Incentives and constraints to an expanded and viable orange-fleshed sweetpotato value chain: The case of Kenya

Preliminary technical report on the assessment of the orange-fleshed sweetpotato commercial value chain in Kenya

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1. Introduction

One of the main outputs of the Scaling up Sweetpotato through Agriculture and Nutrition (SUSTAIN) program was the development and marketing on a commercial scale of orange-fleshed sweetpotato (OFSP) based products in each of the project counties, namely Kenya, Malawi, Rwanda and Mozambique. Building on its experience in Rwanda, in which the International Potato Center (CIP) worked with Urwibutso Enterprises Ltd, the program aimed to develop effective partnerships with similar businesses to launch OFSP-based commercial/industrial products in Kenya, Mozambique and Malawi, while strengthening its partnership with Urwibutso to expand and strengthen its OFSP product lines in the market.

The commercial processing of OFSP is an important pathway for reaching large numbers of urban and rural consumers with nutritious, value-added OFSP-based products. These products are high in beta-carotene, a precursor for vitamin A, and therefore an effective tool for combating vitamin A deficiency among vulnerable and poor rural and urban consumers. Development of viable and vibrant OFSP-based value chains can also play a major catalytic role by creating incentives for the expanded production of OFSP by rural farmers (i.e. being a pull factor), thereby facilitating stronger linkage of farmers to a more lucrative value chain.

The SUSTAIN program set out to measure progress in this area using two indicators: the number of OSFP-based products launched in each project country and the number of smallholder farmers linked to the OFSP value chains. The focus on smallholder participation was to ensure that the development of the value chain did not marginalize resource-poor smallholder farmers. Moreover, care needed to be taken to ensure that the establishment of OFSP-based product value chains did not discriminate against women.

Over the implementation period, the SUSTAIN program made great strides in realizing these goals. In Kenya, the focus of this report, the program formulated and steered partnerships with Tuskys Ltd, Euro Ingredients Ltd (EIL) and Organi Ltd, and also a start-up business and farmers to launch a variety of OFSP-based products to urban consumers in Nairobi, the capital city of Kenya, which has large pockets of poor vulnerable populations. Nairobi is home to some of the largest informal settlements (popularly known as slums) in Africa where poor households, likely to suffer from vitamin A deficiency, live.

A key partner in this value chain was the public sector (through the Department of Agriculture) that supported production activities upstream in the chain. Through a series of public-private partnerships (PPP) that the SUSTAIN program launched, in Kenya alone three commercial products emerged, namely OFSP-based bread, buns and galette bread. At the time of this study (May 2018), two private businesses were producing industrial OFSP-value added products for urban populations. A third, which had recently suspended production to enable it to comply with the new environmental requirements on the use of plastic packaging materials, targeted rural populations.

This success by SUSTAIN in forging and steering partnerships for commercial production of OFSP-based products in Kenya was replicated in Malawi and Mozambique, but with a focus on different OFSP products. For instance, in Malawi the program worked with a private business to develop and launch three products (crisps, biscuits, and puree). In Mozambique, two products (juice and biscuits) were launched. In Rwanda, focusing away from dependence on one established private sector firm, the project worked with a farmers’ cooperative to develop
and launch into the market OFSP-based doughnuts, popularly known as ‘amandazi’, and two other products, namely biscuits and bread.

While the SUSTAIN program has been very successful in delivering this output, there is little documentation of partnerships that have been forged. The public-private partnerships were developed incrementally, and roles and responsibilities adjusted as the implementation went along. This was a sensible approach in the absence of credible guidelines and documented evidence. However, moving towards greater scalability, efficiency, and effectiveness requires verifiable evidence of the outcome of partnership strategies adopted to spur commercial utilization of OFSP, as well as the effects on farmers and other value chain actors. Such evidence will provide guidance for future program design, including effective structuring and sequencing of activities, identification of shared or complementary milestones, and definition of roles and responsibilities by the various partners. It will also serve as the basis for joint adjustment of roles and milestones.

In order to systematically document and analyze the experiences of working with various partners to realize the goals and the effects this may have had, SUSTAIN conducted a systematic study focusing on various value chain actors. The overall research question addressed by the study was: *What factors determine the early interest and uptake of OFSP processing by commercial partners in the urban food sector, and how can incentives be created for private sector (co-)investments at different stages of program implementation?*

The study focused on the following specific research questions:

i. *How* has the OFSP value chain developed – 2014 to date?
ii. *What* have been the outcomes and *why*: That is, what have been opportunities (incentives) and challenges (constraints)?
iii. *How* were the challenges resolved and opportunities exploited?

In addressing the last question, the study examined the institutional innovations that were used to overcome the constraints and how they lay the foundations for a viable and sustainable value chain.

This report focuses on Kenya and is based on the findings of a series of interviews conducted by CIP in May 2018. The report also draws on secondary data collected as part of the project’s ongoing monitoring and evaluation (M&E), and other secondary quantitative and qualitative analyses of project implementation activities. It also draws on observations made by the author during field visits. Evidence from these various sources were triangulated and synthesized to provide lesson that are presented at the end of the report. The study is therefore anchored in case study techniques and is guided by Yin’s (1989) case study methods.

The rest of this report is organized as follows: Section 2 draws on secondary information presented in project reports to present the study context and briefly describe the implementation of other output areas that are relevant to the understanding of how execution occurred. Specifically, this section briefly highlights SUSTAIN’s OFSP seed system and agronomy in Kenya. Section 3 presents the theoretical framework from which the study draws and ends with a stylized conceptual framework adopted from the literature. The framework is presented in the context of the SUSTAIN project’s goal of establishing a viable, inclusive, and gender-equitable value chain. Section 4 discusses the empirical methodology adopted. Section 5 presents the results in the framework of a value chain, highlighting the key actors that have worked individually or collectively, but synergistically, to add value to OFSP and in the production of the end-product of the value chain, namely OFSP-based products. It specifically highlights how SUSTAIN, though the partnerships forged, managed to adopt strategies that resolved constraints to the development of the OFSP value chain and created the incentives for participation in it by (co-)investors. Lastly, Section 6 draws conclusions from the findings and summarizes key lessons.
2. The context

The implementation of the SUSTAIN project in Kenya started in 2014. The immediate challenge the project faced was where to obtain planting materials from which the OFSP roots that would later feed into the commercial value chain would be produced. At this early stage of the project, this need did not appear urgent but was nonetheless made so by the needs of the other output areas, especially #1 and #2. The output area #1 focused on reaching households with children under 2 years of age and those with pregnant or breastfeeding mothers with quality planting materials of OFSP varieties. Output area #2 focused on improving diets of the populations that are most vulnerable to vitamin A deficiency. Implementation of these nutrition-oriented nodes of the project required that the project had to quickly marshal the capacity to raise and distribute quality planting materials to the targeted households.

SUSTAIN benefitted from the experiences CIP had in implementing the nutrition-focused Mama SASHA project in western Kenya, and indeed borrowed and adapted some of its implementation structures and strategies. First among these was to forge a partnership with local Department of Health through which it identified and vetted, with the help of the Community Units (CUs), suitable candidates for vine multiplication. The vine multipliers were decentralized, that is, spread out within the targeted intervention areas to ease access by the households to quality planting material. The establishment of these decentralized vine multipliers (DVMs) later provided the planting materials that fed into the OFSP value chain.

Once established, DVMs required technical support in terms of sweetpotato agronomy and pest/disease management to optimize vine yields. SUSTAIN hired a crop scientist specialized in these topics. However, to serve more effectively all the DVMs and trained farmers/targeted households had to maintain OFSP vine. A structured partnership with the public agricultural extension service department of the county government was established. With technical backstopping on sweetpotato agronomy and pest and disease control from the project scientist, the public extension personnel visited vine multipliers on regular basis to ensure the ‘seed’ (cuttings) distributed to targeted households was of good quality (i.e. pest and disease-free and high yielding). At the same time, the public extension staff trained farmers on OFSP agronomy and pest/disease management. This was mainly through field and open-day events convened by the project and its partners. These events provided the fora through which both tacit and practical knowledge was passed on to the project beneficiaries.

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2 This is because output area #3 started with product development and therefore did not require immediate supply of roots. Roots used for product development and testing was provided from the implementation of output area #1 and #2.
3. Theoretical framework

This report draws on various economic theories to study the implementation of the OFSP value chain and frame the discussion of the findings. It first draws from the new institutional economics theories, in particular transaction cost economics, to discuss the organization (or lack of) of economic actors in the OFSP value chain and what that portends for the anticipated outcome (i.e. incentives for future private sector participation in the OFSP value chains). The report then uses the commodity value chain analysis and draws from the literature on smallholder linkages to local supermarket chains to discuss the challenges of linking often-unorganized smallholder producers to an organized and powerful retailer with discerning quality-conscious consumer clientele. This literature has tended to argue that, in the absence of institutional innovations, such smallholder producers can easily get marginalized by the demands of supermarkets. Lastly, we draw on the theories of industrial organization to discuss the location of processing facilities vis-à-vis the raw material source. We briefly discuss these theories below.

3.1 The transaction cost theory, commercial commodity chain development and market linkage

The transaction cost theory posits that transaction agents incur a wide range of costs in production and exchange of goods and services. These costs arise from the inherent tendency of transaction agents to act opportunistically (Williamson, 1979; North, 1990; Kherallah and Kirsten, 2002). When high, these costs can erase gains from production and exchange of goods and services leading to market failure.

