

The Socio-economic and Ecological Impacts of the Agro-industrial Food Chain on the Rural Economy in Kenya

The globalization of the agro-industrial food chain in Kenya can be traced back to the restructuring of the international division of labor. The current global agro-food industrial system entails aspects of a complex international division of labor, whereby the South specializes in high-value “non-traditional” exports, while the North concentrates on low-value cereal exports. In their contribution towards global change the relationships between agriculture and industry, and urban and rural areas are inextricably linked. The dynamics of these linkages form a crucial part of this process of globalization. This article examines the impact of the globalization of the vegetable commodity chain on the rural economy in Kenya. This has led to the establishment of multinationally-owned vegetable canning firms in Kenya which are geared towards the international markets, which in turn link up the rural economy in Kenya, with other global players through contract farming, and the manufacturing production chains. The implications of these processes on the rural economy, include environmental degradation, food insecurity, and aggravation of income inequalities among the Kenyan producers.

INTRODUCTION

This study traces the vegetable food processing chain in Nakuru and Vihiga Districts in Kenya, in assessing its impact on their rural economies. Both Nakuru and Vihiga districts are found within the high potential agricultural zones of Kenya and are thus suitable for the growing of vegetables, particularly French beans. The food processing chain model which is used as a conceptual framework in this study presupposes the existence of complex industrial linkages in the food industry. This is due to the fact that labor along the food chain is increasingly being shared by a number of different economic actors with varying expertise. It is no longer useful to examine only the linkages but also the social fabric within which these linkages take place (1–6). This implies defining the agro-industrial food chain in terms of the concepts of *filière* and *complexe*. The term *filière* refers to material flows through the agro-industrial food chain, and consists of vertical, horizontal and diagonal linkages, (or simply production chains). In this way, all important linkages can be taken into consideration in the model. The *complexe*, on the other hand, specifies the social organization of production, and the mutual relations among actors involved in the *filière*. This model underscores the importance of hierarchical relationships within the agro-industrial food chain.

The vegetable *filière* in Kenya is an off-shoot of the larger fruit and vegetable *filière*, and can be directly linked to the restructuring of the international division of labor. This *filière* which is totally dependent on the export market, mainly involves French beans. The impact of the internationalization of the vegetable agro-industrial food chain has been felt as far as Kenya, linking it up with other global players through contract farming, and the manufacturing production chains (Fig. 1). More specifically, industrial restructuring in the food industry at the global level has led to the establishment of multinationally-owned

vegetable processing firms in Kenya, which are geared towards the international markets. This reflects the increasing division of labor in this industry, whereby multinational food firms are increasingly “putting out” part of their production processes in the developing countries. Partly due to the high costs of labor in the industrialized countries and the costs of obtaining the raw materials from its source, while still in “fresh” form, these industries have had to restructure their production processes in order to maintain a competitive edge over most of their rivals.

The age of the vegetable food chain corresponds with the period 1970–90 when characteristics associated with globalization began to manifest themselves world-wide (7, 8). It is now well over two decades, since the initial linkage between Saupiquet (a French canning company) and Njoro Cannery in Njoro (Nakuru District) took place. But with liberalization of the economy in Kenya such linkages have been intensified and there are now other vegetable processing firms in Kenya producing under similar arrangements with other European multinational companies (Fig. 2). The arrangement between the Kenyan and mostly French firms, involves the former processing and canning or bottling the vegetables (with French beans making up 99%, and to a lesser extent chillies, paprika, beetroot and cabbage (1%)). The labels used on the products are brand name(s) of French firm(s), and these are usually made available on a film from which the local firm can then easily print them out. Once the vegetables have been manufactured, most of them are exported to the French firm, which is solely responsible for the marketing. The Kenyan firms are thus able to sell their products on the international market without having to meet the marketing expenses. However, they do this at the cost of not being able to sell their products under their own brand names, and thereby forfeiting any bargaining power that they could have had on the market. However, given the dominance of specific food firms on the international market, it is highly unlikely that these local firms could on their own make a breakthrough in such markets.

The complex of the vegetable *filière* that has evolved consists of dominant and often exploitative relationships. Starting right

Figure 1. The globalization of the agro-industrial food chain.

