



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

**Compliance with International Food Safety Standards  
in Kenya's Green Bean Industry:  
A Paired Case Study of Small and Large Family Farms**

Julius J. Okello<sup>1</sup> and Scott M. Swinton

Department of Agricultural Economics  
Michigan State University  
East Lansing, MI 48824-1039, USA

*Selected Paper Prepared for Presentation at the American Agricultural Economics  
Association Meeting, Providence, Rhode Island, July 24-27, 2005*

*Copyright 2005 by Julius J. Okello and Scott M. Swinton. All rights reserved. Readers  
may make verbatim copies of this document for non-commercial purposes by any means  
provided that this copyright notice appears on all such copies.*

---

<sup>1</sup> Julius J. Okello ([okelloju@msu.edu](mailto:okelloju@msu.edu)) is a Ph.D. candidate and Scott M. Swinton ([swintons@msu.edu](mailto:swintons@msu.edu)) is a Professor in the Department of Agricultural Economics, Michigan State University, East Lansing, Michigan, USA.

The authors gratefully acknowledge funding for this research from a Rockefeller Foundation Dissertation Research Award and a World Bank consultancy.

## **Compliance with international food safety standards in Kenya's green bean industry: A paired case study of small and large family farms**

### **Abstract**

This study uses two farm case studies to explore how Kenyan green bean farmers are meeting European food safety standards. For green bean farmers, the standards increase the fixed costs and the transactions costs of producing beans; the standards also alter how bean quality is assessed. Both the small and the large farm use contracts to protect their specific investments in complying with the standards. However, while the large farm invests in improved facilities using its own equity, the small farm uses a marketing group to spread investment costs and reduce the transaction cost to buyers of monitoring the performance of small units. Green bean buyers face the asymmetric information problem of creating incentives for farmers to comply voluntarily with hard-to-observe production practice requirements. The buyers have responded by using closely monitored contracts, the threat of contract termination, and variable product pricing to induce compliance with the standards. The combined result of producer and buyer behavior has been to increase the scale of green bean production in Kenya. Small farms that band together in cooperative groups have succeeded in collectively attaining the scale economies needed to remain viable.

### **Key words**

Food safety standards, farmer compliance, transaction costs, principal-agent, economies of size

## **1.0 Introduction**

Food safety scandals and the ensuing consumer concerns with food contamination by microorganisms and pesticides in the European Union (EU) over the past decade have led European governments to enact stringent food safety regulations (Jaffee, 2003, Mungai, 2004). The EU fresh produce retailers, especially supermarkets, have responded to consumer concerns and these regulatory changes by developing their own protocols and passing them upstream to developing-country exporters (Fox, 2000, Marsden, 2000). These private protocols are often more stringent than official regulatory requirements.

To secure their markets in the EU, exporters in developing countries have, in turn, responded to the international food safety standards (IFSS) by imposing very strict requirements on fresh produce suppliers (Dolan and Humphrey, 2000). These requirements include: i) pesticide use and handling standards, ii) establishment of traceability systems and, iii) hygiene standards.

Fresh vegetable exporters have, over the years, sourced their supplies from their own farms, contracted outgrower farms, spot market, or a combination thereof. Until the early 1990s, the dominant source was the spot market supplemented by loose contracts with smallholder farmers. Following the introduction of IFSS, leading exporters that supply developed-country supermarkets and/or EU countries that demand IFSS compliance have moved away from the spot market and loose contracts into more closely governed contracts. These contracts require farmers to comply with IFSS. Compliance entails costly investments in i) variable inputs (in particular, the switch to approved pesticides),

ii) long-term structures (e.g., grading shed, charcoal cooler, disposal pit and pesticide store) (Murimi, 2004). These IFSS investments are “lumpy” in nature and mostly specific to the fresh export vegetable business. There is, therefore, growing concern that the high cost of making these investments will exclude developing-country smallholders from the lucrative fresh export business, given their limited access to capital and information (Cowell, 2003, Farina and Reardon, 2000, Mungai, 2004). Despite these concerns, there are as yet no studies that systematically investigate *how* developing-country farmers are complying with these developed-country standards. In particular:

- How are developing country farmers meeting the cost of fixed investments?
- How are they acquiring the skills needed to meet the traceability requirements?
- How are they transitioning to safer but more costly pesticides?

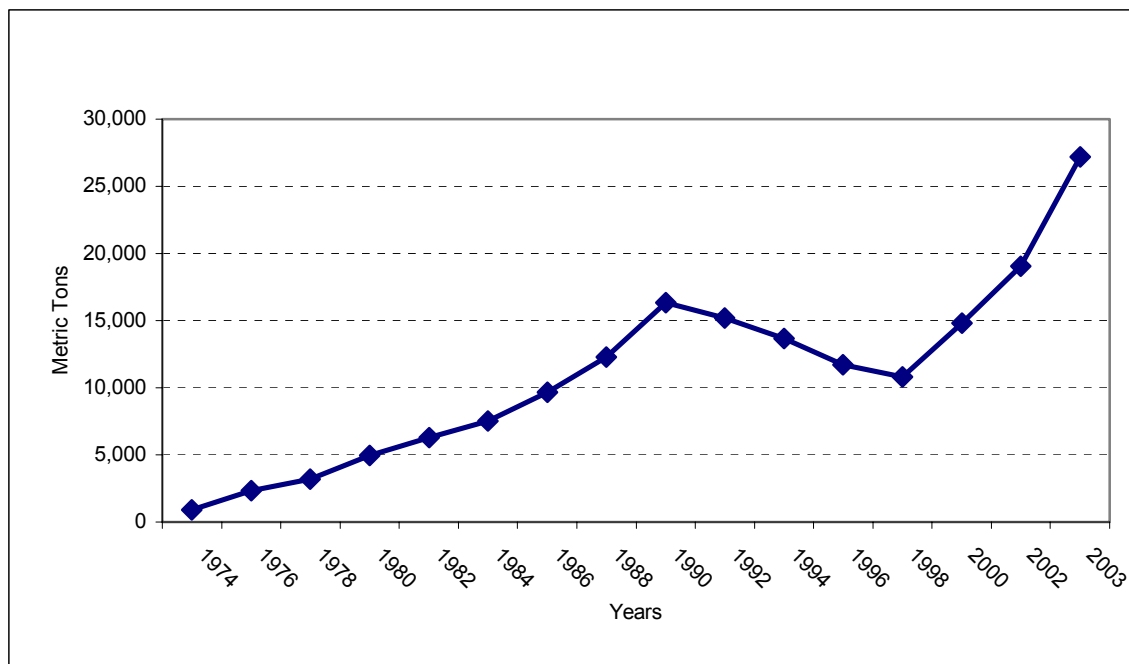
This case study focuses on compliance with IFSS by Kenyan family farms that produce green beans for supermarkets in the United Kingdom (UK). Green bean is one of the most important fresh vegetables exported from developing countries, and Kenya is currently the leading supplier of green beans to UK supermarkets. The UK has developed very stringent food safety standards, making it a suitable case to study.

