

Gender dynamics in cassava leaves value chains: The case of Tanzania

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Abstract

There is growing recognition of the importance of African leafy vegetables for achieving healthy diets, particularly amongst low-income households. In Tanzania, cassava leaves are an important vegetable, yet little is known about how their markets are organized and who benefits from participation and how. This study examines the structure of and gender dynamics in the cassava leaves value chain in Mkuranga District, Tanzania. Data was collected through structured and semi-structured interviews, focus group discussions and observations. The findings show that the value chain is in its formative stage, yet, two thirds of the sampled farmers market cassava leaves. While the value chain is dominated by women, participation at different nodes is highly gendered, and so is the distribution of benefits. Private and public institutions urgently need to increase their support to the value chain, given the importance of the leaves in enhancing diets and as a source of income for women. Finally, future research on cassava should consider both tubers and leaves to understand the trade-offs and synergies between them.

Keywords: African leafy vegetables; cassava; cassava leaves; gender; Tanzania; value chains

Introduction

Cassava (*Manihot esculenta* Crantz) is the second most important staple food in Sub-Saharan Africa in terms of calories consumed and it is also the cheapest source of calories (Howeler *et al.*, 2013). Despite growing global attention towards cassava in the scientific community, and more recently in policy circles, it is mainly the tuberous roots that have been researched and promoted through various breeding and value chain interventions and seldom the leaves (in this paper we use 'tubers' and 'roots' interchangeably). Yet, cassava leaves have for centuries been widely consumed in Africa, often making up an important ingredient in the soups and sauces accompanying the staples.

The highest consumption rates (more than 60 percent of the population) of the leaves were found in the Central African Republic, the Democratic Republic of the Congo, Angola, Liberia and Sierra Leone, whereas in countries such as Tanzania, Mozambique, Malawi and Zambia, 40-60 percent of the population consumed cassava leaves (Achidi *et al.*, 2005). With their rich nutrient quality content, cassava leaves can enhance dietary diversity, micronutrient and protein intake and health, particularly amongst low-income households. Cassava leaves are sometimes the only vegetable available, especially during the lean and hungry season (Chiwona-Karltun *et al.*, 1998). Indeed, the omission of cassava leaves in policy and research circles appears to be symptomatic for African leafy vegetables (ALVs) at large (Smith & Eyzaguirre, 2007; Diouf & Ba, 2014; Chagomoka *et al.*, 2014). FAO (2011) and (Bioversity International, 2013 and Smith & Eyzaguirre, 2007) trace this to a complex of factors, including that there are so many different species, that their use is often very localized, that many of them are wild, semi-wild or weedy, and that the (urban/younger) consumers often consider leafy vegetables a low-status food associated with poor, rural lifestyles (c.f.

Chagomoka *et al.*, 2014). However, the earlier lack of interest in ALVs may be changing with the growing recognition of the importance of nutritious and healthy diets (including by the growing middle class), on one hand, and the increasing need for drought-tolerant and pest- and disease-resistant crops due to changing climates, on the other (Cernansky, 2015; Smith & Eyzaguirre, 2007). Several initiatives to promote the production and consumption of fruits and vegetables have also been launched over the last few years, including e.g. the global FAO-WHO Promotion of Fruits and Vegetables for Health Initiative (PROFAV) and the Kobe Framework for promotion of fruits and vegetables production, availability and access and greater consumption on national level. In light of this, there is a need for crop-and-place-specific research on ALVs.

Early documentation of cassava leaves in Africa was done by Lancaster and Brooks (1983). More recently studies documenting the consumption and preparation of cassava leaves in several countries in Africa have been done (Achidi *et al.*, 2005). But we have only been able to identify one value chain analysis covering cassava leaves. This study covered both cassava tubers and leaves in Tanzania (Sewando, 2012). The limited knowledge concerning the structure, dynamics and performance of the cassava leaves value chain has also been observed by Chiwona-Karltun *et al.* (2015) and Donovan *et al.* (2011). Previous research on cassava leaves appears to have been concentrated on quantitative investigations concerning chemical and nutritional content (Eggum, 1970 and Nassar & Marques, 2006), processing methods for removal of anti-nutrients such as cyanogenic glycosides (Achidi *et al.*, 2008; Bradbury & Denton, 2014) and suitability of the leaves as animal feed (Anaeto *et al.*, 2013; Phuc *et al.*, 2000).

With the growing agri-food systems transformation of cassava value chains in Africa (Haggblade *et al.*, 2012; Tschirley *et al.*, 2015), it is important to assess and understand the drivers behind the unfolding diets in southeastern Africa including those related to cassava leaves utilization. With their high nutritional value cassava leaves provide an interesting opportunity for understanding nuances of a more diverse cassava value chain beyond the tubers. In a recent review publication (Adetunji *et al.*, 2015) the authors reviewed potential products that could be developed from cassava leaves and found that it could be a useful food and feed as protein concentrate. A deeper exploration of how cassava leaves markets might work, how they are structured and determining who benefits and how, from participation could shed light on specific intervention points where cassava leaves are concerned.