The new institutional economics theory identifies five categories of transaction costs: i) searching for (information about) and screening transaction partners, ii) negotiating the terms of transaction, iii) monitoring the partners, iv) enforcing the terms of agreement ex-post, and v) maladjustment, that is, adjusting the terms of the contract to reflect the realities of execution. These costs are often manifested in transactions involving smallholder farmers and buyers of their produce (Jaffee and Norton, 1995; Okello and Swinton, 2007).

Search and screening costs become especially relevant when determining the type and number of transaction/exchange partners with which to work. Negotiation and contracting costs are influenced by the state of organization of smallholder farmers as root suppliers. Their geographical dispersion implies high coordination costs which can greatly influence the cost of reaching an agreement on contract terms including price and quality parameters. One way to overcome coordination costs is to mobilize farmers into groups, although this too has a cost (Okello and Swinton, 2007). To the buyer, the high coordination costs imply high costs of monitoring contractual terms, such as compliance with the agreed quality parameters, contracted volumes and supply schedule. Enforcing compliance with the terms of the agreement and attempts to adjust the terms to reflect changes in the contract implementation environment, especially payment arrangements and terms, can be affected by power relations between the exchange partners.

Transaction costs are particularly high under two exchange conditions: asset specificity and uncertainty (Okello, 2005; Gonzalez-Moralejo et al., 2015). Asset specificity refers to the degree to which an asset is committed to a transaction and represents the ease with which that asset can be transferred or redeployed to other uses. Martinetz (2002) and Okello (2005) identify 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 the processing facility close to the raw material source to reduce transportation costs, iii) temporal specificity—where timing of the harvesting and/or delivery of exchange goods affects their quality, hence value, and iv) knowledge/skill specificity—in which a party to exchange has to acquire certain skills to execute the transaction.

Transaction partners often seek to safeguard losses resulting from non-redeployability of an asset by engaging in contracting. Contracts can take two forms: formal—entailing written and signed agreement between the transacting parties, sometimes endorsed (i.e. witnessed) by a third party, and informal—sometimes referred to as gentlemen’s agreement—usually based on non-written verbal agreement between the parties (Henson and Jaffee, 2006). The latter is especially common in a developing-country context where enforcing contracts tends to be a problem (Okello, 2013). Contracting is a common way of governing transactions between producers and buyers of agricultural products. In the context of this study, it governs the relationship between farmers and the sweetpotato root purchasers (i.e. the root processor), as well as the relationship between the root processor and the user of the intermediate product of root processing (i.e. the puree), namely the producer of the final OFSP product.

Uncertainty in a transaction occurs when an exchange can and is subject to unanticipated changes in circumstances, such as price and volumes. There are two ways by which transaction agents deal with uncertainty. First, the party at risk can seek to transfer the risk to another party through formal insurance, which indemnifies the loss when it occurs. The second option is to hedge against the risk by sharing it through collective action in the form of participation in group production and/or marketing (Okello, 2005; Okello and Swinton, 2007).

Buyers may also face considerable risk in dealing with smallholder farmers and the producer of intermediate products. This is especially the case when the contracted product (roots or puree) is prone to measurement or quality verification problems because the attributes of the product cannot be assessed through visual inspection (i.e. experience or credence goods). When this is the case, the transaction party with less information is likely to institute mechanisms that will enable it to assess whether the transacted good meets the agreed quality specifications, usually by monitoring the behavior (activities) of the more informed partner. However, due to dispersed nature of sweetpotato root producers, the less informed party will tend to contract and monitor groups rather than individual farmers, thereby reducing the costs of enforcing compliance with quality specifications (Okello and Swinton, 2007).

### 3.2 Commodity chain development and supermarket linkage

The development of commodity value chains in agriculture comes with some advantages and disadvantages to smallholder farmers. The advantage is that it links such farmers to better-paying markets, hence increases revenues earned. However, the literature documents a major downside to the ‘modernization’ of commodity value chains, away from focusing on low-paying wet markets to better-paying urban-linked value chains, especially the supermarket chains. These chains tend to have stringent quality standards that suppliers must meet to stay in business. Dolan and Humphrey (2000), for example, found that linkage to developed-country supermarket chains often require that farmers invest in costly assets and comply with exacting standards that

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3 The position taken by the transaction cost theory with regard to location of processing facility is in line with von Thunen’s (1826) theory of industrial organization (McCann, 2016). The theory posits that it is efficient to locate the production and processing of field crops in rural areas because of the high costs of land in urban areas, where the consuming population is based.
can potentially marginalize less asset-endowed smallholder farmers. Studies of smallholder farmers’ linkage to better-paying domestic supermarket value chains in developing countries have also reported similar tendencies (Neven and Reardon, 2004; Weatherspoon and Reardon, 2004; Berdegue, et al, 2005; Reardon et al, 2009; Andersson et al, 2015). These requirements are often in the form of product quality specifications (including physical appearance) and safety standards (defined in terms of freedom from certain pathogens and pesticides). Due to the *credence* nature of the latter, smallholder farmers find it difficult to communicate compliance with the requirements, even when they do comply (Rich and Narrod, 2005), because of the prohibitive cost of obtaining certification of compliance by a third party (Okello, 2007). Henson and Jaffee (2006) and Narrod et al (2009) indicate that smallholder participation in such demanding supermarket value chains therefore require public-private partnerships specifically formulated to identify and resolve obstacles that might be insurmountable and marginalizing to small-scale farmers. They recommend that such partnerships should especially target investments in areas of the value chain where markets, if left unfettered, are likely to fail for smallholder farmers.

The above discussion indicates that there are indeed instances when the markets can fail for some value chain actors due to high transaction costs and stringent value chain requirements for participation, unless there are institutional innovations to overcome such outcomes (Reardon et al, 2004; Okello et al, 2006). Kydd and Doward (2004) argue that market failure has important implication for the development of the local agricultural economy and, in the context of this study, the value chain. They argue that markets fail for smallholder farmers and other actors in the value chain due to coordination risks (i.e. the risk that actors in the value chain will not act towards common good/benefit of all) and risks of opportunisms (i.e. the tendency to exploit exclusively available information towards own gain). The former (also known as coordination failure) is fueled by transaction costs and results in high risk of doing business, stifling agricultural intensification and investment in the value chain. This, in turn, results in what is described as a low-level equilibrium, characterized by a vicious cycle of underinvestment in the value chain. The diagram below (Figure 1) illustrates this aspect. It shows that high transaction and coordination risks and costs drive overall costs leading to a premature equilibrium point (i.e. where returns equal costs) at which investments ($I_0$) are significantly lower than the desired equilibrium level investment ($I^*$). Low level equilibrium can result from or be exacerbated by weak institutions, including poor contract enforcement. The result is that financiers are reluctant to invest in traders and farmers, input suppliers in stocks and supply system, farmers in purchase of productivity and yield-enhancing inputs, and traders in crop marketing system transport and purchases (Kydd and Doward, 2004). Poulton et al (2009) further argue that the future of small farms lies in overcoming these coordination failures, thus allowing them greater and efficient access to pre-and postharvest services.
In the section below, we use the above conceptual framework to discuss the operations of commercialization of the OFSP value chain through industrial value-addition of fresh roots into puree and subsequently into baked products. The discussion specifically focuses on the partnerships forged and highlights the constraints (i.e. disincentives) that have motivated formation of those partnerships. It also highlights the opportunities (incentives) that have spurred the development of the OFSP value chain, as well as the roles different actors have played in the process.
4. Empirical methods

This study used both qualitative and quantitative data collected through personal interviews with various stakeholders in the OFSP value chain. The qualitative data was obtained through a series of key informant interviews (KII) held with carefully selected stakeholders who were involved in the design and establishment of the OFSP value chain. They were drawn from the SUSTAIN project implementers, CIP researchers, county department of agriculture staff, farmers, farmer organization leaders, and private sector representatives. A complete list of KII respondents and their affiliations is presented in Appendix 1.

In addition to the KII, detailed qualitative data was obtained through focus group discussions (FGDs) with OFSP growers supplying the root processor. A total of four FGDs were conducted, two involving women only and two men only. The participants in the four groups were members of two farmer organizations that supply OFSP roots to Organi Ltd, namely the Kabondo Sweetpotato Farmers’ Cooperative Society (henceforth referred to as the coop society) and Ng’uono Farmer Self Help Group. Each FGD comprised of 8-12 participants selected to represent both young and older farmers. The FGD interviews were based on a check list of predesigned questions. In addition, two independent farmers (one man and one woman) were interviewed to understand the issues associated with independent production of OFSP roots for Organi Ltd. They were representative of the kind of farmers Organi has recently started contracting for root production. Both farmers had planted about one acre of OFSP at the time of interview and were therefore representative of medium-scale independent farmers supplying Organi with fresh roots. Details about Organi Ltd’s root procurement strategy by are discussed in Section 5.1.

The quantitative data used in this report were collected from bread consumers in Nairobi as part of a larger survey designed to assess consumer perception and demand for OFSP bread. The respondents were selected using systematic random sampling of every second consumer buying OFSP bread in six selected Tusks supermarket stores4 in Nairobi. A total of 141 OFSP bread consumers were interviewed over a period of three weeks in May 2018. The survey ran parallel to the qualitative interviews. The quantitative data from the survey interviews are complemented with data collected from secondary sources and the project monitoring data.