## **2.0 Brief historical perspective**

Kenya’s green bean production dates back to the 1950s, although production and trade expanded most rapidly in the 1980s and 1990s (Kimenye, 1993, McCulloh and Otta, 2002). Kenyan exports of green beans increased from 6000 tons in the early 1980s to more 27000 tons in 2003. In 2002, green beans alone accounted for 22% of the value of

all Kenyan horticultural exports and was hence the second largest foreign exchange earner in the industry (HCDA, 2003). However, as shown in Figure 1, the rate of expansion of trade in green beans slowed down in the 1990s as the industry adjusted to the challenges created by IFSS and competition from other African producers (Dolan and Humphrey, 2000). The strong recovery is attributed to the increased supermarket trade by leading exporters in the wake of IFSS due to pre-pack (prepared produce) business. Production response to IFSS has followed the same trend, but with a significant impact on production structure.

Fig. 1: Kenya's green beans exports, 1974-2003 (metric tons)



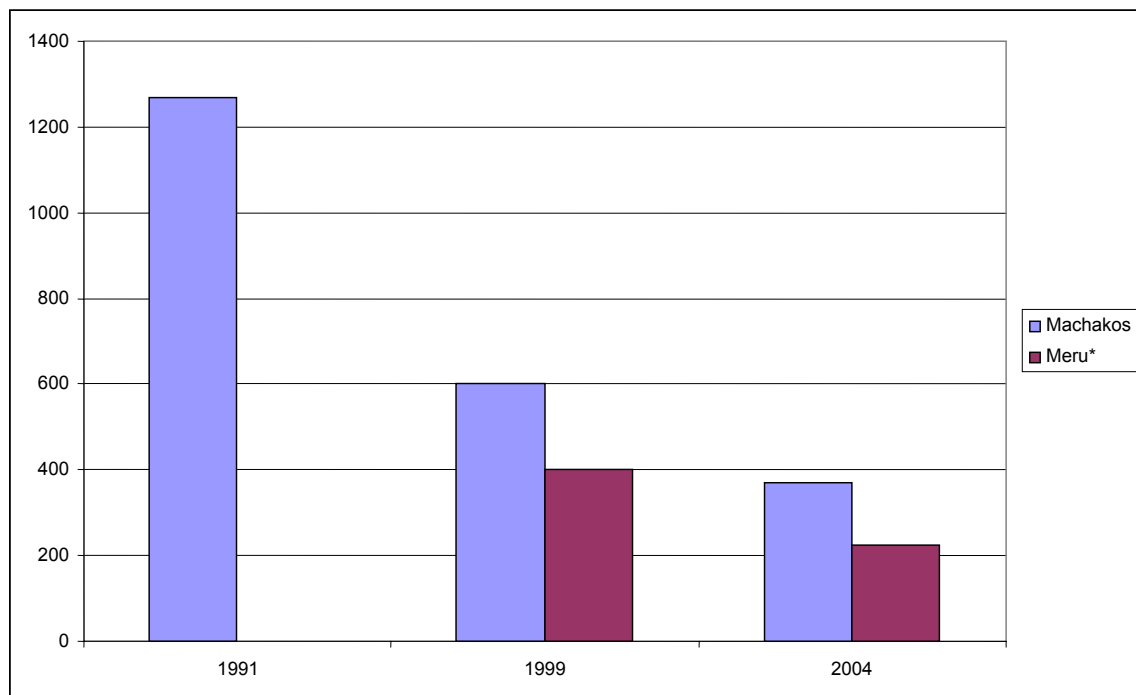
Source: HCDA trade statistics

Green bean production has been the domain of small and medium scale growers, although the share of smallholders has declined in the recent past. In the 1980s,

smallholders produced 40-50% of all green beans grown in Kenya (Kimenye, 1993).

While no official figure exists, unofficial estimates indicate that smallholders' share has now fallen below 40%, largely due to the cost and difficulty of complying with IFSS (Dolan and Humphrey, 2000, Jensen, n.d.). Figure 2 shows a rapid decline in the number of smallholder green bean growers supplying one leading exporter from the districts of Meru and Machakos. The fall in share of smallholders has been met by increase in green bean production on exporters' own (estate) farms and by medium and large scale growers.

Figure 2: Smallholders supplying one of Kenya's leading exporters from Meru and Machakos Districts, 1991-2004



\* The number of smallholder growers in Meru in 1991 is unavailable.

Source: Author's survey, 2004

IFSS were introduced in the early 1990s in response to food safety regulatory changes in the UK and the EU as a whole. In the UK, these standards emanated from the UK Food Safety (Due Diligence) Act of 1991 and the resultant supermarket-developed codes of practice. These regulatory changes were initially aimed at addressing the problem of microbial contaminants in food. They later evolved to cover three broad areas: i) pesticide residue standards, including pesticide usage, handling, and storage as well as disposal of pesticide containers and leftover pesticides, ii) hygiene standards, including sanitation of grading and storage facilities and general personal hygiene, and iii) traceability requirements, including documentation of production activities, especially pesticide usage, planting and spraying dates, and labeling of graded beans.

Because of the heavy pest pressure in humid tropics and the insistence of European consumers on freedom from pest and disease blemishes, green bean production has relied heavily on pesticides. Prior to IFSS era, farmers applied many different types of pesticides (including those unregistered) on green beans, often with sprayers that were old and poorly maintained and dosages that are higher than recommended (Okado, n.d). Smallholders applied pesticides weekly regardless of need, using scant protective gear, and pesticide containers were either left in the field or disposed in domestic waste pits. In addition, most smallholders stored pesticides in the food store, family residence or kitchen. Farm-level postharvest handling of green beans received little attention also. Beans were transported to a collection point, usually under a tree by the roadside, where they were graded on the ground and packed into cartons previously distributed by agents of the exporters or by exporters. In the rare instances where farmers had a collection



center, the facility was a simple low cost shed (Jaffee and Morton, 1995). Since export markets only emphasized physical attributes (spotlessness, size, shape and length) green bean grading in the pre-IFSS era was done by visual inspection and was hence fast and inexpensive.

