Catalysing food safety in the domestic horticulture sector in Kenya: The potential link between export production and evolving domestic supply chains

Gema J1, Keige J1, Chemeltorit P1, Ngetich T1, Saavedra Y2, Koomen I2

1 Tradecare Africa
2 Wageningen Centre for Development Innovation

Fruits and Fresh Vegetables (FFV) that meets food safety and quality standards is highly demanded by the export market and it is gradually becoming significant for domestic market in Kenya. New regulations on traceability (National Horticulture Traceability System) and food safety (KS1758-2:2016 standard) are being promoted due to the increasing awareness and concern for food safety of FFV in the domestic market segment.

Despite the efforts and willingness to promote food safety, challenges to meet food safety requirements still remain. In Kenya for example, Onyango and Kunyanga (2013) found high levels of agrochemical residues, heavy metals from use of contaminated irrigation water and microbials in kales, tomatoes, mangoes and amaranth from samples collected in wet markets and supermarkets in Nairobi, Nakuru and Machakos.

One interesting opportunity for the FFV development is to look at the learnings from the export platform as they have significantly contributed to production knowledge of FFV that meet high food safety standards. Evidence of this is the more than 20,000 farmers certified under Global GAP for FFV export production (GlobalGAP Website 2017). Hammoudi and Hamza (2015) and Khrishnan (2018) already noted that export markets are diffusing good practices to domestic chains through spill-over effects and strategic positioning of export products.

This brief presents the key findings of the action research which aims to understand the leverage points that can catalyse investment opportunities for enhancing quality and safety in the domestic FFV sector. As an entry point of the action research, the team conducted a study whose objective was two-fold: a) to investigate whether (and how) practices among export farmers are being diffused towards production for the domestic market in relation to quality and safety (supply side); and b) to understand practices in the domestic markets (that are predominantly within the cash economy1) in relation to safety and quality and how different market segments are perceiving and responding to demand by consumers (demand side).

This study relied on a mix methods approach to collected both quantitative and qualitative data. The methods included farmer survey, interviews with market traders, Nairobi County officials, and selected grocery stores (qualitative insights were needed.

Data collection tools were prepared and uploaded in Survey CTO (https://www.surveycto.com) which enables online data collection. This was followed by a process of data cleaning to facilitate analysis. Key insights were recorded by the interviewers as quotes on note books during the interview process and used to draw insights from the data.

3R Kenya Research Brief 002

3R Kenya Project

The 3R Kenya (Resilient, Robust, Reliable. — from Aid to Trade) project is a learning initiative supported under the Agriculture and Food and Nutrition Security (FNS) program of the Embassy of the Kingdom of the Netherlands. 3R Kenya seeks to assess evidence and lessons from FNS and other related programmes that support competitive, market-led models in spurring agricultural development. It focuses on the aquaculture, dairy and horticulture sectors. 3R Kenya is executed at a time when Dutch government’s bilateral relations in Kenya are transitioning from a focus on Aid to Trade to enhance the development of agri-food sectors. Through evidence generation and stakeholder dialogue, 3R seeks to contribute to an understanding of effective conditions for sustainable inclusive trade for transforming resilient, robust and reliable agri food sectors.

3Rs:
Resilient: dynamic and adaptive capacities that enable agents and systems to adequately respond to changing circumstances
Robust: systematic interactions between agents that enable them to adjust to uncertainties within the boundaries of their initial configuration
Reliable: the ability of a system or component to perform its functions under changing conditions for a specified period of time, to create opportunities for (inter)national trade.
KEY FINDINGS
1 Supply Side (Production)

Key finding 1: There is diffusion of good production practices from the export platform that is guided by GlobalGAP certification to production for the domestic market by small and medium scale farmers practicing parallel production of FFV for both export and domestic markets.

