 employees with cultivated area of below 3acres. This approach obviously has negative impact on the quality of the horticultural produce and subsequent low market prices.

On labour demand, the study established as at table 2 below that, 4% of the small scale horticultural farmers (cultivating 10 acres) employed 9- 11 employees, 22% of them (cultivating 5 acres) employed 3-5 employees , 7% of them (cultivating 7 acres) employed between 6-9 employees while 67% of the farmers (on less than 3 acres) employed between 2-3 employees.

Table 2: Number of Employees hired

Cultivated area	Number of employees hired	percentage
Cultivating 10 acres	9-11	4
Cultivating 5 acres	3-5	22
Cultivating 7 acres	6-9	7
Cultivating less than 3 acres	2-3	67

Source: Field data

It was further reported that during the previous three years the trend in demand for labour for the respective farmer scales was; farmers cultivating 10 acres in 2010 employed between 5 to 6 employees, in 2011 they employed between 6 and 8 employees while in 2012 they employed between 9and 11 employees. Those farmers cultivating 5 acres in 2010 employed

between 2 and 4 employees, in 2011 they employed between 3 and 4 employees and in 2012 they employed between 3 and 5 employees. Farmers cultivating 7 acres in 2010 employed between 4 and 5 employees, in 2011 they employed between 4 and 6 employees and 2012 they engaged between 6 and 9 employees while those cultivating less than 3 acres in 2010 employed between 1 and 2 employees, in 2011 they employed between 2 and 3 employees and in 2012 they employed between 2 and 3 employees. This trend showed a general increase in demand for labour which reflects a scenario where demand for labour rises with an increase in the area under horticulture production with consequential rise in wages and salaries. Therefore, as a result of high wages and salaries, farmers especially those cultivating less than 5 acres tended to utilize family labour which incidentally attracted lower pay.

It was also established, as shown on table 3 below that, majority of the respondents (67%) lease a maximum of 3 acres, 22% lease a maximum of 5 acres, 7% lease a maximum of 7 acres and 4% lease a maximum of 10 acres all at a cost ranging between Kenya shillings 7,000 to 10,000 per acre per year depending on the proximity to the road.

Table 3: Number of acres leased

Number of acre leased	Percentage of respondent
3 acres	67
5 acres	22
7 acres	7
10 acres	4

Source: Field data

Because of the yearly increase in the cost of leasing an acre of land, a small percentage of small scale horticultural farmers manage to acquire an acreage of more than 7 acres and hence experience difficulties in breaking even with their operations. Therefore the study established that most of the farmers (over 65 percent) tend to concentrate on 3 acres for intensive cultivation and a portion of them tend to cultivate along the official road reserve in which case they risk their investments.

Purchasing of land by the horticultural farmers along the developed highways is the best alternative to leasing. The study established that whereas farmers would prefer to own their own land as opposed to leasing, it was far beyond their reach due to high purchase cost. It was reported that cost of buying land along the Dundori-Olkalou-Njambini road averaged between Ksh 500,000 and Ksh 800,000 per acre notwithstanding the fact that land owners in the subject area are largely unwilling to dispose off their family land.

On the cost of fertilizers, it was established that, the average price for DAP was Ksh3, 500 for 50kg, CAN was Ksh2, 200, Foliar sprays 23:23:0 was Ksh3, 300, and Foliar sprays 17:17:17 was Kshs2, 700 as shown on table 3 below;

Table 4: Cost of fertilizers

Type of fertilizer	cost
Dap 50kg	Sh3,500
Can 50kg	Sh2,200
Foliar spray 23:23:0 50kg	Sh3.300
Foliar spray 17:17:17	Sh2,700

Source: Field data

These are on average very high prices for the small scale horticultural farmers in the area. Those farmers, who tended not to purchase certified fertilizers and pesticides due to the high prices and resorted to use of animal manures and traditional pest control methods, did not receive good harvests to warrant profitable small scale horticultural farming.

The study results further established that commercial banks were the most popular financial institutions among the stockists and distributors of farm inputs. From the study findings, out of the 24 respondents, 14 (57.1%) of the stockists and distributors provided credit lines to small scale horticultural farmers through commercial banks, 7 (28.6%) through farmers' cooperative societies while, 3 (14.3%) through investment groups as shown on table 5 below.

Table 5: Financial institutions

Financial institution	Number of stockists and distributors	percentage
Commercial banks	14	57.1
Farmers cooperative	7	28.6
Investment groups	3	14.3

Source: Field data

The banks, savings and credit societies and investment groups which are the preferred channels of financing by the stockists, charge interest rates ranging between 12% and 25%. The high preference by the stockists and distributors for commercial banks and these other formal institutions is due to their formal lending structures and reduced credit risk in cases of default by the small scale horticultural farmers. This is however expensive for the farmers as they have to pay the credit at the prevailing interest rates which are often high. There is also the issue of appropriate collaterals required by banks for them to extend the credit facilities. In the circumstance, the study established that these small scale horticultural farmers relied on the village money lenders, relatives and personal savings for their financial needs which is a fairly inadequate form of financing of their activities.