Introduction of IFSS has changed all these practices. Besides meeting the cosmetic requirements of UK consumers, IFSS-compliant beans have to meet specific production and farm-level postharvest handling requirements, namely: i) spray operators wear full protective gear, ii) pesticides are handled in ways that ensure safety to mixers and applicators, iii) pesticide applicators bathe immediately after spraying or when pesticides accidentally come into contact with the skin, iv) pesticides are stored away from foodstuffs in a fully secured pesticide store with adequate ventilation, v) disposal of pesticide containers and leftover pesticides is done in ways that do not threaten the health of humans or animals and vi) farmers discontinue the use of unapproved pesticides and ensure that residues of approved pesticides on the harvested beans remain below the maximum residue level (MRL). In addition, green beans are required to meet a number of postharvest handling requirements. In particular, grading must minimize contamination by microbes or foreign objects (e.g., dirt and human hair) and shield the beans from the tropical heat. Lastly, each farmer is required to document pesticide use practices for each plot of beans. The record of pesticide usage accompanies each consignment of green beans sold.

In order to become IFSS-compliant, a farmer needs to change a number of production practices and make significant investments including the following: i) purchase protective gear, including long-sleeved overalls, gumboots, rubber gloves, nose mask, goggles, and hat; ii) construct a shower room for use by the spray operators, a well ventilated and secured pesticides store, a pesticide disposal pit and an incinerator; iii) apply only approved pesticides typically more costly but safer than those they replace; iv) implement an integrated approach to managing pest and disease problems, and only use pesticides when absolutely necessary (i.e., upon approval by the exporter's agronomist or technical assistant); v) construct a grading shed (with cement floor, washable tables, and facility for washing hands) and a pit latrine adjacent to the shed; vi) build a charcoal cooler for holding graded beans prior to pickup by exporter; vii) observe personal hygiene at all times during grading of green beans. The hygiene measures taken include the use of headscarves by women and hats by men, barring children from the grading area, and barring the wearing of perfumes from sorting and grading areas.

### **3.0 Theoretical framework**

This paper uses transaction cost economics (TCE), principal-agent theory (PAT) and economies of size (EOS) concept to develop hypotheses that are tested in this case study. Transaction cost economists assume that parties to a transaction will choose a governance structure that, while allowing exchange, will economize the cost of carrying it out. The governance structure used in coordinating the acquisition of goods and/or services can range from open market transaction to vertical integration. Which governance form

economizes costs of exchange will depend on the degree of asset specificity, behavioral and environmental uncertainties, and frequency of exchange (Williamson, 1985) .

The production of an export crop involves many decisions in which the farmer has informational advantage over the buyer, a situation that makes exchange both risky and uncertain from the buyer's perspective. PAT provides a sound theoretical background for analyzing how costs of information asymmetry and risk and uncertainty can be reduced through the design of a proper incentive system and risk sharing.

Production of export crops often requires that farmers invest in long-term, lumpy assets. Such investments increase the fixed costs of producing an export crop. The concept of economies of size suggests that larger farms face lower unit costs because they are able to spread their fixed costs over larger output quantity. Consequently, larger farms compete more favorable than smaller ones. In the following sections, we discuss these theories in light of the fresh export vegetable business and generate case study propositions.

### **3.1 Transaction cost economics**

#### **3.1.1 Asset specificity and uncertainty**

Transaction cost economics emphasizes asset specificity which is the degree to which the assets used in the exchange relationship are specific to that relationship.. Martinetz (2002) identifies four types of asset specificity in agriculture: i) physical specificity – such as a non-deployable investment in physical facilities needed to complete the exchange process, ii) site specificity – where there is need to locate

processing/manufacturing plant close to raw material source usually aimed at reducing transport cost, iii) temporal specificity – where timing of the delivery of exchange goods/services affects their value, iv) knowledge/skill specificity – in which a party to exchange has to acquire certain skills/knowledge to expedite transaction. The assets used in fresh produce trade are certainly temporally specific. To a lesser extent, they are also physically and skill specific. This matters because high asset specificity can subject the farmer to price “hold-up” in the part of the producer (Williamson, 1989).

High asset specificity *per se* does not pose a problem unless exchange is characterized by significant uncertainty. There are four main types of exchange-conditioning uncertainties (Martinetz, 2002): i) behavioral uncertainty - caused by a strategic behavior in form of nondisclosure, disguise or distortion of information by one of the parties, ii) environmental uncertainty - caused by demand volatility, lack of timely communication and inability to determine timely plans/decisions made by others, iii) technological uncertainty – caused by changes in technology needed to complete the transaction, and iv) quality uncertainty- caused by inability to verify at low cost quality of the produce at the time of product delivery. All four types of uncertainty characterize Kenyan green bean business.

A combination of high asset specificity and uncertainty has important ramifications for how exchange partners do business. It presents an opportunity for one party to take advantage of another by using exclusively available information to benefit itself (North,

1990). Knowing this, the uninformed party will seek to safeguard its specific assets through vertical coordination.

Contracting<sup>2</sup> is the most widely used form of vertical coordination to safeguard specific assets in agriculture. The three most common types of agricultural contracts are production, resource-providing and market specification (Minot, 1986). In production contracts, the buyer supplies some of the inputs and retains the decision-making and ownership rights of the contracted product throughout the supply chain. In resource-providing contracts, the buyer provides technical advice and some production inputs but ownership of the product changes at the time of delivery. In market specification contracts, the farmer provides the production inputs, is responsible for production decision-making and retains ownership until the time the products are delivered. The farmer may, however, receive technical advice on quality and timing of delivery of the product. In all the three, price and quality of the produce are part of the contract terms. Contracts can facilitate close working relationship between exchange partners hence allowing them to resolve future contingencies by “work things out” (Martinetz, 2002, Williamson, 1985).

***Proposition TC1:***

*Farmers will choose to produce under contracts to safeguard their specific investments.*

---

<sup>2</sup> In this study we define a contract as written binding agreement between two exchange partners specifying the roles and responsibilities of each party.

### 3.1.2 Measurement costs

Transaction costs can also result from information asymmetry among trading partners regarding unobservable product characteristics and producer effort. Martinetz (2002) argues that if a partner to an exchange cannot directly observe some product attributes, then she may be willing to incur search, sorting and screening expenses to obtain better information. The problem is exacerbated if the traded product has some attributes that the buyer desires but cannot be assessed until consumption (as in the case of *experience goods*) or may not be assessed at all (as in the case of *credence goods*).

Verifying product quality has become a very important issue in the fresh produce trade (Rehber, 1998). Chambers and King (2002) argue that where quality verification is costly or difficult, exchange partners will govern their exchange using tighter vertical coordination systems such as relational contracts. Such contracts enable the less informed exchange partner to monitor production process so as to discourage the more informed partner from engaging in opportunistic behaviors such shirking and cheating (Milgrom and Roberts, 1992).