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4 The study was conducted in Hakati, Harasha, Pioneer, T Mall, Buru buru, and Chap Chap Tuskys stores.
5. Findings

5.1 Mobilization of the OFSP fresh root supply base and dealing with transaction costs

Sweetpotato is one of the few cash and food crops grown in western Kenya, the region targeted by the value chain development component of the SUSTAIN project. The leading sweetpotato growing counties are Homa Bay, Migori, Nyamira, Kisumu, Siaya, Busia, and Bungoma. In these counties sweetpotato is grown alongside maize and beans, with maize as the leading food/cash crop (grown by 90% of the households) (Tedesco and Stathers, 2015). It is grown by approximately by one-third of the households in Busia, one-quarter in Siaya and Homa Bay, and one-tenth in Migori. Farm sizes in the sweetpotato growing areas are quite small, averaging 0.9-1.7 acres, implying that per household production volumes are necessarily quite small. The extent of market-oriented production of sweetpotato differs among the counties and is stronger in Homa Bay than in Siaya and Busia.

In counties where there is greater focus on production for sales (i.e. market-oriented production), the trade in sweetpotato is dominated by traders and middlemen (also known as brokers). The brokers purchase the crop (unharvested fields) or harvested roots. Trade is predominantly based on local white/cream and yellow-fleshed varieties. Most traders and brokers shun the orange-fleshed varieties and often do not buy it even when the other local varieties are in short supply. One of the participants in the FGD summarized the brokers attitude towards as OFSP as follows:

“People around here don’t like it. So, traders don’t even sell it in the local market. And the brokers don’t want it either. The only way to use the surpluses is to feed it to cows, which seem to like it very much”. [Male member of coop society]

The mobilization of OFSP fresh root for processing by Organi Ltd faced several challenges. First, due to the small farm sizes, most farmers only grow small volumes of OFSP roots; aggregation costs were therefore high. Second, the lack of local demand (by traders selling in the local and brokers selling in distant markets) implied that it could rely on the open wet or roadside markets for supplies of fresh roots. Third, the fact that sweetpotato farmers are widely dispersed in the target counties made coordination of the supply system particularly difficult. The difficulties resulted from the high costs of identifying farmers who are willing to grow OFSP (i.e. search and screening costs), arranging the terms of production and aggregating roots (negotiation and transportation costs), and ensuring that root producers follow the production specifications5, especially those that can influence quality of the roots (i.e. monitoring costs). Moreover, sweetpotato production is normally affected by idiosyncratic (i.e. farmer-specific) risks and systemic risks (e.g. bad weather) that require flexibility in the terms of exchange (e.g. frequent renegotiation of volumes, prices, and harvest and delivery time) which in turn increase the costs of contract renegotiation (i.e. maladjustment costs). In other words, production of OFSP roots for Organi Ltd entailed high and multiple types of transaction costs. So how has the value chain dealt with these transaction costs?

The mobilization of farmers, which includes identifying them and agreeing on the production terms (i.e. acreage, time of planting, and quality requirements), has been approached using two strategies. The first

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5 The specifications included that farmers grow roots in flat beds and use oxen to prepare the beds and harvest roots to reduced root crookedness and damage. In addition, harvesting was to be done in 3-4th month to reduce weevil damage and attain higher dry matter and beta carotene content.
involved the county department of agriculture (DoA), the coop society and the SUSTAIN project working together. Under this PPP, the coop society – which had a large membership of sweetpotato growers – identified members interested in growing OFSP. The initial identification of the interested farmers was preceded by a meeting during which farmers were exposed to the project and the then new sweetpotato processing venture by a locally-based root processor (i.e. Organi Ltd). Details of the transaction were discussed including the payment terms. Once identified, the farmers were given OFSP planting materials (vines) and advised of the date by which to plant them.

The DoA provided agricultural extension services relating to sweetpotato agronomy and good agricultural practices, especially relating to OFSP. The need for OFSP-focused agricultural advice resulted from the fact that the quality and shape of OFSP roots is sensitive to harvest time and the type of planting bed. The former affects beta-carotene content and hence color of roots, while shape of roots affects the time taken to peel and/or wash the roots. The agronomic training by the county therefore focused on changing entrenched sweetpotato farming practices that were not appropriate for OFSP. As noted by the SUSTAIN project liaison officer at county DoA

“OFSP crop management by farmers was a big issue: farmers were used to planting in mounds rather than flat beds, intercropping sweetpotato with maize, recycling seed rather than getting clean materials. The partnership worked hard to change these practices.”

Under this first model of farmer mobilization, farmers sold their roots through the coop society, hence the society was responsible for following up farmers during the season to ascertain that vines are indeed planted, and the condition and status of the crop. The farmers then deliver the roots to one of the several collection centers owned by the society. The produce was sorted to Organi’s specifications after which the farmer receives a delivery note specifying the quantity delivered, date of delivery, price, and total value of the delivered roots.

The price paid to farmers for fresh roots was negotiated by the SUSTAIN project, the coop society leaders and Organi Ltd, rather than with individual farmers. The negotiated price is Kenya Shilling (KES) 15 per kilogram (kg), with KES 1 per kg retained by the society as an administrative fee. Payments were made directly to farmers using M-PESA mobile-phone transfers by Organi Ltd.

This strategy of the transactions being intermediated by the coop society reduced search and screening costs, the costs of negotiating or reaching agreements (on production volumes and timing as well as on price) and of monitoring the terms of agreement (especially the timing of planting and harvesting, and root quality) for the buyer (i.e. Organi Ltd). This is because working with farmers organized into a group reduces the per unit cost of root procurement. Further, because negotiating changes to the terms of the agreement involves fewer parties (namely the representatives of coop and the Organi Ltd, with the project and DoA’s representatives as witnesses), the strategy reduced the transaction costs associated with reaching specific agreements, such as the price of fresh roots.

The second, relatively recent, strategy in use for mobilizing root supply involves Organi Ltd sourcing roots directly from farmers. Under this strategy, Organi Ltd still obtains a list of names of farmers interested in planting OFSP from the coop society. It then delivers planting materials to farmers directly and maintains contact through phone or random visits to assess the status of the crop. When ready for harvest, the farmer

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6 The cooperative was, at the time, processing OFSP into flour for direct sale to consumers, while Organi Ltd was going to be processing OFSP roots into puree.
7 Approximately USD 0.15 per kg.
notifies Organi Ltd which specifies the harvest date. Harvested roots are either delivered directly to Organi Ltd by the farmers, at their own cost, or collected by Organi Ltd. The former occurs when volumes are low – i.e. less than a Canter truck load (approximately 7.5 tons). However, farmers in an area can organize themselves and harvest jointly, thus get enough volume to fill a truck, in which case Organi Ltd then collects roots for free. In the case of direct delivery, the farmers usually sort the roots under the supervision of one of the Organi staff at the factory. Where Organi Ltd collects the roots, sorting is done in farmers’ fields, also under supervision of the Organi staff.

Organi Ltd has also identified other farmer groups and medium- to large-scale individual farmers that it contracts for root production. It uses the same model as that for working with individual farmers under the coop society in dealing with the new farmer groups: it delivers vines, maintains random phone and physical contact, and later collects the roots or receives them. The new group members receive a brief introduction to Organi’s operations during the mobilization meeting. The meeting also discusses the terms of OFSP production (including planting and harvest dates, root quality specifications, and price). The interested individual farmers are identified, recruited and given introductory information about OFSP production for processing, the agronomy of OFSP, and the sales procedures. Terms of business (including the price, planting, and harvest procedures and timing as well as root quality) are further discussed directly between Organi Ltd and the respective farmer.

The arrangement in which the coop society acts as intermediary in the transactions between OFSP root producers and Organi Ltd minimizes transaction costs and coordination risks using collective action because the society shares in some of these costs and risks (Okello and Swinton, 2007; Poulton et al, 2010). On the other hand, in the second strategy, Organi Ltd shoulders all the transaction costs and coordination risks. From a business point of view, the second strategy is likely to be unsustainable. It will require that Organi Ltd hires a large team of field staff to mobilize, monitor, and enforce production agreements with the suppliers, which can pose major logistical and coordination challenges, and increase the transaction costs, thus stifling the expansion of fresh processing. So, what necessitated this strategy?

The decision by Organi Ltd to take over some of the roles the coop society played could be attributed to problems the society faced with members, which were in turn attributed to internal management problems and some root marketing problems, as discussed in Section 5.2, below. It also appears that Organi Ltd was keen to reduce the fresh root sourcing price to KES 14 per kg and avoid paying the extra KES 1 per kg, the coop’s administrative fee. Notably, in mobilizing members of other farmer groups to join OFSP production for processing, Organi Ltd avoided negotiating the price with group leaders. Instead, the price was dictated by Organi Ltd as “the price we are paying other farmers for fresh OFSP roots”.

Figure 2 presents the revenues earned by fresh root producers during the 16 months preceding the study. Overall, a total of KES 1,075,28 (USD 1,060) was injected into the local economy during this period, an average KES 67,206 per month. The figure shows that in March 2018 alone, nearly KES 140,000 was injected into the local economy by Organi Ltd through direct purchases of roots from farmers. The figure further shows that the cash injection into the rural economy generally increased, albeit slowly, during this period, a reflection of increase in root supply to Organi. The data therefore shows that farmer linkage to the OFSP value chain has benefited the rural economy through cash incomes earned by fresh root suppliers.