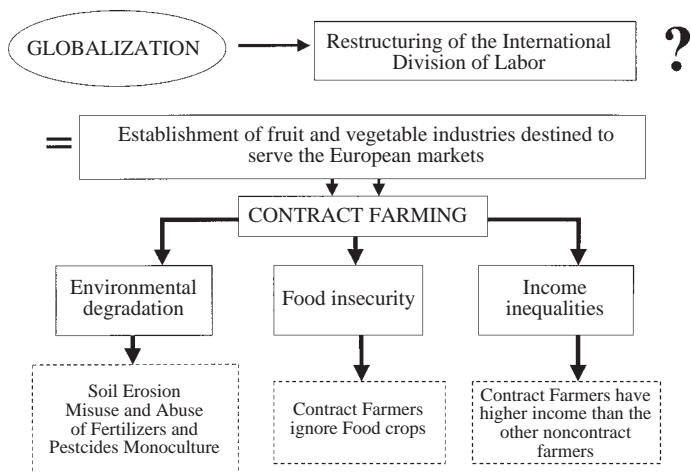
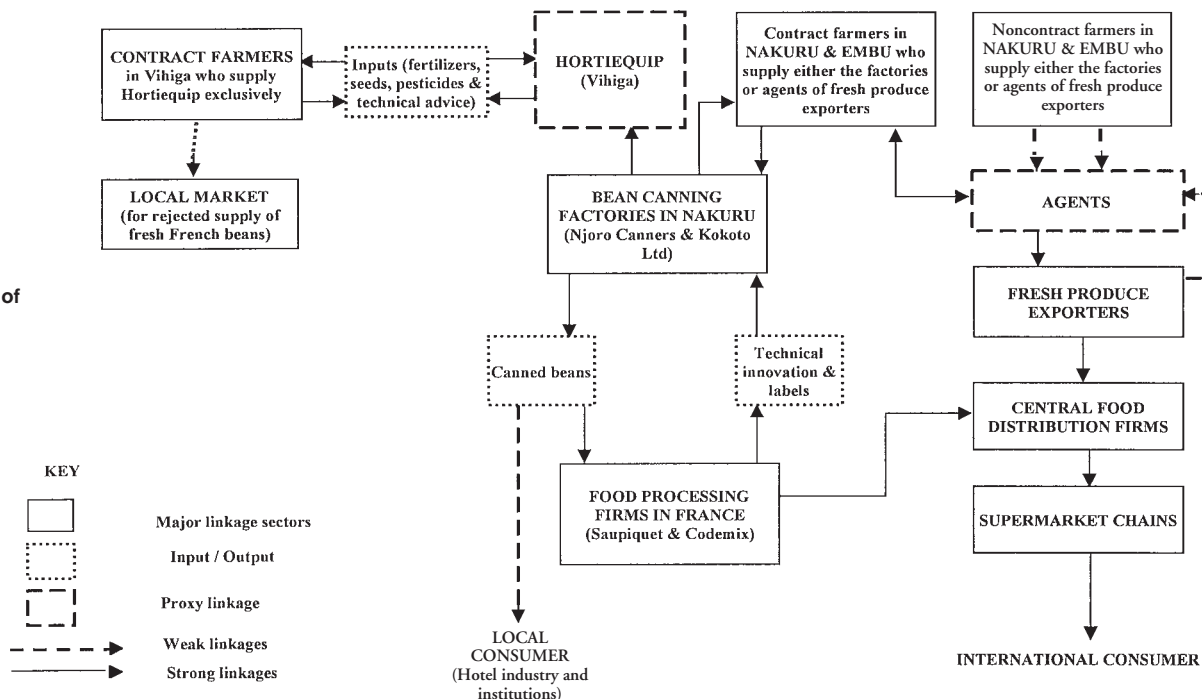


Figure 2.
Production and marketing linkages of French beans (18).



at the farm level, this linkage is primarily effected through contract farming, which by virtue of its nature tends to transfer the greater part of the risk to the farmer. Contract farming is a production system that consists of an agreement or an arrangement (formal or informal) between a grower and a contractor (these could be processors, exporters, agents, or state corporations). This agreement binds both parties to one or more specific market obligations, provision of particular inputs thus effecting some element of control at the production level. Generally (but sometimes this may not be the case), the contract states in advance the volume, value, quality, and price of the product to be purchased from the growers. The contractor, on the other hand, normally provides inputs on credit, farm machinery rentals, and advisory services. The contractor also has the right to reject products that she/he considers to be of poor quality. In the French beans sector symbiotic (9) contracts (as opposed to open-ended contracts, in which there is minimal interaction between the farmer and the contractor) are the norm. At this level, the farmer is not only exploited by the contractor but also by the agents (Fig. 2).

The major actors involved in the manufacturing process occupy different hierarchical positions on the agro-industrial food chain, and this is basically determined by their access to labor expertise, raw material inputs and markets for either their products or labor. For those employing labor, access to cheap sources of labor is necessary in maintaining a competitive edge over other players. At this level of the manufacturing chain, the factory laborers occupy the lower rungs of the power ladder. Their bargaining power is limited because of the large numbers of readily available labor. Possession of skills among the laborers thus influences the scope of opportunities open to them.

Those firms which are able to exert a certain amount of control over the raw material sources, make significant cost savings on production costs. In the agro-industrial vegetable chain, this is mainly achieved either by contract or corporate farming. Those firms which produce mainly for export and whose products are not easily consumed by the local market run the risk of making losses in case of market changes. Their dependence on the international market shows how helpless they could be in the face of depressed markets. The foreign firms on the other hand, although they have to meet marketing expenses do not undertake as much risk. So the pattern that emerges is one of risks being

shared among the key players along the food chain, with the players on the top echelons having comparatively diminished risks.

ENVIRONMENTAL DEGRADATION

The decision-making process has an intrinsic relationship with the socio-economic hierarchies and power relations regulating the utilization and conservation of natural resources. In this study, two key actors influencing the direction of ecological change were identified. At the farm level, the contractor lays down the production schedule for the farmer. By determining the type of crop grown and husbandry practices that the farmer has to adhere to, the contractor thus influences the impact that the agro-industrial food chain will have on the environment. The government, on the other hand, is the chief source of agricultural conservation measures (that is, advisory, financial, and material). The farmer's access to these measures is to a large extent determined by governmental policy. The direct role played by the farmer in such circumstances is thus greatly reduced. The political factor here is access to control of the resource "decision-making". Both the contractor and the government have a greater control over this crucial resource influencing ecological change than the farmer, since they occupy a "privileged" position in the realm of decision-making.