Monitoring an exchange partner provides the less informed partner with a tool for evaluating the more informed partner's performance and hence aligning her goals with those of the less informed partner. However, when product attributes are not directly observable, a high level of monitoring may be required to detect cheating (Olesen, 2004). Further, the expenses associated with evaluating partners' performance through monitoring will rise with the number of partners involved in exchange. In smallholder

agriculture, where the more informed partners (the farmers) are widely dispersed, the material and personnel costs of monitoring can be prohibitive relative to small volumes of product delivered (Olson, 1985). In addition to monitoring costs, an exchange partner may incur other *ex ante* transaction costs, such as search and screening costs of recruiting farmers and the costs of negotiating contract terms with each farmer. Even after the contract is signed, the buyer still faces the *ex post* direct and opportunity costs of renegotiating (bargaining) and adapting the contract to changes in the production or market environment. The high cost of monitoring individual contracts involving small volumes makes preferable vertical coordination through relational contracts with farmers' groups, associations and cooperatives.

**Proposition TC2:** *High transaction costs of monitoring individual smallholder farmers will motivate buyers to contract with smallholder farmer-groups or associations rather than individual farmers.*

### 3.2 Principal-agent theory

The crop procurement relationship between a buyer and farmer(s) can be modeled as a principal-agent problem where the principal (a buyer) engages the agent (a farmer) to grow a crop that has specified quality attributes. As part of the contract, the farmer carries out effort-demanding activities that affect quality attributes of the crop. The buyer faces information asymmetry caused by uncertainty about the farmer's effort and performance under the contract because the buyer cannot completely observe the farmer's effort. While the buyer wants the farmer to work hard, the farmer may not wish to do so.

Minimizing the cost of risks through risk-sharing and providing the agent with adequate rewards to motivate a high level of effort are the core issues of the PAT. If effort cannot be completely observed, then it makes sense to base reward on outcomes (Eisenhardt, 1989, Grossman and Hart, 1983, Shavell, 1979). To elicit a high level of effort from the farmer, the buyer should pay a price that varies with the outcome. However, this exposes the farmer to production risks unrelated to effort (e.g., weather and pests) (Shavell, 1979). The buyer should therefore monitor the farmer so as to isolate the farmer's effort from outside influences and reward it accordingly. While perfect monitoring of input use and farmer effort is impossible, partial monitoring combined with performance-based price keeps agent behavior aligned with the principal's objectives (Hueth, 1999).

### **Proposition PA1**

*The contract between buyers and farmers will be such that the buyer shares the risks with farmers by paying a price that is variable.*

To the extent that the buyer only insures the farmer against some of the risks, farmers must devise ways of dealing with uninsured risks. Small and large farmers will differ in the way they deal with risk left uninsured by the buyer. Like large buyers, large farmers are assumed to be less risk averse than smallholders (Bagetoft and Olesen, 2004, Eisenhardt, 1989). Larger farmers are usually wealthier than smaller ones, which makes them less vulnerable to bad outcomes and less risk averse. More importantly, large



farmers often have preferential access to low interest bank loans, venture capital, exclusive inputs and technical information. In addition, some large farmers spread their risks by maintaining off-farm businesses. Consequently, large farmers are better able than smallholders to cope with exposure to risks left uninsured by the buyer. The smallholder farmer may therefore insure against uninsured risks (for instance, untimely or poor access to credit, crucial inputs and technical information) by sharing them through a program or group.

**Proposition PA2:**

*Smallholders will deal with some of their risks by joining a contracted farmer's group/association while larger farmers produce under individual contracts.*

**3.3 Economies of size**

Economies of size (EOS) exist when a firm's average cost declines as its output increases (Debertin, 1992). In particular, average fixed costs must diminish with increasing output. Economies of size can also arise from decreasing variable costs, such as reduced prices for variable inputs through bulk purchases (Debertin, 1992). Economies of size allow a large farm to take advantage of advanced but lumpy cost-reducing technologies that are unaffordable to a smaller producer. Examples in Kenyan horticulture include fax machines and telephone hookups to rapidly access market information (Dolan and Humphrey, 2000), constructing cooling facility, or hiring a full-time, trained manager. Input market imperfections in developing countries can also confer special pecuniary

economies of size on large farmers who can afford bulk purchase (Key and Runsten, 1999).

**Proposition ES1:** *The high fixed costs required to become compliant with IFSS will motivate smallholder farmers to join in groups in order to attain economies of size.*

#### **4. Case study design and methods**

To investigate the four propositions above, we examine two Kenyan family farms that grow IFSS-compliant green beans for sale in supermarkets in the United Kingdom (UK). A case study approach was selected because it is better at answering the *how* questions than quantitative methods (Yin, 1989). The study is based on one small and one large case farm that had, respectively, 0.5 and 10.0 acres under green beans. These were the respective mean farm sizes for small and large family farms for the last crop of green beans at the time of the survey in 2003. Both case farms sell to buyers who insist on IFSS compliance in order to supply the UK supermarkets.

The information needed to address the case study propositions was obtained through personal interviews with case farmers and industry participants between October 2003 and May 2004. We interviewed buyers/exporters, government officials, officials of Fresh Produce Exporters Association of Kenya, third party certifiers of EUREP-GAP as well as officials of both existing and defunct farmers' marketing groups involved in fresh export produce. Additional data was obtained from official government and industry statistical reports, industry newsletters and newspaper articles on the subject.

### 5.0 Compliance with IFSS: a paired case study

The small and large farms are owned by Chomba and Mango, respectively (these are pseudonyms). Table 1 offers summary information about the two case farmers.

Table 1: Characterization of the case farmers, Kerugoya district, Kenya, 2004

	Mango	Chomba
Profession	Retired accountant	Farmer
Age (Years)	56	49
Education (years)	14	12
Farm size (acres)	15	2.5
Area under last beans crop (acres)	10	0.5
Sales (Kshs*) from last plot	400,000	30,000
Years of growing beans	6	8
Number of bean plots in 2004	12	5
Non-farm business	Yes	No

Source: Author's survey, 2004.

\* U.S. \$ = 78 Kenya Shillings (Kshs) in January 2004.

### **5.1 Asset specificity in green bean production under IFSS**

The speed with which green beans are moved from the farm to the buyer's packhouse has always been critical since green beans are very perishable. How long beans are held in the farm after picking, the conditions under which they are stored, how they are transported from the field to the collection point, and how long they are held at the collection point all affect the overall quality of fresh export beans. Consequently, harvesting, farm-level grading by the farmer and collection by the exporter occur under a highly synchronized system. To ensure that pods do not overgrow, Mango and Chomba pick beans every Monday, Wednesday and Friday. Picking takes place in the morning before the pods get warmed by the high tropical heat. Once harvested, beans are immediately taken to the grading shed, where they are sorted and packed into crates and then kept shielded from heat awaiting collection by refrigerated trucks the same day. Production of fresh export green beans is therefore characterized by temporal specificity.