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8 Some farmers objected to this strategy of free transportation by Organi for farmers with high volumes because it discriminates against smallholder farmers in terms of cost of delivering the roots to Organi Ltd.
5.2 Fresh root processing into puree

The processing of OFSP roots into commercial products has a relatively short history in Kenya. In the early stages, roots were processed into flour by grating, drying, and then milling. The idea was that the flour would then be used for making commercial bakery products. At the time the SUSTAIN project was launched in western Kenya the coop society was already producing OFSP flour. The flour was, however, mainly sold directly to consumers for use in home-baked products such as mandazi and chapati, and in the preparation of local baby foods, especially porridge. Similarly, when Organi Ltd was being incorporated the initial intention was to process OFSP roots into flour for use in industrial baked products. Indeed, the first line of investment by Organi Ltd was in equipment for producing OFSP flour. The company was motivated, in part, by the desire to help increase income opportunities for women and end the culture of ‘exploitation by middlemen’. As the company founder explained:

“It was my way of giving back to my community. I decided to invest in Organi because I felt it would provide income to women and uplift their standards of living. I grew up witnessing how middlemen exploit sweetpotato farmers through unfair measurements (bags). Right from the beginning we chose to do business differently, to profit farmers.” [Director, Organi Ltd]

Proof of concept studies conducted elsewhere, however, found that the processing of roots into flour for use in industrial baking was not cost-efficient. Consequently, Organi Ltd quickly converted into processing roots into puree, a mash made from cooked crushed roots. Puree production started in 2015 (Bocher et al 2017) and was preceded by coordinated effort, initially largely driven through partnerships involving CIP, Organi Ltd, and Euro Ingredients Ltd (EIL). Under this partnership, EIL supported the procurement of appropriate equipment and the experimentation of their usage in OFSP root processing.

Right from the beginning the operations at Organi Ltd encompassed a series of research programs, through partnerships between Organi Ltd and research organizations, especially CIP. The partnerships were to enable Organi Ltd, CIP and other partners to learn about the product (the puree), the final product (OFSP bread) and the needs of the market. CIP needed to convince the private sector partner about the viability of using OFSP in bakery products. As a new small start-up company, Organi Ltd needed to learn about the market for its
product, the puree, which was a completely new concept in the baking industry in Kenya. The baking industry, dominated by wheat flour, needed to know the right mix of ingredients incorporating puree. At the same time, it was not clear how consumers would respond to bakery products made from sweetpotato, a traditional staple food considered by some consumers as an inferior food for low-income consumers. Therefore, partnerships involving CIP and the Natural Resources Institute (NRI), Organi, the industrial bakery firm EIL, and the farmers and consumers (i.e. a series of public-private partnerships) were forged for experimentation, learning, and overcoming the obstacles to usage of OFSP in industrial baking.

The first line of research was the development of a recipe for consumer-preferred OFSP-based bread. This line of research was undertaken through a partnership involving EIL, Tuskys Ltd, and CIP. CIP, jointly with EIL, provided the technical and scientific expertise needed to experiment with different recipes, with financial costs met by CIP. Tuskys provided industrial experience regarding consumers of bakery products and equipment for test baking. Details of Tuskys involvement in this line of research and the ultimate consumer taste-tests performed by it are discussed in the next section. This line of research resulted in the launch by Tuskys of sweetpotato bread with 40% sweetpotato puree and 60% wheat flour. Other OFSP baked products namely, buns and galette bread, were also launched.

Following the launch of OFSP bread, Organi Ltd, jointly with the SUSTAIN project and the Ministry of Agriculture, intensified their efforts to mobilize farmers to produce roots for processing. Large numbers\(^9\) of farmers were recruited and brought into production. The partnership assumed that Tuskys would go full-throttle in the production of sweetpotato bread and urged recruited farmers to expand OFSP production. One of the partners even urged Tuskys to shift fully from wheat to sweetpotato bread containing 100% OFSP puree. However, Tuskys seemed to have had a different strategy. It decided to start small on OFSP as it gauged consumers’ response\(^10\). This lack of coordination between Tuskys and Organi Ltd and its partners resulted in both opportunistic and coordination risks, and a significant bottleneck in processing of roots as Organi Ltd failed to absorb most of the roots produced at the peak of the season.

Transactions between Tuskys and Organi Ltd entailed a significant degree of coordination failure. Specifically, Tuskys' failure\(^11\) to sufficiently invest in complementary processing facilities and services for producing large volumes of OFSP bread, which could absorb all the puree produced by Organi Ltd, resulted in significant coordination risks associated with procurement of fresh roots from farmers. Moreover, given the nature of the market, at the time being characterized by a single monopoly\(^12\) puree buyer, the transaction between Tuskys and Organi also entailed a significant amount of opportunistic risks. At the same time, Organi Ltd was the sole producer of puree. Under this environment, and as predicted by theory, the ensuing coordination failure resulted in low investment by both parties (Tuskys in less OFSP bread and Organi Ltd in less puree). The consequence is that both Organi Ltd and Tuskys invested in lower product volumes than desired. Figure 3 presents the volume of roots purchased by Organi Ltd and puree supplied to Tuskys. The figure shows that root supply fluctuated around 5–7 tons per month during the first six months. The puree sales during the same period followed a similar but predictable trend with the average being around 2.5 tons per month.

\(^9\) It is estimated that up to 200 farmers were recruited into OFSP root production.

\(^10\) Tuskys indicated that it “realized through internal research” that OFSP bread is specialty product and that it would not be fast-moving as the rest of partners believed.

\(^11\) Tuskys’ action was on the other hand driven by the concern that i) Organi may not be able to consistently deliver sufficient amount of puree and ii) consumers may not like the OFSP. In the former case, one Tuskys official indicated that there was concern that Organi Ltd was overdependent on the SUSTAIN project and would find difficulties operating on its own after the project wound up.

\(^12\) Tuskys was awarded a 2-year sole buyer status through an agreement jointly reached by Organi and CIP.
The procurement of roots, however, increased rapidly from January 2016 reaching its peak in April 2016 when nearly 40 tons\(^{13}\) were received by Organi Ltd. The rapid increase in OFSP root supply was the result of an intensive campaign by Organi Ltd, the County DoA, the coop society, and SUSTAIN project. The root procurement then sharply dropped and currently fluctuates around 4–5 tons per month. Notably, while the root procurement increased sharply during the first half of 2016, puree sales to Tuskys remained nearly constant, and exceeded 5 tons per month in just three months. The figure clearly shows that there were coordination failures among the actors in the value chain that reached a climax in April 2016. The sweetpotato root glut in 2016 also demonstrates the monopoly power that the puree buyer had over the rest of actors in the value chain. It seems that the buyer used this power to dictate the volume of puree supplied to the level that suited its extent of investment effort\(^{14}\) in the value chain. The resulting coordination failure most affected the farmers, the coop society, and Organi Ltd.

Most farmers lost a considerable proportion of their roots because the factory could not absorb all the roots produced. During the 2016 episode, farmers were only allowed to deliver roots to Organi Ltd after express permission and clearance to harvest. This strategy was used by Organi Ltd to store the roots in the soil and ease congestion. Most farmers ended up not receiving the clearance to harvest roots. The most affected farmers were those who rented land used for OFSP production. At the end of agreed rental period, some were forced by land owners to harvest their crop and release the land for other tenants without a market to sell their roots. The harvested roots could not be sold in the local market as most traders needed white- or yellow-fleshed sweetpotato. As one farmer narrated during one of the focus group discussions:

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\(^{13}\) At the price of KSH 14/kg paid to farmers, Organi Ltd effectively injected nearly than KSH 0.56 million (approximately USD 5,500) into the community in April of 2016 alone, a significant cash injection into a rural economy.

\(^{14}\) The low level of investment effort by Tuskys resulted in opportunistic risk in the value chain, further exacerbating coordination failures.
“Organi Ltd would not give us to the go-ahead to harvest our crop. So, when the landlord wanted his land back, I harvested the roots and tried to sell it as other roots. But no broker was interested, even in giving low price. Some used the incident to punish us because we stopped growing the usual varieties for them. I did not know what to do with the roots, so I gave some to cows and some to my neighbors. But the roots were too much. A lot went to waste, rotted in the field.” [Female farmer and member of coop society]

This viewpoint was further corroborated by the SUSTAIN project liaison officer at county DoA:

“The campaign (i.e. farmer mobilization) led to massive response. Farmers produced a lot of roots. Eventually, due to lack of market, a lot went to waste. Farmers harvested and dumped roots at Organi and the coop society. Heaps of roots rotted at Organi, and others at the coop society. Some farmers challenged Organi: ‘You told us roots will be soggy after 3-4 months. It is now more than 4 months and you are still telling us to wait. Why? Here are your roots’.”

As indicated by the agriculture officer, some farmers ignored the restriction by Organi Ltd and harvested and delivered their roots to either the coop society or Organi Ltd. The majority of the roots delivered were formally received and receipted by the society and Organi Ltd. This, however, encouraged even more farmers to disregard the embargo and harvest and deliver roots to Organi Ltd and the society. Consequently, there were large heaps of roots in both premises. Both the society and Organi indicated that they did not want to turn farmers away because it would have escalated the anger displayed by some farmers. A staff member at Organi Ltd remarked:

“We wanted to ensure that the situation did not spiral out of control and become violent. We therefore received and receipted all the roots farmers delivered, even though we could no longer process them into puree. We made a promise to farmers and wanted to be fair, by sharing in their loss, and to keep our promise even when it was costly to do so.”

Farmers also reported loss of trust of the labor they hired for field operations, especially harvesting, because of inability to pay them from the sales of harvested OFSP or due to late payment; loss of revenue because of being forced to keep the OFSP crop too long in the field, thus missing to plant early the next season; loss of trust with landlords because of failure to harvest OFSP crop in the agreed/rental period.