Global GAP standards provide guidelines to farmers on good agricultural practices in order to effectively manage pests and diseases. Indicators of compliance include record keeping, risk assessment, scouting for pest and diseases, training on safe use of agrochemicals and hygiene among others. This study found clear diffusion of these good practices from export production to domestic production by certified farmers compared to those without certification. This is attributed to the fact that through certification, farmers learn to implement procedures and practices that become part of the normal way of working and which have embedded in the way they manage their farms. Training covers all aspects of production including cultivation practices, harvesting and handling including the facilities that a farmer needs to meet the standards.

It was found for example that all of the certified farmers respect (even though not always) PHI for their crops, be it for export or domestic market. For the non-certified producers, 11% (export) and 8% (domestic) admitted never observing the PHI, by virtue of not knowing it. (Figure 1). The PHI has several implications on the quality and food safety because after the lapse of this period, the residue levels of the pesticide should have fallen below the maximum Residue Limits (MRL), meaning the harvested product may be safe for consumption. Thus adhering to that period is a very important practice.

Key finding 2: There is a higher likelihood of farmers growing under certification to invest at the same level for domestic production in quality inputs as they invest for export crops production. Investments allow for management practices that promote product safety and quality.

The use of inputs like compost manure, fertilizer and pesticides was found to be significant among certified and non-certified farmers although much higher for those growing under certification. The differences in input usage was found to result from stewardship in how the two segments use inputs

While farmers growing under certification were found to undertake soil analysis, analysis of irrigation water and scouting for pests and diseases, those not under certification did not undertake such tests as basis for rationale for choice and use of inputs and to ensure the crop is healthy and well fertilized. The importance of this is to allow food safety considerations to be made by the farmer while selecting inputs. Farmers with certification were found to be more likely to use pesticides in the official PCPB list, ensure the same are registered for the crop and observe pre-harvest intervals after applications. Practices by non-certified farmers were found through Chi Square test to be significantly different compared to those of certified farmers.
Furthermore, the majority of the interviewed farmers are engaged in contract farming with companies that buy their produce. The companies supply seed for the commodities they buy both to certified (52%) and non-certified (34) farmers. Having access to certified seeds is important because quality seeds have an influence on the crop health and crop resistance to certain pests or diseases and therefore to the extent farmers would need to use more or less pesticides in the crop cycle.

Key finding 3: Microbial and heavy metal contamination of produce is less likely to happen among certified farmers compared to non-certified farmers who were less likely to observe hygiene practices and undertake water testing.

Microbial and heavy metal contamination can result from not following hygiene practices and use of irrigation water from catchments which are contaminated not only with biological hazards, but also with heavy metals. Certified farmers were found to be aware and follow hygiene practices during harvest, use clean harvesting equipment, hand washing before and after visiting the toilets/latrines as well as having a toilet/latrine facility accessible to those working in the fields. Training on hygiene, availability and cleaning of personal protective equipment’s, harvesting and holding facilities, latrines with, water and soap are mandatory certification requirements. Additionally, certified farmers are required to test irrigation water and water used for produce handling in an accredited laboratory to ensure it is of good quality. The Chi Square test comparing practices by certified farmers from non-certified farmers yielded significant relationship between hygiene practices and certification. Hygiene practices for certified farmers and hygiene practices for non-certified farmers are different for both export and domestic crops with a significant percentage of certified farmers regularly following hygiene practices compared to non-certified farmers.

Key finding 4: Farmers in the export platform have a higher likelihood of receiving training and extension services from technical assistants, agrovets and agricultural extension officers.

Certified farmers were found to receive information and training on FFV production from technical assistants employed by exporting companies at 64%, agrovets at 12% and agricultural extension officers at 9% compared to farmers growing without certification whose relied 23% on technical assistants, 11% on agrovets and 16% on public extensionists. The content of training received by certified farmers was found to be broad ranging from production methods for both export and domestic crops; rational use of agrochemicals, harvesting and post-harvest handling as well as compliance with export standards, Visit and train was the most likely method through which certified farmers interacted with extension allowing for practical training. Non-certified farmers mainly relied on mass media and field days for training where they were less likely to gain practical skills.
Key finding 5: FFV produced by certified farmers is mixed and traded in the domestic market with other FFV that is not grown according to high standards exposing it to contamination leading to loss of its value.