Mango has made a number of specialized investments in both production and farm-level post-harvest handling practices to become IFSS-compliant. She has constructed a pesticides disposal pit, shower room, incinerator, and fully secured pesticide store. She has also employed a trained agronomist/entomologist as a manager. The manager supervises pesticide usage, handling, storage and disposal, keeps technical information on pesticide use, and scouts for pests and diseases (alongside her buyer's field technical assistant). Chomba, on the other hand, is exempted from making some of these production investments. Since his farm is small and located close to his home, his buyer has allowed him to use the family pit latrine to dispose of leftover pesticides and

pesticide containers, and he may use the family wash room to bathe after spraying. In addition, Chomba has not been pressured to build a pesticide store because his buyer believes that he buys just the amount of pesticide needed each time he sprays his green beans.

For postharvest handling, Chomba and Mango have invested in specialized physical and human assets. They each have a grading shed with cement floor and washable tables, a pit latrine, facility for washing hands, a charcoal/hessian cooler and a crate store. These facilities are part of the requirements for meeting IFSS hygiene requirements and, especially, preventing contamination of beans by microbes and foreign objects. Both farmers also observe strict personal hygiene within the grading shed during the handling of green beans. The personal hygiene requirements include washing hands, wearing a headscarf (for women) and a hat (for men), wearing no perfume, earrings or loose finger rings. Chomba and Mango have also hired trained personnel to help them comply with IFSS production and post harvest practices. Both have a clerk who oversees all aspects of hygiene in and around the grading shed. They also have a trained agronomist or entomologist to oversee pesticide use, handling, storage and disposal requirements. The two farmers, however, differ in the way they have invested in the above IFSS requirements. Mango has invested individually. She has her own facilities and has hired a clerk and a trained manager. Chomba, on the other hand, uses the facilities and services of trained personnel provided by the Karie<sup>3</sup> Horticultural Farmers Group (KHFG), to which he belongs.

---

<sup>3</sup> This is a pseudonym used for confidentiality.

KHFG was formed in 1999 by a group of smallholder green bean growers. Membership was 31 farmers in 2004. New members are screened for good conduct and character and have to pay a membership fee upon joining the group. Members have personal savings accounts with the group into which they contribute Kshs 3/kilogram of beans sold through the group as personal savings and Kshs 2/kilogram for running the group. The group is governed by an elected committee comprised of the chair, secretary, treasurer and two members. The committee enforces the group by-laws and represents the group in contract negotiation and dispute resolution with the buyer. However, policy decisions are made by all members through voting. KHFG employs a trained clerk and a trained technical assistant. The former is in charge of enforcing physical and personal hygiene in and around the grading shed, while the latter enforces member compliance with pesticide use, handling, storage and disposal requirements.

The investments Chomba and Mango made to be IFSS-compliant are specific to green beans and motivated by their buyers' demands. For instance, a clause in a contract between one of the exporters and its farmers says; "the group shall provide ... one grader (clerk) and field supervisor employed by the group..." By requiring Chomba and Mango to invest in medium and long-term assets, these IFSS lock them into the green bean business and also into producing for specific exporters. Apart from green beans, both farmers grow maize and tomatoes. These crops do not need specialized assets because they are sold in the domestic market where consumers are not concerned with the way they are produced and handled. Investments made for IFSS compliance are therefore unutilized if a farmer or group ceases producing green beans. For instance, when one

IFSS-compliant group broke up in 2002 over a payment dispute with its buyer, it simply abandoned the grading shed, pit latrine and charcoal cooler which had cost Ksh 96,000 to construct. The grading shed is occasionally used for social meetings, but the charcoal cooler has no current use.

Only farmers producing beans under some form of marketing arrangement with exporters have invested in these IFSS-driven production and postharvest practices. The extent to which the IFSS requirements are met depends on the nature of the marketing arrangement. Farmers with verbal agreements tend not to have most of the IFSS-driven investments. Their most common investment is a simple grading shed with earth floor and no washable tables. Farmers that grow beans under such informal arrangements are unwilling to commit their money to upgrading their grading shed and constructing a latrine and charcoal cooler because they interpret the absence of written contracts as evidence of weak buying commitment from the buyers. Two medium-scale farmers that left a buyer after being asked to upgrade their grading sheds indicated during the interviews that the buyers they left did not want to commit themselves by signing written contracts. This made the farmers fear that they might lose their investment if the buyer abandoned them or lowered the price to a point where they are forced to quit growing beans. One farmer reported,

“My exporter has given me 3 months to construct a grading shed and charcoal cooler, but I won’t. Look at my neighbor, Peter. He put up a grading shed in his farm 2 years ago after his exporter asked him to. Last season his exporter offered him a lower price, which he disputed. Now the exporter is gone and the structure

lies there unused. I don't want to 'burn' my money like that unless he [the exporter] is ready to commit himself through a contract co-signed by HCDA<sup>4</sup>.”

The exporter this grower was talking about is one of the many medium-sized exporters that send trucks and loaders each day from Nairobi to buy green beans directly from the spot market or through loose verbal arrangements with growers via brokers. Such medium exporters buy green beans seasonally, exporting them when market conditions are good and moving to other fresh export fruits and vegetable crops during other times (Harris, et al., 2001). These exporters eschew written contracts, making it easy for them to abandon a farmer or change price at will.

Price reduction by the exporters is a major concern among green bean growers who produce under loose contracts. Mrs Mbugua, one of the area agricultural officers, summarized the problem as follows:

“Prior to planting, an exporter and farmers agree on a specific price and volume of beans. When the crop is in flower stage, it (exporter) sends a verbal message through its truck loader to farmers that the price will be lower because the ‘market is bad’. At harvest, the exporter sends another message with even lower price. At this time the green beans must be picked and sold hence farmers have no choice but to take the price. If they dispute the price offered, the exporter leaves the area and goes to buy in another region. I see this often during peak production season when there are plenty of beans”.

---

<sup>4</sup> Horticultural Crops Development Authority (HCDA) is a government parastatal responsible for licensing exporters and arbitrating conflict between horticultural growers and exporters.



Price holdup by buyers more often takes the subtler form of the rejection rate. Most buyers maintain that beans are rejected purely based on their failure to meet ‘exportable quality’. However, some exporters’ representatives interviewed during this survey conceded that rejection rates are sometimes used to shield the exporters from market losses especially during periods of oversupply. Consistent with proposition TC1, Chomba and Mango produce under contracts and work closely with their buyers in order to protect their specialized investments from price holdup practices. Both have faced lower rejection rates (2-6%) than those who sell in the spot market or under informal marketing arrangements (10-40%) even under periods of oversupply.