Soil Erosion

Approximately 30% of the land in Kenya has been affected by gradual land degradation, a scenario made worse by inappropriate land-use practices. The impact of this process has been disruption of the ecosystem, leading to soil erosion, lowering of water-tables, decline in land productivity, drought and destabilization of communities in search of food and security (10).

An analysis carried out in the field by the author, of the farmers' perception on the limiting factors that they encounter in crop production, indicates that soil erosion is one of them. This factor is then isolated in order to calculate the proportion of these farmers, and the results show that only one-fifth of them perceive soil erosion as a problem. Later on all the farmers were asked whether they experience soil erosion on their farms. The results obtained show that one-third of the farmers acknowledge the existence of soil erosion on their farms. This figure is larger

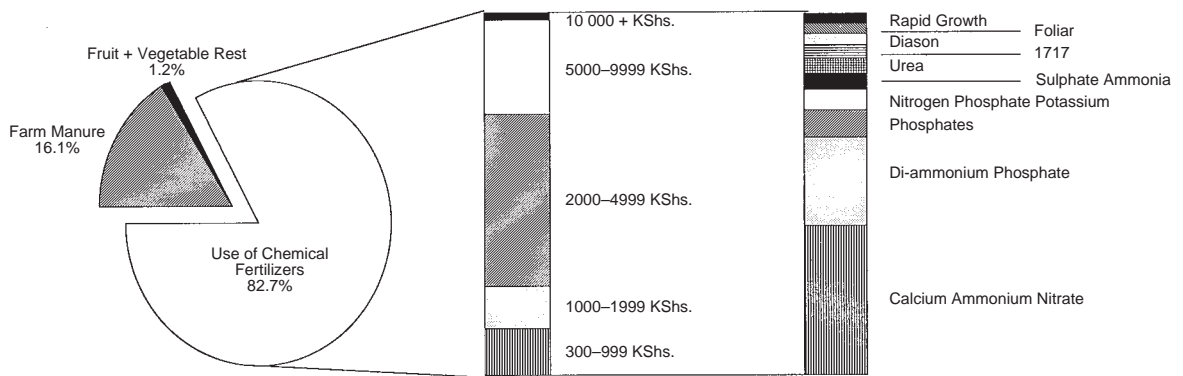


Figure 3. Fertilizer usage and costs (n = 394) (18).

than the one-fifth who saw it as a production problem. This implies that although about 30% of the farmers experience soil erosion, 10% of them do not see it as a problem which limits crop production. The way in which farmers perceive soil erosion has important ramifications for the efforts that they make towards rectifying the situation. Certain studies (11, 12) have shown that farmers who perceive soil as a problem are more likely to adopt soil conservation measures than those who do not. However, as these results indicate, not all those farmers who experience soil erosion on their farms see it as a problem. This suggests that the existence of soil erosion alone is not the only factor influencing the farmers' perception of the problem and the efforts to eliminate it (for a more elaborate discussion see ref 12).

Where soil erosion is acknowledged as taking place, it is a chronic problem since almost two-fifths of the farms have been experiencing it for the last 20 years. The implication here is that, this group of farmers is likely to pay more attention to the issue of soil erosion control than the other farmers.

Some of the most commonly applied soil erosion control measures include terrace farming, building of gabions, and cover-crop farming. The soil conservation methods utilized give an indication of how soil erosion manifests itself. In this instance, terraces are needed in slopes with easily erodable soils. This suggests that in some of the farms cultivation takes place on steep slopes. The building of gabions is commonly used in areas that have been subjected to gully erosion, an indication that some parts of the study area suffer from this type of erosion.

However, even those farmers who are more perceptible towards the problem of soil erosion do not necessarily apply soil erosion control measures on their farms. This is because most of them cannot afford to carry out these measures and have to rely on the external sources such as the government for assistance. The farmer's efforts towards effective soil erosion control are therefore limited to the type and amount of assistance provided. This greatly diminishes the farmer's role and yet she/he is supposed to be the central actor. The ramifications that this

Table 1. Environmental implications of the agro-industrial food chain (18).

Farming	Implications
Monoculture	– depletion of valuable soil nutrients
Farming on steep slopes	– soil erosion
Fertilizers	
(i) ammonium-based fertilizers (e.g. DAP and CAN)	– release of ammonium gas (especially when applied to dry soil), which is toxic to seedlings. – may increase soil acidity, especially when applied to moist soil.
(ii) fertilizer runoff and leaching	– the entry of the runoff into waterbodies may encourage the growth of water plants and thereby clog rivers, streams, lakes, and swamps.
Pesticides	– unreliable standards of the suppliers of pesticides and local misuse pose threats to the ecology, human health, and long-term economic sustainability. – mislabelled or adulterated pesticides have been exported to Kenya. – some of the chemicals used in Kenya have been banned or their use is restricted in their countries of origin. – can affect non-target plants and animals. – human pesticide poisoning (in 1989 it was estimated that there were 2184 such cases per year in Kenya). – increase in pollution of ground and surface waters
Manufacturing	Implications
Water pollution	– large volumes of wastewater. – has raised the biochemical oxygen demand in Kenya. (BOD) to more than 100 mg L and has also lowered the dissolved oxygen thereby killing fish. – highly biodegradable effluents make it relatively easy and inexpensive to treat the wastewater. – high concentrations of fats, oils and greases which are difficult to remove to acceptable levels for direct discharge into waterways.
Solid waste	– large quantities of solid materials as a by-product, however, recoverable as fertilizer or animal feed. – highly perishable wastes which cannot be stored for a long time.
Air pollution	odors from processing operations if not properly operated and maintained.

has had on the environment is evident, particularly among the small-scale rural farmers in Kenya.