The loss incurred by the coop society and Organi Ltd were twofold. First, both paid towards some of the costs of roots farmers delivered to the premises but that could not be processed. Both organizations had to draw down their cash reserves to meet these expenses. Second, both the society and Organi Ltd lost the trust of the farmers. In the case of the society, the members blamed leaders for leading them into unstable business and causing them to lose money. Many of them have stopped participating in the society activities. The remark by one of the leaders summarizes this point:

“Many farmers were very angry with the 2016 episode. Although some were bold and brought their roots to the society, many did not even harvest their fields. The losses were huge. Farmers blamed the society for misleading them that there was going to be market for all OFSP roots they produce. At the height of the ‘market collapse’, we had a big heap of roots rotting here in the society compound. As result, the majority of our members stopped growing OFSP and no longer want to hear anything about growing OFSP for Organi Ltd.” [Leader, coop society]

The exit by most farmers explains the sustained drop in volume of roots procured by Organi Ltd since the mid-2016.
Organi’s factory had the capacity to process much higher volume of roots into puree than it did during the 2016 episode. It, however, did not have the cold storage facility that could hold puree for long. Thus, its operations were premised on immediate shipment of any processed puree to Tuskys to avoid spoilages. Puree was shipped in medium-sized cooler boxes using externally purchased ice blocks. Organi Ltd did not also have a facility that can store unprocessed sweetpotato roots and was reluctant to install a cold storage facility, another case of underinvestment in the value chain. This meant that roots arriving at the factory had to be processed within two to three days. The perishable nature of the roots increases the transaction costs of procuring and processing roots from farmers and was the subject of the second research program at Organi Ltd. This research program involved a partnership between NRI, Organi, and CIP and focused on finding a low-cost method of extending the storability of OFSP roots. The aim of the research was to find a way of smoothing the supply of OFSP roots to Organi Ltd over the whole year. At the time of the 2016 episode, the research program was only in its early stages. It is still on-going in 2018.

A third line of research, also aimed at addressing the perishability of the transacted product, focused on finding ways of extending the shelf life of puree under ambient conditions. That would allow Organi Ltd to process all the roots delivered by farmers and store the puree for future sales. This research program involved a partnership between Organi Ltd and CIP. Although in its infancy at the time of the 2016 episode, it has now identified a way of extending the shelf life of OFSP puree using chemical preservatives.

In summary, in 2016 the OFSP value chain, though dealing with highly perishable products, operated without an appropriate storage system. The nascent nature of the value chain therefore exacerbated the losses during the 2016 episode.

5.3 Production of OFSP bread and other commercial products

The idea of developing sweetpotato bread was in many respects a timely venture for Tuskys which was pursuing its business model of product differentiation based on healthy foods in its bakery and prepared and cooked meals. Prior to the work leading to launch of OFSP bread, Tuskys was already selling carrot bread, carrot chapati, and a range of healthy baked products including wholegrain/wholemeal, sugar-free, brown, and multigrain breads. It was already considering developing a recipe for and launching a sorghum bread jointly with scientists from a local Kenyan university at the time CIP approach it with the idea of an OFSP bread. Tuskys therefore readily embraced the idea of developing baked products containing OFSP. The challenge was how much wheat to substitute with OFSP puree. In addition, the Tuskys bakers needed to learn how to bake the OFSP puree-containing bread to optimize bread features such as softness, color and taste. Matching the bread features to consumer expectations and demand was one of the main research activities undertaken through the partnership involving Tuskys, CIP, and EIL.

Support for the production of OFSP products within the Tuskys management was also relatively high. A senior Tuskys bakery staff member noted that top management viewed it as a real business opportunity and that some took a very keen interest in making it successful. Some of the members of the top management at Tuskys even participated in the internal taste-testing of the products during various stages of their development and gave detailed feedback that was used to refine the recipe. However, there were frequent

15 Low cost charcoal cooler storage units, that rely on evaporative cooling, have been used in Kenyan horticultural industry and can be easily adapted for root storage.

16 While not directly involved, farmers had to be recruited into the research program involving private sector firms because roots for storage experiments needed to be grown, harvested and handled in specific ways. Hence one can argue that both farmers, and the county department of agriculture, which provided technical agricultural advisory services, were peripherally involved in the partnership.
and considerable changes in Tuskys management, and also internal management problems that often undermined this support and slowed the progress. For instance, a last-minute change in one of the top management positions prior to introduction of OFSP products into the market led to cancellation of the planned robust and widely advertised launch by the marketing team. Eventually, a recipe was developed and subjected to taste-testing among consumers in stores located in low, middle, and high-income neighborhoods of Nairobi. The results showed consumer interest in OFSP-based products and that consumers generally liked the OFSP bread. There were plans to develop a recipe for cakes, but this was abandoned when production of puree changed from using peeled roots to unpeeled. The production of the OFSP products, however, started at a slower pace than the CIP-Organis team had expected, because Tuskys treated them as specialty rather than mainstream products.

The introduction of OFSP-based products into Tuskys baked products lines required training the bakery staff in how to incorporate the puree into the wheat-flour dough, and the correct times for proofing, baking and cooling. The bakers specifically needed to know the right texture for OFSP bread, molding time, timing of removal and oven temperature. These activities affect the softness, formation of crust, and browning which have an impact on the physical appeal of the bread. Hence, prior to the launch of the OFSP product line, the bakery staff (six men17) went through a two-week on-the-job training program. All the staff trained were based at Tuskys central bakery, Nairobi, where specialty bakery products including OFSP bread are baked. Tuskys also purchased new equipment, namely an oven and mixer, during the process of developing the OFSP product lines. However, this was due to a general bakery expansion plan by Tuskys at the time.

The procurement of puree used for baking the OFSP products by Tuskys has changed over the time. Initially OFSP puree was shipped by Organis directly to Tuskys central bakery using a public transport system in cooler boxes with ice blocks to prevent spoilage. Since 2017, puree has been transported to Nairobi by Tuskys trucks which would otherwise be empty when they return from delivering products to Tuskys store in Kisii. The shift to using Tuskys trucks was aimed at reducing the risk of microbial contamination and loss through spoilage and theft.

Tuskys does not have a cold storage facility at its central bakery section, hence puree has to be utilized within three days of arrival at the central bakery. The lack of cold storage facility contributed to the 2016 episode of root waste because Tuskys could not absorb the extra puree and store for later use. Interestingly, Tuskys indicated that it has been receiving lower than needed volume of puree from Organis and that this has constrained its expansion of the OFSP product line. For instance, Tuskys indicated that its plan to expand the baking and distribution of OFSP products to Kisumu and Kakamega consumers was suspended due to shortage18 and irregular supply of OFSP puree. The coordination failures between the two partners has resulted in each blaming the other for inadequate services.

Apart from the low volume of puree bought by Tuskys, timely and full payment for purchases have also been major issues. While the contract between Organis and Tuskys stipulated that payment would be within two weeks of puree delivery, payments are often delayed for up to two months. There were also incidences of underpayments for puree consignments received. Overall, there has been a high degree of uncertainty in the

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17 Most of the bakery staff are men, “because bakery activities involve heavy lifting. Women do lighter jobs such as slicing and packaging.”

18 According to Tuskys, the shortage of puree is due to low root supply to Organis Ltd and bad weather (e.g. drought). It cited the case of October-December 2016, when there was no puree at all causing a two-week outage of OFSP products from the shelves, which it attributed to bad weather. However, it seems that the lack of puree during that period could be related to the root glut and waster earlier that year.
timing of payment by Tuskys. These delays trickle down to the farmers. The finance officer at Organi Ltd remarked:

“We hardly ever get paid for the puree we deliver on time. Delays of more than one month are common. This hurts our relationship with farmers. We often have to turn to the director for money from her own sources to pay farmers for their puree as we wait to be paid by Tuskys. And when payment eventually comes, it is not always the exact amount expected.”

The sentiment about delays in payment by Tuskys was corroborated in all the focus group discussions conducted. Farmers indicated that delayed payment was the biggest challenge they faced as suppliers of OFSP roots to Organi Ltd. One farmer noted:

“Organi promised to pay us within two weeks, but that has never happened. We usually get paid after one month. This makes it hard to pay for labor (especially for harvest) who are used to being paid within a few days after harvest. One can therefore not budget school fee payment with OFSP money.”

[Male farmer and member Ng’uono Self Help Group]

The above discussion underscores and corroborates the earlier argument that transactions between Organi Ltd and Tuskys have been characterized by high degree of uncertainty (hence high transaction costs) and opportunistic risks. Under these conditions one would not expect that Organi will invest a lot of effort and finance into expanding the production of puree, unless there is a drastic change in the way business is done. This partly explains why puree has stagnated at a low level of five tons per month, about half of the initial production level. That is, as theory indicates, puree production reached an equilibrium level at half the initial average monthly production volume prior to the 2016 episode and the repeated late and uncertain payment that ensued.

This low-level equilibrium state has been exacerbated by the failure to renegotiate the terms of agreement between Organi and Tuskys. The case in point is the price of puree. The initial price of KES 60 per kg for the puree was agreed in 2014 but at that full details of actual pureee production and transportation costs were not available. The price was to be revisited after these costs were fully known. It took Organi Ltd a lot of effort to get it increased to KES 65 per kg. Efforts to further adjust the price upward owing to high costs of root procurement and transportation have not been successful. Tuskys has maintained that the current price is fair.

Organi’s efforts to renegotiate puree price emanates from the farmers’ clamor for a higher root price. Farmers in the focus group discussions argued that the current price of KES 14 per kg does not reflect the changes that have occurred in the cost\(^{19}\) of production. It may also explain why Organi has decided to circumvent OFSP root procurement through the coop society, which wanted to levy KES 1 per kg as a transaction fee on the roots it handled. This would effectively reduce farmers’ payment by the same amount or force Organi to pay extra (i.e. KES 15 per kg), further reducing its profits.