Another reason that Chomba and Mango find contracting appealing is to meet the frequent need to adjust production practices while remaining IFSS compliant -- especially for the type and dosage of approved pesticides. Under their formal contracts, they have access to certified seed and technical information needed to meet the IFSS from their buyers, which eases the technological uncertainty. Information on the IFSS-approved pesticides and their preharvest interval (PHI) requirements is especially important, because Chomba and Mango are sometimes forced to switch to alternative pesticides when pests and diseases develop resistance to conventional pesticides. Both farmers receive the technical information from their buyers in the form of handouts containing information on approved pesticides, the bean growth stage at which they should be used, and how much should be used (dosage). Mango gets additional technical information and

advice via regular farm visits by the buyer's trained technical assistant, who must be consulted before pesticides are switched.

Chomba's and Mango's contracts specify the volume and quality of beans they should produce and the price they are to receive during the contract period. They also get a calendar scheduling the delivery plan. For both farmers, a written contract signifies a binding commitment by their respective buyers to continue collecting beans at the agreed prices and reduces the fear of possible loss of specialized assets through holdup or unfair contract termination. They both said that they completed IFSS investments only after receiving written contracts from respective buyers. Mango tested her buyer's commitment by asking for a two month extension of deadline for constructing charcoal cooler and wash room.

## **5.2 Quality verification and enforcement costs and the choice of monitoring strategy**

The introduction of IFSS has also changed the way Chomba's and Mango's beans are graded. Under IFSS, quality assessment has shifted from easily observable characteristics to credence attributes related to production processes. This shift has created quality verification and enforcement problems in the production of IFSS-compliant beans. Both farmers' buyers now face information asymmetry with regard to the production and post-harvest practices used by the farmers. To overcome the quality risk posed by this information asymmetry, both buyers have developed elaborate systems of farmer monitoring.

Mango and Chomba are subjected to very close monitoring throughout the year, although there is a difference in the way they are monitored. Mango is monitored directly by her buyer through a trained technical assistant. The technical assistant visits her twice a week to address any pest and disease control problems, to scout for pests and to inspect compliance with traceability requirements, use of protective gear, and physical and personal hygiene within the grading shed. In addition, the technical assistant conducts unannounced inspections of the pesticide store to ensure that unapproved pesticides are not kept there at any time. This strict separation of green bean pesticides from those used in other crops is aimed at reducing accidental use of unapproved pesticides on green beans.

Chomba's buyer, on the other hand, monitors the entire KHFG group and punishes the entire group for lapses in IFSS compliance. To facilitate monitoring Chomba's group, the buyer has two field coordinators and a field supervisor. A coordinator visits Chomba's group once every week to inspect hygiene conditions around the grading shed as well as the group's production and pesticide use records. In addition, the buyer's field coordinator accompanies the group technical assistant to one or two farmers' fields every week to address a pest or disease problem that the group is unable to deal with or to assess the performance of the crop. Although the group is normally unaware, the field coordinator uses such field visits to gather information about production practices used by the farmers and especially about pesticide use, handling and storage. In 2003, Chomba personally was visited only three times by the buyer's field coordinator.

The field supervisor of KHFG's buyer, on the other hand, works on more difficult issues, such as pest outbreaks, and also ensures that accurate records about individual group members' use of pesticides are kept and that those records accompany the group's beans to the buyer's packhouse in Nairobi. She also relays information to the buyer the morning of every bean collection day about the production outlook situation (hence the volume of beans to be expected from each of the groups). The supervisor also monitors the activities of brokers and reports to the buyer if there is threat of losing their contracted beans to brokers who sometimes woo group members with higher and instant pay especially when there is high demand for beans in the UK.

Chomba's direct and most rigorous monitoring comes from KHFG's trained technical assistant (TA). The TA visits each member of the group at least 3 times between field preparation and green bean harvest. During each visit, the TA scouts for pests and recommends pesticide remedies. The TA also monitors the area planted, from which he is able to estimate expected sales volume. This is crucial for preventing sale to the group of green beans from non-members, most of whom use unapproved pesticides and/or do not observe the PHI. After the visit, the TA records Chomba's production practices on his spray record. Chomba is required to submit information to the TA on actual dosage used and the date and time the pesticide was applied.

The second approach used by Chomba's group to monitor and control pesticide use by its members is through a small pesticide store, which sells to members only. Chomba's group purchases key pesticides in bulk and makes them readily available to members at a

discount. This arrangement has allowed the group to control the type and quantity of pesticides used by most of its members, as well as helping to enforce the minimal interval between last spraying and harvest, by dispensing only pesticides that are appropriate for the growth stage of the beans. The scheme has also made it easier for the TA to keep more accurate technical records of pesticide use by individual members. Perhaps most important, the scheme has eliminated the need for group members to build pesticide stores in their homes. Chomba and most other members of his group now buy pesticides as needed, rather than maintain separate pesticide stores in their farms.

Why did Chomba's buyer choose to monitor him through a group whereas Mango's buyer monitors her individually? The answer lies in the high costs of searching, recruiting and monitoring individual farmer *vis a vis* a group. Consistent with proposition TC2, Chomba's buyer minimized these costs by contracting with an existing group and choosing to monitor the group instead of individual farmers. The group shouldered the *ex ante* and *ex post* transaction costs by mobilizing and screening its members. It also reduced contract negotiation costs. The production manager of Chomba's buyer underscores the point when he says,

“We are not in the business of making groups and supervising farmers. That is the work of the groups through its leaders. We can't afford to monitor each farmer. If we did, we would never break even... We supervise the group and penalize the whole group if they don't deliver on their promises. It is up to them (leaders) to supervise members”

Chomba's buyer has two other advantages in dealing with KHFG. By punishing the whole group for quality lapses, his payment system encourages farmers to police each other and be loyal to the group and therefore to him. Their loyalty is useful during low seasons when brokers entice group members to sell beans outside the group by offering higher pay. Secondly, the buyer is able to diversify the risk of crop failure since individual farmer's crop loss due to idiosyncratic risk is compensated by other farmers.

Why, then, has Mango's buyer been buying green beans from her through individual contract? In the last few years, her buyer has focused its procurement strategy on medium-and large-scale farmers. Mango, like the rest of her colleagues, had to show proof that she could put more than 5 acres of land into beans (at any given time) before she secured contracts with her buyer. The large volume enables her buyer to reduce the transaction costs of dealing with individual farmers, which also fits with proposition TC2.