Use and Abuse of Agrochemicals

The importation and usage of agrochemicals (fertilizers, pesticides, herbicides, and fungicides) in Kenya has increased rapidly since the early 1980s. This is also reflected in contract farming, where it was established that two-thirds of the farmers only started using fertilizers and pesticides when they became contract farmers. The consequences of the use of agrochemicals has two "faces". Through its usage, agricultural productivity has been significantly expanded. Many pests that previously jeopardized crop production have been brought under control. Crops can now be produced in regions where it was thought impossible, thus, curbing or arresting disastrous crop losses. The greater predictability with which crop production can be managed has led to greater commercialization of the farming economy (13–16).

On the other hand, agrochemicals can adversely affect human health and the environment in a number of ways. Pesticides that are toxic for man and other forms of life may be harmful if not used properly. In some instances, their application often extends to other areas not intended for their use. For example, they may find their way into aquatic ecosystems and contaminate the life

there. The presence of chemical residues in the crops being protected can be potentially harmful. Major food importing countries have standards specifying the maximum permissible levels for named pesticides, which determine whether food imports can be accepted into their food chains or not. According to Ward and Munton (14), "most new pesticides are 'broad spectrum' compounds which act upon a range of pests rather than specific target organisms". The natural in-built protection of the ecosystem could thus be destroyed. This indicates that those parasites which were kept in check by such predators could easily develop into pests. Therefore, the misuse or abuse of agrochemicals can have adverse effects on the environment (13, 14, 16).

Fertilizers

The primary types of fertilizers that Kenya imports include Di-ammonium Phosphate (DAP) for planting, Calcium Ammonium Nitrate (CAN) for top-dressing, Nitrogen Phosphate Potassium and Super Phosphate. These are the ones that were also commonly used by the farmers in the study area (Fig. 3). The impact of these fertilizers on the environment is presented in Table 1. Only a small minority of the farmers seem to be aware of the side effects of the fertilizers that they use. The contractor does not provide such information as part of the contract package. This small minority of farmers was then asked how they came across this information. For more than half of them (Fig. 4) it was through experience, for example, the tomato farmers in Bahati Division of Nakuru have had to learn the hard way, that unregulated usage of the fertilizer DAP on their already acidic soils increases acidity and eventually leads to poor yields.

Pesticides

The proper use of pesticides takes on significant meaning in Kenya especially with quality regulations and requirements for horticultural imports under review in the European Union (EU). For instance, the Maximum Residue Level(s) (MRL) is currently being examined for all active ingredients (ai's) in all crops with the intention of setting a MRL for all crop/pesticide combinations. So far, a uniform standard of MRLs for 103 ai's have been set. In addition to this, there are also the National MRLs for other ai's/crop combinations. Therefore, the exporters still need to know each individual EU country's full list of MRLs. Any imports not measuring to the MRLs standards will be banned in the EU (16).

Some of the pesticides still being used in Kenya have been banned in Europe. This is particularly important for those horticultural crops such as French beans which are purely export crops. The high cost of environmentally sound agrochemicals causes a lot of farmers to avoid using some of those recommended, and to continue to use proscribed chemicals. But this can only be in the short term because testing for the maximum residue regulation has already begun in Europe, and produce found not adhering to this regulation will be rejected.

As part of the response to this situation, the Kenya Safe Use Project (KSUP) was established in 1991, to promote observance of the Food and Agriculture Organisation's Code of Conduct on Pesticides (CCP). This project is sponsored by major research-orientated agrochemical firms and managed by the International Pesticide Manufacturers' Associations. The project pro-

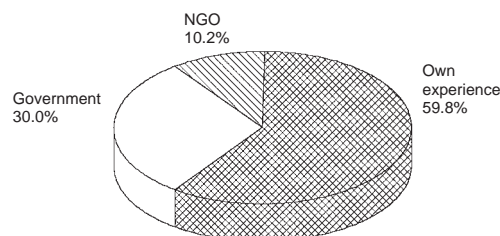


Figure 4. Source of information on the impact of agrochemicals (n = 294) (18).

vides technical information on the EU market. This information which is made available (to those in the horticultural industry) through forums such as seminars, is effected through the cooperation of the Horticultural Crops Development Authority (H.C.D.A.) and the Fresh Produce Exporters Association of Kenya (whose members are predominantly contractors) (17).

Data on the use of pesticides in Kenya was only recently made available by a field survey carried out by the GTZ and KARI in 1994. This survey, which was carried out among French beans, tomato and cabbage farmers, sought to identify the farmers' pest problems and to determine the degree of knowledge possessed by farmers on the selection, preparation and application of pesticides. The results of the survey show that almost 90% of the farmers interviewed used pesticides. Some of the results of this survey are presented in Table 2. The pesticides shown in the Table are representative of the main types utilized by horticultural farmers in Kenya.