Most farmers, however, indicated that they continued to grow OFSP for Organi because of certainty about the price paid. All the focus group participants indicated that, despite the delays in payment, Organi pays the promised price of KES 14 per kg, regardless of supply situation, and that payments are usually exact. One farmer summarized their decision to continue growing OFSP for Organi as follows:

\(^{19}\) In one focus group discussion, farmers argued that the root price of KES 14 per kg was negotiated when labor cost was KES 150/day, compared to current rate of KES 250/day.
“Organi’s price of KES 14 per kg of roots is far better than what brokers pay when there is plenty of sweetpotato here. And the other advantage is that there is no difference in production process between OFSP and other types of sweetpotato.” [Male farmer and member of coop society]

5.4 Consumer demand and perception for OFSP bread

The low investment by Tuskys in the production of OFSP products, owing to limited volumes of puree produced by Organi, has resulted in a situation where supply of OFSP products outstrips demand. A consumer study conducted in six Tuskys stores in Nairobi in parallel to this study found that cases of OFSP being sold out quite early in the day\(^\text{20}\) were very common. All six stores reported running out of stock, on average one or two days a week. Two of the stores where this was common received, on average, only 40 loaves of OFSP bread per day during the three-week study period.

The consumer study also found that majority (50%, n=141) of OFSP buyers are salaried employees, mostly middle-aged with an average age of 35 years. They had, on average, 15 years of schooling, which is equivalent to secondary level of education. These findings suggest that consumers view OFSP bread as a specialty product, which supports the position taken by Tuskys. The literature (Popkin, 1998; Swinburn et al, 2011) indicates that middle-aged income earners tend to be health seeking and are therefore more likely to purchase products that are perceived to be healthy.

Regarding the perception of the OFSP bread, the majority of study respondents indicated that they decided to buy OFSP bread because they considered it to be a healthy food. Indeed, more than 95% of buyers indicated that they thought that OFSP is a healthier bread that white wheat bread.

![Figure 4: Segmentation of OFSP bread consumers](source: Consumer survey data, 2018.)

Results also showed that more than 70% of the consumers learned about OFSP bread from the supermarket\(^\text{21}\) (Tuskys), with an additional 18% learning about it from friends. This finding suggests that Tuskys has also

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\(^{20}\) In some cases, OFSP bread was sold out as early as 12.00 noon.

\(^{21}\) Tuskys displays a small promotional banner on OFSP bread on the shelf containing the bread. The banner provides brief information about the OFSP bread, among others.
underinvested in the promotion of OFSP bread. It corroborates the argument by Tuskys’ bakery staff that the launch of OFSP bread was weak.

5.5 Supermarkets and the smallholder linkage to the OFSP value chain

Modernization of value chains, and especially linkages to supermarkets, tend to work against smallholder farmers. Part of this exclusionary tendency of supermarket value chains is due to the stringent requirements they have over their suppliers. These requirements are often drawn up to meet the needs of increasingly discerning consumers (Louw et al, 2007; Reardon and Minten, 2007; Neven et al, 2009), especially those experiencing increases in incomes. Developing-country domestic supermarket chains have also tended to adopt stringent requirements when the products being traded have the potential to cause food safety-related health hazards to consumers. Such requirements are usually disguised as consumer protection measures and have included stringent, costly-to-implement food safety measures encompassing a system of signaling compliance (through third party certification) and traceability. Third party certification is especially common when credence attributes of the product being traded are the focus of the requirements. Moreover, these stringent standards have mostly been applied to fresh produce, especially fruits and vegetables.

In the OFSP value chain, farmers do not directly supply Tuskys supermarket. Farmers were therefore subject to the requirements of the intermediary, Organi Ltd. These requirements included:

- Planting date should be observed
- Plant in flat beds\(^{22}\) not mounds, preferable prepared using oxen
- Harvest 3–4 months from date planting, but after clearance from Organi. Harvest with oxen preferred
- No damaged/injured/bruised roots
- No weevil-infected roots
- Root size—should not be very small (non-marketable). No upper limit on size

Most of these requirements deal with agronomic and physical quality attributes. There was a requirement about weevil infestation. However, the focus was not on food safety, but rather on the fact that weevil infected roots develop black spots which can taint the color of puree, hence impact the physical or aesthetic attributes of the final product. These requirements do not need costly third-party certification and consequently farmers have complied with them relatively easily. None of the farmers who participated in the focal group discussions reported experiencing problems meeting Organi’s requirements on the fresh OFSP roots. The farmers indicated that Organi was only strict in enforcing size requirements, although even this requirement was relaxed when the factory shifted from peeling roots to washing. Most farmers also noted that Organi has generally been less strict in enforcing its root quality requirements since the 2016 episode. This could be because it has been struggling to get enough supplies of fresh roots. So, in contrast to the predictions in the literature, participation of smallholder farmers in OFSP root production for Organi Ltd has not been affected by the linkage to the Tuskys supermarket chain.

Two other reason why smallholder OFSP root producers have not been affected by the linkage to Tuskys relates to the nature of the traded product. The OFSP fresh root producers supply a product (roots) that go through two stages of processing; high-temperature processing destroys most pathogens in the second stage. As the value chain develops further, and OFSP buyers become more discerning about food quality and safety and ethical issues, Tuskys might start asking about ethical issues around root production and production and

\(^{22}\) This requirement targeted root shape. Roots from flat deep beds tend to have regular shape.
handling practices. This is, however, likely to take time to emerge. Food safety issues could also emerge when puree, which has been subject to limited heat processing, starts to be sold for use in home-cooked meals.

5.6 Meeting industry requirements and preparing for the demanding consumer of the future

The above section has described how the OFSP value chain has, to date, not been characterized by stringent food safety standards, especially for fresh root production. However, food manufacturing entities are subject to public health requirements relating to food safety. These requirements can be costly for a small startup company, such as Organi, to implement. In order to place Organi on the path to complying with the basic good manufacturing practices (GMP), CIP partnered with EIL to train Organi’s staff, especially food handlers, on hygiene and food safety. The training included both lectures and hands-on sessions, with the latter designed to reinforce the former. It covered basic requirements for puree production (and by extension baking) and included:

1. Food safety procedures
2. Building requirements - design flow
3. Food handlers’ hygiene
4. Pest control
5. Water and sanitation

The training did not focus on Tuskys at the time, neither had Tuskys demanded that Organi complies with industry food manufacture requirements.

Since it was established, Organi Ltd has used a rented facility. One of the weaknesses of the facility has been that it was not designed for food manufacture. An audit conducted by CIP and University of Nairobi food scientists revealed that the facility did not comply with most GMPs (Malavi et al, 2018). To address this weakness, Organi Ltd has plans to construct a puree factory that will be designed to comply with the public and industry GMPs. It has already purchased a piece of land on which it plans to build its new premises, including the factory. The land is located a few kilometers from the current facility and will therefore still be located within the leading sweetpotato growing area of Nyanza.

Another equally important investment Organi is currently making is in the OFSP seed system. Until recently, the firm depended solely on the SUSTAIN project-facilitated seed system. The OFSP vines for use by farmers supplying Organi were obtained from decentralized vine multipliers (DVMs) established by CIP. CIP agronomists trained the multipliers jointly with the county DoA and subsequently back-stopped them in terms of technical advice through regular field visits. The DVMs were strategically located in all the SUSTAIN project areas and CIP later established DVMs in Bungoma and Busia counties. Farmers supplying Organi with roots have sourced vines from these CIP project DVMs, based on availability and demand.

To establish its own seed system and gain greater control of supply and quality of vines, Organi has moved to establish its own seed multiplication field close to the site where new the factory is to be constructed. The land used for seed multiplication was also purchased by Organi and is conveniently located in the wetlands, which will mean the vines can be irrigated during dry periods. The site was established in late 2017 and had a crop at the time of this study. The county DoA and a CIP agronomist were both involved in the establishment of the vine multiplication field; it is unclear whether the former will continue to provide technical support to Organi Ltd,
which currently has no trained agronomist, once the project ends. The SUSTAIN project liaison person at the county DoA stated:

“We have been backstopping Organi’s farmers and the DVMs because CIP was paying the facilitation costs (meaning field allowances and transport). We are not sure if Organi will continue to facilitate the county agriculture staff to provide technical and agronomic support to farmers and its vine multiplication unit. Without the facilitation, it will not be possible for the county agriculture staff to play this role.”

The other issue is that Organi’s multiplication site is too small to produce sufficient quantity of vines to supply its farmers with planting materials. At the same time, Organi did not plan to maintain and continue using the current network of project-established DVMs as source of vines for its farmers. Clearly, unless there is a different strategy of dealing with the demand for clean vines by OFSP farmers, it is likely that access to quality vines will become a major bottleneck to the further development of the OFSP value chain in Kenya. In particular, the lack of ready access to clean vines will encourage recycling of own-vines for longer periods, which will reduce yields and profitability, and in turn erode farmers’ interest in growing OFSP.

Notwithstanding the OFSP seed system constraints, investment in the GMP-compliant facility will be a major leap towards breaking out of the low-level equilibrium state in which Organi has been operating since its establishment. So why is Organi taking steps to invest now? Unlike previously when Organi supplied only one market (i.e. Tuskys), the market for OFSP puree has started opening-up, with new industrial bakeries now starting to use OFSP puree for their products. For instance, at the time of this study, Organi was supplying a second industrial bakery, also a Kenyan supermarket\(^{23}\) chain, with outlets in many major towns. Currently the supermarket chain is baking and selling OFSP bread in its outlets in Kisumu, Eldoret, Bungoma, Kapsabet, Kericho, and Nairobi. It plans to expand production and sale of OFSP bread into all its outlets. Organi was actively looking for new puree buyers to diversify its market base. The increase in puree users will likely spur competition and minimize, if not eliminate, opportunistic risks while increasing the prices earned by puree and root producers.