### **5.3 Risk and risk insurance and the use of variable prices**

Chomba and Mango encounter various risks in the production of green beans that meet their buyers' quality specifications. Generalized (systemic) risk such as diseases and pests are a problem, exacerbated by the IFSS-driven reduction in number of approved pesticides. Chomba's beans, like those of other smallholder farmers, are prone to pest and disease infection from neighboring beans. The area agricultural officer attributes the widespread pest and disease incidence in smallholders' farms to another factor.

Smallholders grow beans all year round or rotate them with tomatoes (which hosts green bean fungal diseases), resulting in pest and disease buildup. Chomba and Mango

encounter significant market risks too. Cancellation of buyers' orders by UK importers is usually transferred to them, at least in part, as are any changes in price due to changes in currency exchange rates or contract renegotiations between their buyers and UK importers.

Chomba's and Mango's buyers on the other hand, face quantity and quality risks. They use monitoring to enforce compliance with quantity and physical quality attributes like spotlessness. However, monitoring is less effective in enforcing compliance with unobservable attributes such as residue content. Mango's buyer therefore uses the threat of contract termination in combination with monitoring to enforce maximum residue level (MRL) compliance. If a farmer is caught in violation, bean collection is suspended. The contract is reinstated when the farmer provides proof that remedial action has been taken and the buyer is satisfied that the farmer is not likely to repeat the violation. Mango's buyer conducts occasional unannounced testing of the residue content of green beans on his medium and large scale farmers. In 2003 alone, Mango's beans were tested five times for MRL compliance without prior warning. In the same year, her buyer withdrew contracts of three medium scale growers after their beans tested positive for unapproved pesticides. In contrast, Chomba's buyer does not test his farmers' beans for residue content, but noted that his UK buyers occasionally test random samples and notifies him if there are any major problems that warrant immediate attention.

Both Chomba's and Mango's buyers also use price to enforce compliance with residue requirements. They both pay their farmers a price that depends directly on what they earn

in the export market. Indeed while Mango's and Chomba's contracts promise them fixed prices of Ksh 45/kilogram and 40/kilogram respectively, these prices are for what their buyers call "exportable quality". Both buyers define green beans of "exportable quality" as those that are of the length, size and appearance (meaning spotlessness) required by their UK customers. According to Chomba's buyer, Chomba actually gets a percentage of what the UK buyer pays for his beans. That is, Chomba is paid what is left after his buyer deducts his procurement and marketing costs and margin for his profit. This comes to about 20 percent of the price the buyer is paid. The price Chomba actually receives varies with every consignment of beans sold, since his buyer's costs of procurement (including oversight) and marketing change routinely. Paying Chomba a variable price seems contrary to the fixed price stated in his contract. But the practice is consistent with proposition PA1, because the prices Chomba and Mango actually receive depend on the quality of their beans. Both receive prices that vary depending on what the UK market offers their buyers. Since market price conveys quality signals, pegging Chomba's and Mango's remuneration to the UK market price is one way to motivate them to work hard in meeting IFSS. It makes them the residual claimants of the effort they put towards meeting the international food safety standards.

#### **5.4 Coping with uninsured risks: the smallholder turns to a farmers' group**

Given that buyers do not insure Chomba and Mango against all production and market risks but instead transfer significant market risk to them (by basing their prices on market price), how do they cope with these risks? Mango has diversified her investment portfolio



into other farm and off-farm businesses which makes her less vulnerable to income risks than Chomba.

By contrast Chomba has no other sources of income except the farm, so he is vulnerable to income shocks. To insure himself against such shocks, he joined the Karie Horticultural Farmers Group because it provided services that can resolve some of his uninsured risks in addition to helping him meet the long-term IFSS investments. Through its savings account, the group advances short-term interest-free cash loans to Chomba whenever he has proven financial difficulties. Second, KHFG loans pesticides to members who are unable to afford them and recovers the loan from members' sales. Third, the group seeks, purchases and stocks locally unavailable inputs (especially new pesticides), making them available to members. Fourth, Chomba has ready access to the group's trained technical assistant in case there is an outbreak of pest or disease on his farm. Fifth, to address the rising cost of new pesticides, the group is working with the buyer to have farmers' fields sprayed by a team of hired pesticide spray operators in future. The buyer, who sees this as eliminating the problem of use of unapproved pesticides and violation of MRLs, fully supports the plan. Chomba feels that it reduces his exposure to pesticides and eliminates knapsack sprayer and protective clothing expenses.

### **5.5 Victim to beneficiary: Chomba tackles the economies of size issue by joining a farmer's group**

The threat that smallholder farmers like Chomba face from the introduction of IFSS -- especially the need to undertake lumpy investments -- was aptly captured by the *Daily Nation* newspaper headline, "EU rules could destroy horticulture: the protocol ... will have profound impact on both large and small-scale farmers, although the biggest impact will be on the latter<sup>5</sup>". How did Chomba meet the IFSS requirements for a grading shed with cement floor and washable tables, charcoal cooler, toilet and shower room? Like some other smallholder farmers, he joined a farmers' marketing group. Indeed, there has been a rapid increase in the number of smallholder horticultural groups in the last few years coinciding with period during IFSS has been more aggressively enforced by buyers. According to *The Sunday Standard*<sup>6</sup>, over 1,400 smallholder horticultural farmers' groups have been formed, most them in the last 10 years. In green beans alone, there were more than 70 smallholder farmers' groups in 2003. Production managers of the leading exporters reported to this researcher that they intended to recruit more groups because their clients have become more emphatic about meeting residue limits and traceability. The UK traceability laws that came into effect in January 1, 2005 require buyers to "demonstrate that they have set up systems and procedures enabling them to identify their direct suppliers and customers and to recall products if problems are detected<sup>7</sup>". Leading exporters have therefore turned to farmer groups that can more establish such systems. Chomba's group has already set up a traceability system. When sent to the buyers'

---

<sup>5</sup> Daily Nation, May 7, 2004, p11

<sup>6</sup> Sunday Standard, January 29, 2005, p19

<sup>7</sup> Sunday Nation, December 12, 2004, p22-23

packhouse, his produce is accompanied by his membership number, the number of the plot where it was grown, the picking date, and the KHFG group number.

The move by smallholders to form and join producer marketing groups appears to be the major strategy enabling smallholder farmers like Chomba to remain in the fresh export business. Joining a farmers' group enabled Chomba and other members of his group to take advantage of economies of size and remain competitive, which is consistent with proposition ES1. Their producer-level incentive to seek economies of size to comply with IFSS thus led them to the same group organizational form sought by export-oriented buyers to minimize transaction costs (proposition TC2). Evidence from South Africa supports this finding. Smallholders there have been successful in obtaining costly third party EUREPGAP certification by coming together to form producer marketing organizations which then seek certification (Mungai, 2004).