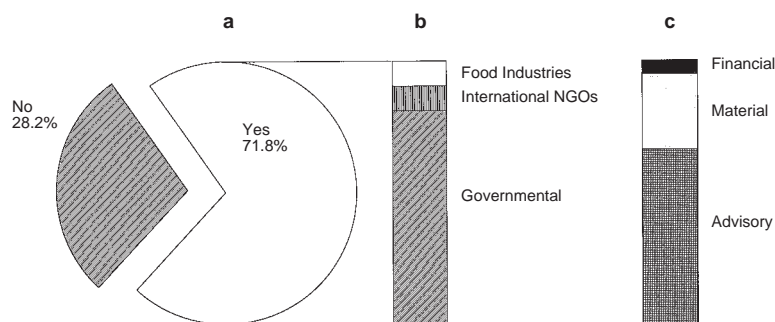
Environmental Management

Not all the farmers receive assistance in their efforts towards curbing soil erosion (Fig. 5a), and this mainly comes from the government (Fig. 5b). But even then governmental assistance is mainly advisory (Fig. 5c). The material assistance here refers mainly to the labor-intensive method (19). The government's material assistance has steadily been decreasing over the years, due in part to macro-economic financial constraints. It expects the farmers to also meet part of these costs. The assistance offered by the contractors is insignificant and is only offered by one type of contractor (that is the food industries), the others such as the Fresh Produce Exporters and the agents are not represented. This should be compared against the role of the contractor in prescribing the type of crops, conditions of production (that is, season, inputs and harvest time), and eventually the price to be paid. This leaves the farmer with very little room for her/his own decision-making, but when it comes to soil erosion control, the initiative is left to the farmer. Given that most of these farmers have never

Table 2. Common pesticides utilized by horticultural farmers in Kenya (18).

Pesticides	Crop	Legal Status
Insecticides		
Cypermethrin	French beans	Not registered for use in vegetables
Lambdacyhalothrin	French beans, tomatoes, brassicas	
Diazinon		
Carbonsulfan		
	Carbonsulfan is only allowed for use in crops with a waiting period (pre-harvest interval) of 51 days. French beans can be harvested after 42-45 days in some areas	
Deltamethrin	French beans	Registered for use in vegetables
Endosulfan	Tomatoes	
Dimethoate	Tomatoes, brassicas	
Malathion	Brassicas	
Fungicides		
Mancozeb		Registered for use in vegetables
Copper		Registered for use in vegetables
Propineb		Registered for use in vegetables

Figure 5.
a) Assistance in soil erosion management (n = 271);
b) Source of assistance (n = 271);
c) Type of assistance (n = 271).
 (Source 18).



grown contract crops before, and the possibility of cultivating contract crops on steep slopes, the contractor should take more responsibility towards the control of soil erosion.

Further analysis of the data concerning the perception of the contractor appears to confirm that they are not very much concerned about the possible relationship between soil erosion and contract farming. Most contractors interviewed felt that control of soil erosion is the responsibility of the government. Moreover, very few of them saw contract farming *per se* as having led to soil erosion (in spite of the effects of monoculture and cultivation of contracted crops on steep slopes). The farmers, on the other hand, view the situation differently and complain that the contractor does not usually provide all the information concerning contract crops, instead there is a tendency of emphasizing only the rosy side of the picture.

But the possible abuse of pesticides particularly in the horticultural sector appears to be taken more seriously by the contractors (as is evident by the active participation of the KSUP). The contractor is anxious to keep to the required MRLs, lest their products are rejected in the European markets. Indeed, farmers are asked to strictly adhere to type and amounts of prescribed agrochemicals, this is also part of the reason why the contractor

prefers to supply the agrochemicals used by the farmers.

Other groups, such as the government (through H.C.D.A) and non-governmental organizations (such as GTZ), are also more concerned with the use of pesticides. That these efforts have mainly been concentrated on the horticultural farmers underlines the importance of this sector to the Kenyan economy, and the international conditions necessary to retain the horticultural market. However, the impact of pesticide usage eventually affects the whole farming community (Table 1), and such efforts should be directed at all the farmers. Of course, there is the issue of the short-term economical viability of such efforts being directed at the less lucrative agricultural sectors. The long-term impact on the environment, however, outweighs the short-term costs.

Most of the environmental management efforts in the horticultural industry in Kenya have been influenced by consumer preferences in the industrialized countries. These consumers place great emphasis on "healthy" products, and this underscores the efforts made to keep the MRLs to the required levels. The foregoing analysis has shown how the misuse and abuse of pesticides in the horticultural sector has been drastically reduced within a short period of time. Lesser efforts on the other hand have been directed towards soil conservation measures, which

continue to be seen as the responsibility of the farmer and the government. The conclusion that can be drawn from this analysis is that, since soil erosion is not (yet) a critical factor in the marketing of the contracted crop, little or no attention is paid to it. This points to the lack of concern (for the environment) of decisions made at the global level by multinational corporations, which are interested only in reaping profits and maintaining the status quo of the dominant players, *viz.* multinationals and state interests.

INCOME DISPARITIES AND FOOD INSECURITY

Official statistics in Kenya define a small-scale holding as that having between 0.2 and 12 ha of land (15). Based on this definition then, the majority of the farms in the study area are smallholdings, but this classification does not tell us much about the income characteristics of the farmer. In order to circumvent this problem, this study in addition to the size of

Table 3. Classification of farmers (n = 394) (18).