Organi is also likely to have been prompted to invest in their new factory due to the threat of new companies entering puree production. One new firm was setting up puree processing facilities at the time of this study. It is targeting the same counties from which Organi currently sources roots. The decision to relocate and build a GMP-compliant food processing factory therefore seems to be motivated by Organi’s desire to consolidate its base and take first-mover advantage.

5.7 Location of Organi in the OFSP production area

As indicated in the methodology section, the theory of industrial organization indicates that it is more efficient to situate processing of bulky agricultural products in the production areas. Sweetpotato roots are both bulky and perishable. Yet the baking of OFSP bread by Tuskys is currently done only at Tuskys central bakery in Nairobi. Organi Ltd’s OFSP root processing factory was therefore, in line with von Thunen’s theory of industrial organization, located in western Kenya, the OFSP producing area. The factory is in Kabondo, Homa Bay County, which is the leading market-oriented sweetpotato growing area of Kenya. The county produced approximately

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\(^{23}\) The supermarket chain started procuring puree from Organi in February 2018 and has gradually increased purchases to 450kg/week, with further increase in volume purchased expected as it expands to other towns.
96,000 tons of sweetpotato roots in 2013/14. It sells about 60% of the production through a network of traders (Tedesco and Stathers, 2015). The new puree processing factory will also be established in Kabondo.

The location of the puree factory in Kabondo also served to reduce the costs of sourcing roots from other OFSP growing areas because of its central location. Organi relies on roots grown in several other sweetpotato growing counties. Initially, it obtained the majority of its roots in Homa Bay and adjacent counties, notably Migori, Kisumu, and Siaya, and to a limited extent Nyamira. However, to expand the production base, and in view of the depressed production following the 2016 collapse of the root market, procurement areas were expanded to included Busia and Bungoma. The current and future location of the factory therefore serves to reduce the hauling costs from these new far-flung sources.
6. Summary of findings and conclusions

This study used qualitative and quantitative methods to assess the partnerships forged in implementing output area #3 of the SUSTAIN project, namely the development of the OFSP value chain. It focused on the drivers of early interest and adoption of OFSP processing by commercial partners. The study also examined the incentives that can or have been created to attract private sector (co)investment in OFSP value addition through processing.

The study finds that the OFSP value chain was characterized by high transaction costs and coordination and opportunistic risks due to the characteristics of the OFSP production and procurement process, as well as the structure of the initial market for puree. As suggested by theory, these problems posed significant hurdles to the development of the value chain during the early stages resulting in limited investment by the two main actors (i.e. Organi and Tuskys) in the essential services, facilities, and equipment needed to make the value chain work efficiently. The result was the classical case of low-level equilibrium. This was characterized by lack of investment at all levels: in modern food processing facility by Organi, in the OFSP fresh root supply base by the public sector, in cold storage facility to hold excess puree by Organi and Tuskys, and in expanded production of the OFSP products line by Tuskys.

This study also finds evidence that interest from the private sector in investing in the OFSP value chain is due to institutional innovations spearheaded by the SUSTAIN project. These reduced the high transaction costs and coordination failures that characterized the early establishment of the OFSP value chain. This has, in-turn, created incentives for private sector partners to invest at various levels of the OFSP value chain in Kenya. For example, an additional industrial bakery has started using OFSP puree to produce baked products and is selling to consumers in several major Kenyan towns. Similarly, while Organi was the only fresh OFSP root processor, a new firm had now started implementing plans for construction of facilities for processing fresh OFSP roots into puree.

Key institutional innovations that have resolved coordination failures in the OFSP value chain by lowering transaction costs, and coordination and opportunistic risks are:

- **Collective action** – the decision to use farmer organizations to mobilize interest in OFSP production, recruit OFSP producers, coordinate planting, and aggregate roots reduced transactions costs associated with search and screening of growers, negotiating terms of exchange including price and root quality specifications, and monitoring and enforcing the terms of exchange. Through sale of roots as a group through the coop society, the value chain harnessed economies of scale to reduce produce aggregation costs and per unit transport costs, which increased the efficiency of root procurement.

- **Public-private partnerships** forged at the various points and stages of the value chain establishment availed expertise (human capital) and financial and physical assets, and helped minimize coordination risks and resolve some of coordination failures that characterized the OFSP value chain during its early stages. These partnerships provided farmers with access to agricultural (agronomic and entomology) information; Tuskys with expert food science knowledge; Organi with physical assets (equipment) and capacity building in food manufacture and handling; CIP with new knowledge in OFSP processing, storage and utilization; and Organi, CIP, and Tuskys with information about consumer taste evaluation and perception of OFSP products. These skills, assets, and services can be costly to undertake and a barrier to entry for a small start-up company. The various partnerships forged by the SUSTAIN project also helped minimize or eliminate some of the barriers to entry into the OFSP value chain.
• **Market competition** – CIP’s decision to encourage participation of other actors was one factor that motivated Organi and Tusks to invest further in the OFSP value chain. Organi’s decision to construct a new modern processing facility is a likely consequence of another large industrial baker, and a Tusks competitor, beginning production of OFSP-based baked products. It was also likely stirred by entry by another puree processor into the value chain. The entry by a new producer of OFSP baked products who is interested in reaching more towns than Tusks is also likely to stir Tusks to expand production and sale of OFSP into more towns. The ensuing competition for puree portends a brighter future for OFSP root processors. Moreover, entrance by more firms into the puree production is expected to lead to expansion of OFSP production and benefit more farmers and rural economies.

• **Vertical (backward) coordination into seed system**—CIP through the SUSTAIN project facilitated access to quality planting material that increased yield and income. The network of DVMs reduced the cost of access (including time and transport). Linkage with a source of replacement seed ensured that DVMs can obtain this when needed. One issue that needs careful consideration is, how to keep the seed system going in the post-project era? Organi has taken steps to establish its bulking site. However, meeting the demand for quality seed as production expands, pulled by increased demand for roots by new entrant in puree processing, is likely to prove a challenging task.

Based on the evidence presented above, this study concludes that the partnerships forged during the establishment of the OFSP value chain and the institutional innovations in the form of collective action, public-private partnerships, market competition, and vertical coordination have helped minimize transaction costs, and coordination and opportunistic risks, and resolve coordination failures that characterized the OFSP value chain during early stages of establishment. It also concludes that the reduction in risks and resolution of coordination failures has, in turn, created incentives for, and interest by, private sector actors to invest in the value chain.
References


McCann, P. 2016. Location theory. In *Theories of Local Economic Development* (pp. 149-166). Routledge.


Appendix A: List of KII respondents
Appendix 2: Key information interview guides

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A. Tuskys: Bakery manager

1. When did you join Tusky's, and in what role?
   a. How long have you been in this bakery department? How long have been managing the bakery?

2. Why did Tusky's decide to invest in OFSP line of products- Bread and buns?
   b. How easy or difficult was it starting to make things that incorporated OFSP in them?
   c. Did you have to adjust anything to start using OFSP as a raw material? If yes, what? ____
   d. Did you have to change/acquire any machinery or equipment to ensure that you can utilize OFSP?
   e. Did you change any process or methods of products processing to enable you to utilize OFSP? If so which ones?
   f. Did you have to do any additional staff training? If yes who did the training? How was it?
   g. Did you employ any new staff to handle OFSP processing or was retraining enough? [Probe about gender (women/men) employed and why]
   h. What about how you procure raw material, did you have to change anything? If yes, what? How was it?
   i. Did you have to organize any new supply chain and distribution arrangements?
   j. Did you have to overcome any major challenges to introduce the OFSP based products? If yes, please explain.
   k. How did you go through the process of OFSP products development? What role did CIP and Euro Ingredients Ltd (EIL) play? How would things have been different without these collaborations?
   l. Did you/partner conduct any product testing before the OFSP products were launched? Please explain.
   m. Did you have to conduct any special media or communication campaign to introduce the products into the market?

3. Please point out to us any disappointment you have gone through in working with OFSP as a raw material so far? If any, how did you manage the problem?

4. As a bakery manager, how has been your experience dealing with Organi Ltd, a small startup company located 450 km in a rural setting.
   n. What quality control/assurance procedures, if any, have you had to put in place due to this procurement arrangements? (probe using puree handling e.g., receiving, storage, utilization, etc.)
   o. How has this affected the baking process and costs (personnel, time, material) for your department?

5. In general, what quality control/assurance procedures have you had to put in place that are specific to OFSP products? How has this affected the baking process and costs (personnel, time, material) for your department, in general?

6. Have you adjusted the weight and prices of the OFSP products you are selling from the time you launched them? If so, why?
Looking to hear- Low demand for the OFSP bread, feedback from customers, reduction in costs of procuring puree, it was a marketing move to get more volumes sold etc. For any mention ask:

What has been the lessons learned in general about pursuing this line of business?

Probe about using OFSP, working with a Organ, collaboration with research org, etc

7. If you to start all over again how would have organized the introduction of OFSP as a raw material?

8. Do you think it makes economic sense working with OFSP as a raw material?

9. Will you continue utilizing OFSP as a raw material in your production system? How do you project the future of OFSP products to look like at Tuskys?

10. In general, are time and skill/human resource requirement for baking OFSP products different from all-wheat products? Please explain

Looking to hear whether special skills are needed, some staff decline to bake the OFSP products, Is it easy to slice the OFSP bread as compared to the white bread (special attention needed?)

11. Lastly, what do you consider as the main advantages of incorporating OFSP in the line of baked products such as bread and buns?

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B. Bakery staff/worker that frequently bakes OFSP products [at Tuskys, Organ]

1. What excites you/like about baking the OFSP bread (and buns)- [Mentions ease of handling the dough, baking time, quality of the products motivates etc.]