## **6.0 Conclusion**

This case study contributes to the growing literature on food safety standards by elucidating how developing country farmers are meeting developed country (international) food safety standards. It finds that IFSS compliance requires investment in specialized assets and alters the criteria for assessing quality in ways that increase the transaction costs of doing business between green bean farmers and export-oriented buyers.

The case study demonstrates that farmers can safeguard their specialized medium and long-term IFSS investments by using contracting, while buyers can use a combination of closely coordinated contracts, variable pricing, and the threat of contract termination to successfully enforce farmer compliance with IFSS. This case study also demonstrates that smallholders can meet the long-term IFSS investments if they come together to form a group that enables them to achieve economies of size and collectively to insure against idiosyncratic risks.

This study implies that there is need to strengthen enforcement of contracts between smallholders and buyers. To do this, third party verifiers need to ensure that contracts written by buyers are enforceable before they are signed. This in turn means that developed country governments should develop effective contract laws that are enforceable in law courts. Evidence from Ghana and Zimbabwe support this.

Horticultural exporters there are forced to develop their own systems of enforcing contracts because existing contract laws are poorly developed (Fafchamps, 1996; Coulter, 1999).

## References

- Bagetoft, P., and H. B. Olesen. *The Design of Production Contracts*. Denmark: Copenhagen Business School Press, 2004.
- Cowell, A. (2003) "Kenya lets 100 flowers bloom: It's Europe's rules that are hard to contend with." *The New York Times*. May 23, 2003.
- Coulter, J., J Millns and A.Tallontire. 1999. "Increasing the Involvement of Smallholders in High-Value Horticulture, Lessons from Zimbabwe." Chattam, U.K.: Natural Resources Institute.
- Debertin, D. L. *Agricultural Production Economics*. 2nd ed, Univeristy of Kentucky. 1992.
- Dolan, C., and J. Humphrey. "Governance and trade in fresh vegetables: Impact of UK supermarkets on the African horticultural industry." *Journal of Development Studies* 37(2000): 147-177.
- Eisenhardt, K. M. "Agency theory: An assessment and review." *Academy of Management Review* 14(1989): 57-74.
- Fafchamps, Marcel "The Enforcement of Commercial Contracts in Ghana," *World Development*, 24(1996): 427-448.
- Farina, E. M. M. Q., and T. Reardon. "Agrifood grades and standards in extended Mercosur: their role in the changing agrifood systems." *American Journal of Agricultural Economics* 82(2000): 1170-76.
- Fox, T. "Supermarket Squeeze: For European Retailers, the Environment is Anti-Wal-Mart - but Upping Supplier Standards Should be a Two-way Street." *Tomorrow Magazine*, Vol. 10, No. 5. September-October, 2000, pp. 22-24.
- Grossman, S. J., and O. D. Hart. "An analysis of principal-agent problem." *Econometrica* 51(1983): 7-46.
- Harris, C., P.V. Hegarty, M.X. Kherallah, C.A. Mukindia, J.A. Ngige, P.A. Sterns and J.Tatter. "The impact of standards on food sector in Kenya: 5-26 August 2000." Final Report to USDA, Regional center for Southern Africa & Africa Bureau.
- Horticultural Crop Development Authority. "Horticulture export performance - 2002." *Horticultural News*, Issue No. 28: p. 5-6 (2003).
- Hueth, B. "Incentive instruments in fruits and vegetables: Input control monitoring, measuring and price risk." *Review of Agricultural Economics* 2(1999): 374-398.
- Jaffee, S. "From Challenge to Opportunity: The Transformation of the Kenyan Fresh Vegetable Trade in the Context of Emerging Food Safety and Other Standards." PRMTR Division, World Bank. Washington, DC (May 2003).
- Jaffee, S., and J. Morton. *Marketing Africa's High Value Foods: Comparative Experiences of Emergent Private Sector*. World Bank. Washington DC, 1995.
- Jensen, M. F. "Food safety requirements and smallholders: A case study of Kenyan fresh produce exports." The Royal Veterinary and Agricultural University. Unpublished Draft.
- Key, N., and D. Runsten. "Contract farming, smallholders, and rural development in Latin America: The organization of agroprocessing firms and scale of outgrower production." *World Development* 27(1999): 381-401.

- Kimenyi, L. N. ""The Economics of Smallholder French Bean Production and Marketing in Kenya." PhD Dissertation, Michigan State University, 1993.
- Marsden, T. *Consuming interests: the social provision of foods*. London: UCL Press, 2000.
- Martinetz, S. "Vertical coordination of marketing systems: Lessons learned from the poultry, egg and pork industries." United States Department of Agriculture. ERS Agricultural Economic Report No. 708. May 2005.
- McCulloh, N., and M. Otta. "Export horticulture and poverty in Kenya". Working Paper No.74. Institute of Development Studies, Sussex, England. 2002.
- Milgrom, P., and J. Roberts. *Economics, Organization and Management*: Prentice-Hall Inc., 1992.
- Minot, N. W. "Contract farming and its effects on small farmers in less developed countries." Michigan State University, International Development Working Paper No. 31, 1986.
- Mungai, N. (2004) "EU rules could destroy horticulture: the protocol on good agricultural practices will have a profound impact on both large and small-scale farmers, although the biggest impact will be on the latter." *Daily Nation*. May 7, 2004, p11.
- Murimi, J. (2004) "EU safety rules to cost Kenya Shillings 62 billion." *East African Standard*. May 15, 2004. Nairobi, p20.
- North, D. *Institutions, Institutional Change and Economic Performance*. Cambridge University Press. New York, 1990
- Okado, M. (2001) "Background Paper on Kenya off-season and specialty fresh fruits and vegetables: Lessons of experience from the Kenya horticultural industry." Presented at United Nations Conference on Trade and Development Regional workshop for horticultural economies in Africa. Nairobi, Kenya. May 29-31, 2001 (URL): <http://r0.unctad.org/infocomm/diversification/nairobi/Keny0901.doc>.
- Olson, M. "Space, agriculture and organization." *American Journal of Agricultural Economics* 67(1985): 928-936.
- Rehber, E. "Vertical integration in agriculture and contract farming." Department of Agricultural Economics, Uludag University, Turkey, Working Paper #46, 1998.
- Shavell, S. "Risk sharing and incentives in principal agent relationship." *The Bell Journal of Economics* 10(1979): 55-73.
- Williamson, O. *The Economic Institutions of Capitalism: Firms, Markets and Relational Contracting*. New York: Free Press, 1985.
- Williamson, O. (1989) "Transaction Cost Economics". In *Handbook of Industrial Organization*, ed. R. Schmalensee, and R. Willig, vol. 1, North Holland Publishers, New York.
- Yin, R. *Case Study Design: Design and Methods*. Thousand Oaks, CA: Sage Publication, 1989.