Type of farmer	Size of farm ha	(%)	Annual income (KShs)	Total category (%)	Particular characteristics
Dependent-Subsistence	(0-0.49)	5.7	2000-9999	34.3	The term subsistence here does not imply that the farmer only grows crops purely for her/his own use, but rather to the small size of the land devoted to cash crops, which is reflected by the low income. Most of the farmers in this group rely on one cash crop only as a source of income, therefore, they are bound to be dependent on a contractor. Having no other alternative for income generation, these farmers can be easily manipulated by contractors.
	(0.5-1.99)	6.7			
	(2.0-2.99)	20			
	(3-3.99)	1.9			
Smallholder	(0.5-1.99)	20.0	10 000-39 999	60.0	These farmers are not totally dependent on one crop as a source of income, and do in effect have some latitude for making certain farming decisions. However, they cannot afford to be completely independent of the contract farming economy.
	(2-3.99)	36.2			
	(4-5.99)	3.8			
Independent-Smallholder	(2-3.99)	1.0	40 000-69 999	4.0	These are fairly independent farmers, who determine what direction their farming should take. Most of them are commercial farmers who rely on a number of farming activities to generate income. They may or may not participate in the contract farming economy.
	(4-5.99)	1.0			
	(6-8)	1.0			
Independent-Large-scale Farmer	(14-20)	2	70 000- >100 000	3	Are rarely involved in contract farming, and when they are it is on a more or less equal basis
	(40+)	1			

the farm also uses annual income as an indicator for categorizing the farmers. The size of the farm is then cross-tabulated with total annual income. The results show that the size of the farm does not always correspond with the farmer's income. Four basic groups of farmers could be identified (Table 3).

This analysis has shown that only 7% of the farmers can be considered as independent farmers (Table 3). Whereas, the majority of the farmers because of lack of other income-generating opportunities are forced to accept conditions of the contract about which they can do nothing.

The hiring of extra farmland—a phenomenon which is fairly common in extensive farming, for example, of sugar cane—does not seem to be a common practice among these farmers which further emphasizes their smallness and their intensive farming orientation which is characteristic of small farms. Only a minority of them (that is one-seventh) found it necessary to hire land on a seasonal basis. Smallholdings, appear to be a special feature of vegetable production—for example, in the cultivation of French beans and tomatoes—almost two-thirds of the farmers devoted 10 to 25% of their farms to the cultivation of vegetables. The mean and mode of the size of farms in this study is about 3 hectares, which works out to an average of 0.5 of a ha for the cultivation of such crops. But the pattern of size of such plots shows a skewed distribution with a positive kurtosis of 0.703 (Fig. 6), accounting for the extremes of, for example, the Lilliputian French bean plots in Vihiga of 170 m² on the one hand, and the larger farms in Nakuru of over 4 ha on the other hand. Generally, the cultivation of these crops is not usually economically ideal for the larger scale commercial farmer. Some of the few large-scale farms engaged in vegetable production are corporate-owned and were predominantly set up to serve the fresh vegetable export market and to a lesser extent the processing industry.

One reason which discourages the large-scale commercial farmer from cultivating some of the vegetable crops is the high input requirements such as labor and agrochemicals. For instance, the cultivation of French beans and tomatoes demand a relatively high labor input which is not commensurate with the economic returns. Some studies (21, 22) indicate that the cultivation of such crops is commonly seen as an option only by those farmers who neither value family labor at the market rate nor have any other cash crop production alternative. Indeed, most of the farms are either family owned or in single ownership (23) with access to unpaid family labor, which accounts for more than 50% of the labor employed. Some of the large-scale commercial farmers interviewed, on the other hand, had stopped growing French beans in particular and taken to the cultivation of other cash crops such as maize or the keeping of dairy cattle which require comparatively small amounts of inputs, but with fairly high economic returns.

The cultivation of labor-intensive crops is thus seen as a last resort, which only survives through the self-exploitation of the farmers' and their families' labor. The data on labor show that the farms are fairly labor intensive i.e. the majority of the farms employ an average of at least two persons per ha, most of which is unpaid family labor. Even the casual laborers employed on the farms are a mere 18%, this is a further confirmation of the small-scale nature of the farms and their vulnerability to dependency. The predominant type of labor engaged in the large-scale farms is mainly casual. Generally, however, a comparison between the contract farmer and non-contract farmers shows that the former have significantly higher incomes than the latter.

However, the development of contract farming has significantly reduced the production of food crops particularly in Vihiga District (24). This is because the small plots of land owned by the farmers are devoted almost exclusively to the cultivation of French beans. The implication here is that the relatively high incomes obtained from contract farming would not significantly