While export farmers with certification were found to produce FFV in line with high safety and quality standards, the value of the production towards the domestic market is lost as the produce is traded through brokers (70%), marketed through farmer group to traders (16%), direct to consumers (12%) and other farmers (2%). The brokers mix the produce with other products that are not produced in line with the high standards and is thereafter often contaminated through poor handling on transit to markets as well as within the markets. There lacks visibility of these products beyond farm gate as traders do not recognize its value when traceability is lost and the product cannot be recognized for its higher value.

2 Demand Side (Markets)

Key Finding 1: Clear Market Segmentation of markets that are sensitive to food safety and those that have no concern for food safety based on how traders perceive demand from consumers.

There are four market segments identified through this study being: wet retail and wholesale markets within official City infrastructure, unregulated spillover of traders outside this infrastructure into roadsides and kiosks within city environs, grocery stores with investments in display, storage and packaging who are licensed and operate in permanent addresses within the city environs and residential areas, supermarkets and high-end grocers in upmarket malls. The first two segments are agnostic to food safety both as a result of low levels of awareness averaging 2% for wet markets as well as the fast-impersonal nature of transactions. The grocery stores and supermarkets recognize the importance of food safety but do not have a pull-effect to trigger food safety due to lack of direct control over the value chain.

Key finding 2: Wet markets have no attention to food safety but dominate trade with over 80% of volume and value flowing through the main wholesale markets dominated by Gikomba and Wakulima.

The wet markets at 98% were both unaware and unconcerned about food safety. Traders especially in Gikomba and Wakulima which are the main wholesale markets do not believe food safety is their responsibility and see no value for their businesses investing in food safety. There is limited willingness among these traders to change the nature of transactions and roles of actors as they rely on information gate keeping to maintain their dominant position in the market (example was resistance to new entrants with tertiary education by these traders). Wet markets additionally contribute to food contamination as they lack sanitation facilities, have poor hygiene practices including use of contaminated water to sprinkle vegetables while also allowing consumers to touch the produce while buying.

The wet markets reported that the most frequently sought variables by customers relate to visual quality. Freshness was the most important parameter at 55% followed by lack of visible damage at 14%, colour formation at 10%, firmness at 9% and shape, origin and maturity at 4% each.
The perception of the wet markets on what consumers demand, play an important role on the disinterest of the wet market on food safety, as most of the parameters described as important for consumers are actually not related to food safety but more to the physical characteristics of the products.

**Key finding 3:** Grocery stores and their consumers pay attention to food safety but the positioning statements to consumers by traders in this segment are misleading when it comes to safety and origins of produce traded through the outlets.

The grocery stores are engaged with the topic of food safety as they perceive their consumers to be interested in the same. However, they rely 72% on supplies from wet markets directly and 6% from suppliers who most likely source from wet markets. Only 22% of grocers were found to be involved in direct sourcing including own production. Grocers were however found to misrepresent their sourcing programs to consumers with claims such as natural and organic being used loosely without evidence.

**Key finding 4:** Consumers and regulators are using visual quality to monitor food safety contaminants in FFV; regardless of the fact that contaminants are intrinsic and therefore invisible through visual quality necessitating reliable testing regimes to provide consumer assurance.

Consumers on the other hand were reported to use visual quality as indicator for contamination. Consumers for example believe that agrochemical contamination is only present where there are visible residues a fact that is incorrect. With the lack of a reliable testing regime, consumers have little reliable decision support mechanisms. City regulators do not have a routine monitoring regime for intrinsic food safety contaminants. They visit the markets and inspect the same for poor hygiene which represent presence of contaminants. It is only in cases of serious outbreaks that tests are undertaken by the government chemist to determine the sources of contaminants. Without a good monitoring regime, there is a high likelihood that the majority of incidences are missed as only bacterial contaminants are likely to result to severe outbreaks at scale to necessitate testing. Moreover, contaminations is likely to be spot in nature therefore necessitating regular monitoring with clear sampling protocols.