2. What do you perceive as the MAJOR challenges in producing OFSP bread? Please explain.

3. What skill / trick have you had to learn while handling OFSP bread that does not apply for other types of bread? How did you learn the new skill/trick, if any?

4. How would you compare time requirements of OFSP bread as compared to baking in terms of the following: [more, the same, less: please explain if different].
   a. Handling the dough
   b. Baking a batch
   c. Cooling
   d. Slicing
   e. ....

5. Do these vary between women and men?

6. What are new procedures, if any, do you now have to adhere to since you started baking OFSP products: Do some of these procedures favor women/men? Explain.

7. In your view, what are advantages of incorporating OFSP in baked products such as bread and buns
C. Director, Organi Limited

1. It has been about 2 years since you started puree processing: what has been the experience dealing with a buyer (Tuskys) located 450kms way from you? [Mentions additional investment? Challenges, opportunities, risks?]

2. The puree processing activity could be referred to as a journey that you have been taking jointly with CIP, Tuskys, Euro Ingredients Limited (EIL)/Antonio and farmers.

What would you say have been the highlights of the partnership with CIP, EIL and farmers? Please explain.

What have been the challenges if any for the partnership with CIP EIL and farmers? [Mentions core-funding from CIP? Mentions training support? Mentions frequent capacity building (hand holding business support provided by the team of partners [does the investor view these as necessary or not?])]

3. If you were to start all-over again, what would you do differently? What would you retain [-guide through startup phase, expansion phase, engaging with farmers, engaging with Tuskys, engaging with CIP working with Antonio.]

What has been your major drive to keep on investing in OFSP.... Does it pay, what do you see as the future of OFSP puree at Organi?

4. Recently you have initiated OFSP bakery products-

a. What motivated this business idea and what’s the future like for the bakery products

b. What, in your view, what are the advantages of incorporating OFSP in baked products such as bread?

5. You are a business located in a rural area, what would you say have been the major challenges, what have been the advantages of such a rural setting? What risks do you foresee?

6. You are an investor located outside the country, how has been your experience running Organi remotely?

7. Lastly, what, in your view, what are the advantages of incorporating OFSP in baked products such as bread?

D. Staff at Organi – Manager and root procurement officer

1. What excites you about OFSP puree processing? – Mentions job creating, income creation, simple applied technology etc.

2. You have been handling How deal with farmers- Contracting? Aggregation, collection of roots, provides any type of training to farmers? Quality issues? How deal with rejects? How deal with refuse- peels and water etc

3. What would you say: i) are the MAJOR challenges in puree processing, ii) is the most challenging stage of puree processing as a business for a startup company? Why?

4. In your opinion, what would interest a new entrepreneur to invest in puree processing? What would also put off such an entrepreneur?

5. What in your view are the risks of engaging in puree processing? Please explain.

6. Having been involved in puree processing at Organi for close to 2 years, do you find puree processing profitable? Feasible business idea? What are the must haves to make it work?
7. You have been working closely with farmers - providing vines, purchasing roots from them, visiting their farms etc. ...
   a. what has been your experience getting farmers to follow Organi’s requirements, if any?
   b. How would you rate the preparedness of the smallholder farmers to supply a startup company such as Organi that has year-round demands?

8. Lastly, what, in your view, what are the advantages of incorporating OFSP in baked products such as bread?

E. Kabondo sweetpotato marketing cooperative - Secretary and chairman (separately)

1. Tell me about your cooperative: when it started, how many members (by gender), what are the main activities.

2. The cooperative has been in existence longer than the CIP led projects came into Kabondo. What would you say has been the highlight of CIP’s presence in Kabondo since 2015?

3. Now tell me about your experience: i) working with Organi Ltd, ii) supplying supermarket (Tuskys). [Ask about root quality requirements, crop managements requirements, volume requirements, root handling practices, price of roots, contracting process]. Do these differ by gender? Please explain.

4. How does the cooperative facilitate participation of smallholder farmers to supply roots to i) Organi limited ii) other processors including the cooperative? [Probe with aspects such as requirements for: membership; crop managements including harvesting time, root handling, technical advice by group designated official/staff, if any; transport, etc]

5. What would you say is the major limitation in getting farmers to meet demands of processors? Do these reasons apply for men and women equally?

6. In your opinion, what are advantages and disadvantages of having the buyer - Organi - in your locality?

7. You have often said ‘the future is orange’ What do you mean by this statement? Do you still believe it? Under what circumstances will you as a cooperative find it difficult to continue supplying OFSP to the market for puree and bread? [If not mentioned, probe with i) price declines, ii) changed contracting terms (e.g., stricter quality requirements – rejection rates), iii) yield declines, iv) ...]

8. What are the kind of risks that the cooperative faces in supplying OFSP roots to i) Organi Ltd, ii) Tuskys, iii) Other buyers?

9. Lastly, what, in your view, what are the advantages of incorporating OFSP in baked products such as bread?
F. The Sub-County Agriculture officer

1. You have been involved in implementation of OFSP activities since 2016, including the establishment of Organi Limited in Kabondo. What has been your role?

2. What would you say are incentives for OFSP commercialization by the various actors in the value chain?

3. In your own opinion what place does Organi Limited have as a starter organization in Homa Bay county? For rural development? Does it set precedence? Do you believe the partnership that has been working to support Organi is on track? What should they consider doing differently to enhance the commercialization process?

4. Now tell me about your experience with farmers: i) working with Organi Ltd, ii) supplying supermarket (Tuskys). [Ask about root quality requirements, crop management requirements, volume requirements, root handling practices, price of roots, contracting process]. What role does MoA have in supporting farmers in this endeavor?

5. How does organizing farmers into cooperative facilitate participation of smallholder farmers to supply roots to i) Organi limited ii) other processors including the cooperative? What do you see as role of MoA in getting this work?

6. What would you see as the major limitation in getting farmers to meet demands of processors (Organi and future ones)? Do these reasons apply for men and women equally?

7. Lastly, what, in your view, what are the advantages of incorporating OFSP in baked products such as bread and buns?

G. Euro Ingredients Limited

1. You have worked with Organi Ltd in developing the infrastructure needed to produce OFSP puree. What kinds of activities did EIL support?

2. What have been the challenges? Breakthroughs? Please explain.

3. What are the equipment needs for i) OFSP puree processing ii) baking OFSP bread? Are these available locally in Kenya? What kind of equipment adjustments does on-going bakery need to make to run OFSP line of products? What would be the (machinery, labor, etc) cost implications of such adjustments? How would these costs differ for bakery operation set up to use OFSP puree from the start?

4. The OFSP puree making process started out with manual washing and peeling of roots and moved on washing and slicing unpeeled roots.
   a. Please explain what really informed this shift: [probe about labor costs, output, quality issues, hygiene and sanitation issues, etc]
   b. Gender implications: How did the change affect women and men employees

5. What specific processes has EIL have to subsidize to get puree processing and OFSP line of products running? Why? How can Organi/Tuskys profitably undertake these activities?
6. Organi Ltd is currently baking OFSP bread. What necessitated this? What is its implication for the development of puree industry?

7. Lastly, what, in your view, what are the advantages of incorporating OFSP in baked products such as bread and buns?

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H. FANEL

1. i) What are the quality assurance training processes you have done/installed at Organi Ltd and Tusky’s?
   Which ones were essential for the kind of market/consumer served by:
   a. Organi Ltd (as i) puree producer and ii) bakery)
   b. Tusks bakery section

   ii) For the non-essential ones, what informed their inclusion?

   iii) In the training processes at Organi Ltd and Tusky, please explain how gender considerations were taken into account, if any.

   iv) How where costs of quality assurance, including training met? [who paid, implications for private sector interest in puree processing and bread making]

2. What specific QA processes has FANEL had to subsidize to get puree processing and OFSP line of products running? Why? How can Organi/Tusksy profitably undertake these activities?

3. At the time when Organi was being set up, it was anticipated that puree preservation would be achieved within a couple of months. About 2 years now and the processor is still not using the preservatives. How has been the journey for search for an applicable preservative?

4. In the absence of a preservatives, how do you think Organi has been affected as a processor? How has these delays affected Tusks as a bakery?

5. What is the future of the storable puree- is this still necessary? still possible? Still a viable pursuit? What would be the cost implications for the puree processor? What would be the cost implications for the bakery?

6. FANEL has conducted several laboratory tests of the puree and of the OFSP bread. What highlights that inform commercialization have come out of such analysis? Have these been communicated to the private sector?

7. Lastly, what, in your view, what are the advantages of incorporating OFSP in baked products such as bread and buns?

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I. CIP (SUSTAIN project manager, Value chain specialist, SASHA project manager)

1. What kind of R&D support (services) you provided to Organi Ltd and Tuskys since you started working with these firms?

2. What has been your experience as a development researcher working with private sector (Organi Ltd, Tusks, Naivas)? Highlight the challenges and breakthroughs.
3. How would the development of puree and OFSP bread (and other baked products) be different without your involvement?

4. How can the private sector be positioned to handle the services you have provided in the absence of a subsidy?

5. Organi Ltd is currently baking OFSP bread. What necessitated this? What is the implication of this vertical integration for i) the development of puree industry? ii) producer linkage to commercial value chain?

6. What is the future of puree processing and production of OFSP bread in Kenya? Do you foresee Organi Ltd and Tuskys continuing these product lines once CIP withdraws. Please explain

7. CIP has been heavily involved in storage research. What have we learned? What, if any, can work for private section/industry? Any of the products of this research being used?

8. Lastly, what, in your view, what are the advantages of incorporating OFSP in baked products such as bread and buns?

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