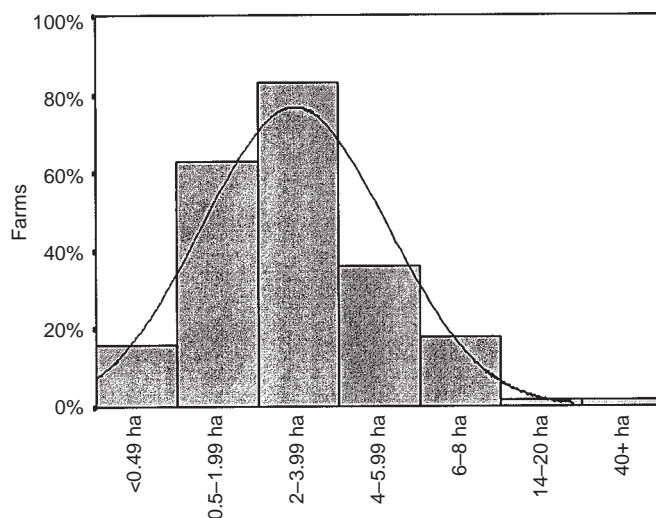


Figure 6. Distribution of farm sizes (n = 394) (18).

improve the economic situation of the majority of the small holders, because it would have to be spent on buying food. Indeed, a large proportion of the contract farmers in Vihiga spend almost two-thirds of their income on food, in comparison to their Nakuru counterparts, who spend only one-third of their incomes on food.

The scenario in which a majority of the Vihiga French beans farmers are caught up in, is a no-win situation. Most of them do not have access to sufficient land for the production of French beans. Therefore, most of them have had to convert some of the land that was previously under subsistence farming to the cultivation of French beans. This means that the output from their subsistence production has decreased, forcing them to buy food. But the cost of buying food is a luxury they cannot afford and so some of them are planning to stop growing French beans (as soon as they can repay back the credit to the contractor) and concentrate on producing enough food for their families.

But it is a vicious cycle, because every year they hope that their incomes from the cultivation of French beans would not be reduced by climatic hazards, and yet the losses repeat themselves each year. They have incurred a lot of debts to the contractor and hope to quit contract farming as soon as they have repaid back their debts, but this has so far not been possible. When they do have a good harvest the income earned is used to repay back part of the debts and the rest is spent on feeding the family. This is the predicament that the very small-scale farmers—who are unfortunately in the majority—are facing, i.e., they have not benefited much from contract farming but all the same find it difficult to quit.

CONCLUSION

The integration of the rural economy in Kenya (mainly through contract farming and vegetable processing) into the global economy of the agro-industrial food chain has had the impact of making these rural landscapes part and parcel of the processes of globalization.

The contract farming economy can be seen as one of the agents of change, responsible for the emerging capitalist relations in Kenyan agriculture. These are usually characterized by dominant, exploitative relationships over the subordinate players. Three factors determine the direction that these associations will take in the contract farming economy. These include, type of contract, economic status of the farmer, and availability of alternative income-generating opportunities.

Whether symbiotic or open-ended contracts are in use, both

have advantages and disadvantages for the farmer and the contractor. But generally the symbiotic contracts are more beneficial to the contractor than the farmer. The open-ended contract lessens the farmer's dependency on the contractor. But a much more significant factor determining the farmer's independence is his economic status. Those who rely purely on contract farming as a major source of income are nevertheless disadvantaged in both types of contracts.

Since the majority of the farmers often rely only on one contracted crop to earn their livelihood, they are fairly vulnerable and can be easily manipulated by the contractor, and other dominant players in the agro-industrial food chain. Furthermore, this group of farmers find it difficult to break the stranglehold that this economy has over them for two reasons. Lacking other income generation alternatives, forces them to continue participating in this type of farming. Secondly, they are able to benefit from local credit facilities because of the assurance of a regular income brought about by contract farming. This then reinforces the subordinate position of these farmers, who end up exploiting not only their labor and that of their families, but also their farms by employing environmentally-unsound practices, in an attempt to make ends meet. Contract farming by its very nature limits the extent to which the farmer can sustain his land ecologically. This is because he has no control over the agricultural practices and related environmental impacts, which are determined by the contractor. The contract farming package does not include general environmental management items. The only items included are those which are in the interests of the contractor. For example, the contractors try to ensure that the farmers strictly adhere to the approved agrochemicals. Moreover, the farmers' independent access to conservation measures is restricted since this is determined by the government. This further underscores the vulnerability of the contract farmer as an environmental manager of his/her farm.

The ramifications of the restructuring of the international division of labor, has led to the further entrenchment of contract farming on Kenya's agricultural economy. The most vulnerable in this instance are the farmers. Governmental policy is the only hope of reducing the hierarchical relations that have developed by introducing certain checks and balances, aimed specifically at safeguarding the farmers' interests and sustaining the environment.

There is need for an integrated policy approach to correct the anomalies of, and promote the agro-industrial food chain, by integrating economic and ecological considerations in planning policies. This implies coordination between the agricultural, industrial and environmental aspects concerned with this agro-industrial food chain. More specifically, this refers to the following:

– The introduction of an Act to protect the contract farmers from exploitation by the contractors. This act should aim at controlling and monitoring the growing and marketing of contract crops within the country. The specific aspects to be covered should be:

- procedures for setting and determining producer prices;
- provision of extension services;
- provision of minimum level of inputs and chemicals;
- planting seasons to avoid diseases;
- environmental issues.

– Development of local and African regional markets, in which the country has an input towards the conditions governing them, for purely export products such as French beans, so as to reduce the predominant reliance on foreign markets. But this also requires that local people should be able to afford these products and this can only be done by increasing their buying power, which means that they should also have access to an income.