**RECOMMENDATIONS**

**Supply side (production)**

i) Targeted training and extension services should be given in order to enhance food safety and quality. It is recommended to look at the type of roles men and women do in order to better identify knowledge gaps. Training giving to men on pest management in topics like PHI or MRLs could also be useful to women who although they are not in charge of application of pesticides but are responsible for harvesting. Women can play an important role in monitoring and making sure that PHI are respected in order to minimize the risks of having residues in the final product.

ii) Identify mechanisms to incentivize brokers and traders to properly identify and keep records of the products growing in line with export standards (even without certification) in order to ensure traceability to those markets that would be willing to pay the value for products with higher standards in regards to food safety, for example the Grocery markets.

iii) Increase the availability of appropriate facilities to guarantee food safety. This can be in the form of collection centers and transportation infrastructure that ensure produce does not get contaminated while on transit. At household level, hygiene facilities and clean harvesting equipment are needed to enhance safety.

**Market side**

We recommend a two-step process: a) action research by aggregating demand from grocery stores and institutions which are within the cash economy, creating linkages to farmers already meeting higher standards to make available options for consumers of FFV that meets minimum safety standards. This need to be accompanied by a testing regime to assure consumers of the intrinsic value of products in this market.

Through the action research, a scale up phase of b) market segments within the wet markets or other city infrastructure that exclusively trades products that are fully traceable and regulated through a testing and monitoring regime. This may necessitate
investment in new public or private wholesale infrastructure, consumer branding that allows identification of products by consumers that have undergone assurance of quality, safety and full traceability.

This can be done by:

i) Focusing on the main products traded in the wet market would facilitate the implementation of practices leading to a good traceability system. For example the focus could be done on tomatoes and leafy vegetables to begin with and progressively adding other products.

ii) Public investment by the national and county governments should be in place. Within the markets, traders for example improving hygiene including hand washing, use of clean display and measuring equipment, displaying produce on food grade benches, awareness and training on food management as well as minimizing the touching of produce that can easily be contaminated by customers as achievable targets at their level.

iii) Training and awareness among traders on food management as well as their responsibilities in order to increase awareness on how they can improve their management practices.

iv) During the action research, identify possibilities to position the national Horticulture Traceability System (HTS) and the national standard (KS1758-2:2016, code of practice for fruits and vegetables) as important for the Kenyan consumers, so groceries and wholesales could see the value of it.

Policy Recommendations

i) The County of Nairobi can better resource the food safety department to have access to routine testing collaboratively with the Kenya Plant Health Inspectorate or other laboratory with capacity for MRL, heavy metals and microbial testing to identify types of contaminants, how and where they are entering the supply chain in order to improve knowledge and compliance.

ii) The County Government of Nairobi can work collaboratively with key counties supplying horticultural products into the City to improve compliance to food safety, access to extension, aggregation and traceability.

iii) Use of traceability to monitor food origins and flow into the City of Nairobi in order to manage any challenges that are identified by the City during routine monitoring.
References


PIP Magazine. (2011). 7 milliards de bouches à nourrir: le nouveau défi pour la filière horticole des pays du Sud, no. 15. PIP-COLEACP.

Acknowledgements

This research was conducted in collaboration with Tradecare Africa Limited in Kenya. We are grateful to various stakeholders, farmers for their cooperation in undertaking this study.

The 3R Kenya project is funded by the Embassy of the Kingdom of the Netherlands in Nairobi, Kenya, within the framework of the Agriculture and Food & Nutrition Security program.

Please cite this study as: Gema, J., Keige, J., Chemeltorit, P., Ngetich, T., Saavedra, Y. and Koomen, I. (2018). Catalysing food safety in the domestic horticulture sector in Kenya: The potential link between export production and evolving domestic supply chains. 3R project Research Brief 002.

The brief is a summary of a more comprehensive research report available at http://www.3r-kenya.org/