6. Conclusions

This study investigated the impact of input prices on the small scale horticultural farmers' incomes in Nyandarua County of Kenya. The study was motivated by the fact that small scale horticultural farming is experiencing significant growth along the highways and the fact that this is an economic activity which largely benefits the low income groups in society. The study was also motivated by the fact that good road network, which appear to be attractive for the small scale economic activities, is critical to local economic development. Infrastructural development is of particular interest to the Kenyan Counties which are out to identify potential investment areas and opportunities for the locals and other investors with the resultant potential growth of employment opportunities in those regions.

It was observed that the majority of the small scale horticultural farmers were women (62.3%) while 38.7% were men all of whom engaged themselves in the cultivation and sale of various types of vegetables, root crops (Irish and sweet potatoes) and some fruits (passion, oranges and pineapples). Majority of these small scale farmers (82.6%) were reported to be resident within the proximity of the highway.

The study findings are that cost of inputs used in horticultural farming are significantly high and affects the economic livelihood of farmers in terms of the amount of income earned from the sale of their horticultural produce. The small scale horticultural farmers experience difficulties in acquiring these inputs which are fairly expensive and often necessitate use of uncertified seeds and fertilizers at the expense of product quality.

Indeed from the study, all the mainly used production inputs in small scale horticultural farming have significant impact on level of the farmers' incomes (livelihood of the farmers). High prices of these inputs reduce the level of farmers' incomes which further affects their ability to cater for their family needs. It therefore critical that focused support mechanisms for the sector are formulated and implemented to support the farmers and also attract more to the sector so as to upscale horticultural farmers' activities and especially in the Kenyan Counties. It may for instance be appropriate to support the farmers by enabling them access relatively cheap source of funding (eg Women Enterprise Fund, Youth Enterprise Development Fund, Uwezo Fund) for their activities and consequently reduce on the cost of farming.

The findings, further established that certified seeds distributed to the small scale horticultural farmers had a high potential to influence their economic livelihoods in terms of quality produce which translates to high incomes received. Certified seeds are disease and pests resistance, which makes it possible for farmers to incur less or no costs in trying to control diseases and pests. The study results thus suggest that necessary farmer training and information services be provided on the usefulness of certified seed.

Hired labour was reported to be a significant component of cost of horticultural crops production. Therefore small scale horticultural farmers need to explore appropriate ways and means of mechanizing some of their operations so as to reduce the reliance on hired labour. Therefore, appropriate support mechanisms such as subsidized credit would be availed to farmers to acquire some of the basic machineries necessary such as spray and product processing machines and hence reduce on the number of persons employed.

The study found that there was increasing pressure on the available land for horticulture production. This was evident from the fairly high purchase and lease prices that raged between Ksh 500,000 and Ksh 800,000 per acre when one wants to purchase and between Ksh 7,000 and Ksh 10,000 per acre when the option of lease is taken. As a result, more small scale horticultural farmers are leasing land of less than three acres for production which is not viable in terms of earnings. In this regard there should be deliberate and practical approach to small scale horticultural farming which should entail training the small scale horticultural farmers on optimal land use methods to maximize on the available land. Ideally the small scale farmers would need to look at production per square unit of the available land for efficiency purposes and crops to be cultivated need be those that give the highest return per square unit of land instead of cultivating the various crop varieties as was witnessed.

The seeds and fertilizer stockists and distributors are part of the network that ensures input security. Creating good distribution networks and good credit terms, implies that the small scale horticultural farmers will be able to access these factor inputs on time and in an affordable manner. It may also be necessary to consider subsidies on fertilizer and seed prices so as to make them much more affordable to the small scale horticultural farmers. On packaging, it was observed that the packages of fertilizer are large and expensive at 50 Kg and not appropriate for the majority of farmers wishing to use an average of 20kg. It is recommended that repackaging into small packets be considered so as to make them more accessible to this larger section of the small scale horticultural farmers. This however does not necessarily lead to absolute price reduction on the fertilizer but it is basically the issue of affordability in terms of the quantity of fertilizer based on the cultivated area. Therefore the fertilizer distribution system which guarantees availability and affordability implies efficiency in crop production and income earnings (assumed) which would in turn lead to enhancement of economic livelihoods of small scale horticultural farmers with positive consequential effects on the local economic development.

Finally as already mentioned, the study established that interest rates charged by banks, savings and credit societies and investment groups on short term loans ranges from 12% to 25%. These are on average very expensive rates, especially the rates charged by commercial banks, particularly given that these farmers may need to borrow twice in a year to be able to

effectively produce. The study results therefore suggest that the small scale horticultural farmers be encouraged to join the farmers' cooperative societies so as to access loans that are more affordable. Farmers may also access subsidized loans through established special social funds such as; Women Enterprise Fund, Youth Enterprise Development Fund, Uwezo Fund to ease the financing burden.

Notably Kenya has a high horticultural farming potential in many regions and should be supported in terms of collaborative efforts by both national and county governments. It is a sector which has the potential to provide employment opportunities especially to the majority rural poor. The sector can also be a good source of food self sufficiency at the local and national levels and enhance income earnings for the farmers which will improve their economic and social wellbeing with positive bearing on local economic development. Development of good road networks especially the bitumen road networks appear to be essential economic development stimulus in both the rural and urban setups for any economic activity.

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