References

1. Wallace, I. 1985. Towards a geography of agribusiness. *Progress in Human Geography* 9, 491–514.
2. Winson, A. 1988. Researching the Food Processing-Farming Chain: the Case of Nova Scotia. *Can. Rev. Sociol. Anthropol.* 25, 520–559.
3. Bowler, I.R. and Ilbery, R.W. 1987. Redefining Agricultural Geography. *Area* 19, 327–332.
4. Bowler, I.R. 1992. The Industrialization of Agriculture. In: *The Geography of Agriculture in Developed Market Economies*. Bowler, I.R. (ed.). Longman Scientific and Technical: Harlow, pp. 7–31.
5. Nuhn, H. 1993. Konzepte zur Beschreibung und Analyse des Produktionssystems unter besonderer Berücksichtigung der Nahrungsmittelindustrie. *Z. Wirtschaftsgeographie* 37, 137–142.
6. Malmberg, A. 1994. Industrial Geography. *Progress in Human Geography* 18, 532–540.
7. The concepts of globalization and internationalization are wrought with a lot of controversies, and their explicit definition are beyond the scope of this article. Suffice to say that, globalization and internationalization have specific attributes (such as the of rise of global markets and economic integration) that point at significant changes that have and are still taking place. Knutsen (8) gives a critical overview of the different theoretical perspectives of globalization and internationalization.
8. Knutsen, H.M. 1998. Globalization and international division of labour: two concepts —one debate? *Norsk geogr. Tidsskr.* 52, 151–163.
9. A symbiotic contract is that in which there is close interaction between the farmer and the contractor. This type of contract usually consists of certain conditions, such as: provision of inputs (seeds, fertilizers, pesticides) to the farmers on credit to ensure right quality and variety; written agreement on the price per unit of raw material; specifications on the type, quantity and quality of raw material; collection of the raw material by the contractor; provision of technical advice and exchange of information between the growers and the contractor; provision of equipment on hire (for example, tractors, irrigation equipment).
10. Republic of Kenya 1989. *Kenya's Efforts to Conserve Soil Water and Forests 1987/1988*. Office of the President: Nairobi, Kenya.
11. Miller, L. 1995. Agribusiness, Contract Farmers and Land-use Sustainability in North West Tasmania. *Australian Geographer* 26, 104–111.
12. Green, G.P. and Hefferman, W.D. 1987. Soil erosion and the perception problem. *J. Rural Stud.* 3, 151–157.
13. United Nations Environment Programme 1982. Environmental Guidelines for Pesticide Use on Industrial Crop's. *UNEP Environmental Management Guidelines, No. 1*, UNEP: Nairobi, Kenya.
14. Ward, N. and Munton, R. 1992. Conceptualizing agriculture—environment relations: combining political economy and socio-cultural approaches to pesticide pollution'. *Sociol. Ruralis* 32, 127–46.
15. Republic of Kenya 1994. Development Plan 1994–1996, Government Printer, Nairobi, Kenya.
16. *The Horticultural News* 1996. May–June, Kem Trust: Nairobi, Kenya.
17. *The Horticultural News* 1995. Safe Use of Chemicals, May–June, Kem Trust: Nairobi, pp. 3–12.
18. Opondo, M.M. 1997. The Dynamics of the Agro-Industrial Food Chain in Kenya. Institut für Afrika-Kunde, Hamburg, Germany.
19. Soil and water conservation is carried out using two approaches, referred to as labor-intensive and mechanized methods. The former involves use of human labor in curbing soil erosion on steep slopes where mechanization is made impossible by steep land surfaces. This involves two methods. One is the laying and construction of cut-off drains (these are diversion ditches that prevent destruction of farmland in the lower slopes by water from an upper catchment area), and two are artificial waterways where no natural drainage exists. The "mechanized methods" approach takes place on farmland that is not so steep and that permits the use of machinery to carry out soil and water conservation activities. These activities consist of terracing, levelling, construction of water-holes and dams, and drainage works. The costs of these soil conservation measures are shared between the farmer and the government (10, 20).
20. Njoroge, S.N.J. 1982. Soil and Water Conservation Extension: The Kenyan Experience. In: *Proceedings, Second National Workshop on Soil and Water in Kenya*. Thomas, D.B. and Senga, W.M. (eds). Institute for Development Studies and Faculty of Agriculture, Univ. of Nairobi, Occasional Paper No. 42, pp. 174–84.
21. Jaffee, S. 1987. *Case Studies of Contract Farming in the Horticultural Sector of Kenya*. Working Paper, No. 83, Institute for Development Anthropology, Binghamton, New York.
22. Little, P.D. 1994. Contract Farming and the Development Question. In: *Living under Contract—Contract Farming and Agrarian Transformation in Sub-Saharan Africa*. Little, P.D. and Watts, M.J. (eds). Madison, Wisconsin, pp. 216–247.
23. The terms "family-owned" and "single ownership" need a bit of clarification, since in both cases family labor is the major source for employment on the farm. The latter basically refers to those farms which are ancestral or inherited and therefore, theoretically, belong to more than one person. Single ownership, on the other hand, refers to farms which are individually owned and could also be occupied by a family.
24. Vihiga district is not only one of the most densely populated regions in Kenya (it had a total population of 457 647 in 1989, occupying an area of 521 km² with a population density of 878 persons km⁻²), but is also a high potential agricultural area. In comparison to Vihiga, Kiambu district it is not so densely populated (118 persons km⁻²).

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