Nweke *et al.* (2002) have shown that cassava, with reference to the tubers, is not just a women's crop but the more commercialized it becomes, the more men participate. We have not been able to find any similar reports on how women and men are involved and decide in cassava leaves production, consumption and marketing. So far, cassava leaves are largely not commercialized in much of East and Southern Africa. Together with the fact that ALVs are generally described as crops mainly produced and controlled by women (David, 2015; FAO, 2011; Oomen and Grubben 1978), we expect also the cassava leaves value chain to be dominated by women. But to the extent both women and men participate; they may not do so on equal terms. Indeed, access to and control of different nodes of the value chain may be highly gendered, as previous research on agricultural commodity value chains suggests (Njuki *et al.*, 2011; Overå, 1993; Quisumbing *et al.*, 2014b). This also easily translates into unequal distribution of benefits and burdens from value chain participation.

In this study, we consider Tanzania, which is a typical African agro-based economy, where

approximately 80 percent of the population depends on small-scale farming for their livelihoods and around 20 percent of the Gross Domestic Product is derived from the agricultural sector (MAFAP, 2013; Eskola, 2005). Cassava is one of the major staple foods, only second to maize and the crop is cultivated throughout the country, although the main producing areas are the Coastal, Northern, Lake and Eastern regions as well as Zanzibar (Kapinga *et al.*, 2005). Over the last ten years, yields from cassava tubers have increased by 1.18 percent per year, while production has increased by 0.67 percent per year (FAOSTAT, 2015), suggesting a slow process of intensification rather than extensification being underway on an aggregate level. The last years have also marked a surge of cassava tubers as a commercial commodity, which makes the country relevant to consider also in terms of the current status of the leaves. Although Kapinga *et al.*, (2005) report a high nutritional importance of cassava leaves for the Tanzanian population, no statistics are currently available on the harvested or marketed volumes of cassava leaves; a common problem for ALVs (Smith & Eyzaguirre, 2007). Achidi *et al.*, (2005), as noted above, report that 40-60 percent of the population directly consumes cassava leaves.

The overall objective of this paper is to investigate the structure of and gender dynamics in the cassava leaves value chain in Mkuranga District in the Coast Region of Tanzania. It is organized around the following set of broad research questions: What is the structure of the cassava leaves value chain in Mkuranga District, Tanzania? What are the gender dynamics, who participates where, and who has access to, and control over, resources in the value chain? What are the main factors that influence the gendered participation and access to, and control over, resources in the value chain?

The paper contributes with crop-and-place-specific knowledge and information regarding this under-researched ALV, it complements the extensive literature on cassava tuber value chains, and it adds to the growing pool of gender aware value chain analyses. Given the role ALVs can play in fighting malnutrition, not least at a time of increasingly erratic rains and drought and growing pest and disease burdens, there is an urgent need to understand their value chains better. Such knowledge and information can be integrated into fruits and vegetables initiatives for improved nutrition and health (Smith & Eyzaguirre, 2007). As such, the relevance of this paper goes beyond cassava.

A gender analysis should be carried out to understand women's and men's specific roles and responsibilities in the cassava leaves value chain in Mkuranga District, Tanzania. Closing the current knowledge and information gap in this regard can benefit future crop-and-place-specific interventions as well as provide an illustration of how such analyses can be done.

The rest of the paper highlights the importance of gender sensitive value chain analysis in considering agricultural commodities and discusses select aspects pertaining to gender dynamics in agricultural value chains, drawing on the existing body of literature. It presents the conceptual framework that has guided this paper, introduces the study site and describes the data collection and analysis methods and finally outlines the empirical findings on gendered dynamics in the cassava leaves value chain. The paper concludes with a synthesis of the findings and their policy implications.

The case for gender aware value chain analysis

Using an agricultural value chain approach for assessment of agricultural commodity performance is gaining popularity within research and development (UNIDO, 2009), since it allows for an overview of which actors benefit and how. It also provides the ability to examine information flows and dynamics, such as gender relations, between and within

groups of actors (Ribot, 1998; Webber & Labaste, 2007). Yet, previous value chain research has been criticized for not considering the gender issues or other economic, political and environmental aspects that affect value chains (Bolwig *et al.*, 2008). This has partly been traced to the narrow quantitative analytical approach widely used.

Another concern has been that many interventions aimed at improving value chains through the creation of vertical market linkages between smallholders and downstream value chain actors have been conducted under the assumption of a unitary household model (Alderman *et al.*, 1995). Consequently, this assumption has been challenged by gender researchers highlighting the importance of taking into account the gender and intra-household dynamics when studying agriculture (Njuki *et al.*, 2011; Quisumbing *et al.*, 2014a). These researchers recognize that household members have different preferences and do not necessarily pool their incomes, and that resource allocations within the household reflect individuals' different preferences and bargaining powers. Gender inequalities in agricultural value chains may therefore have negative impacts on the food security, nutrition and health of some or all household members. For instance, evidence shows that income controlled by women is more likely to be spent on food and other basic household goods (Kennedy & Peters, 1992), while income controlled by men tend to be spent less on food and revenues may not be equitably distributed within the household (Njuki *et al.*, 2011). This calls for gender aware value chain analysis.

The evidence

Gendered participation and control over resources in agricultural value chains

Previous research shows that participation in agricultural value chains may be highly gendered; between and within functional nodes of the chain as well as depending on the value of the agricultural commodity in question. For instance, studies suggest that women participate in marketing nodes to a larger extent when value chains involve low value products sold at local markets. For avocados in Kenya, the export market was dominated by men, while in local markets with lower marketing revenues women were fully integrated in all parts of the value chain (Oduol *et al.*, 2013; Oduol & Mithöfer, 2014). In Ethiopia, women made up the majority of producers selling poultry at local markets, while marketing by men was higher in larger markets (Aklilu *et al.*, 2007). Similarly, in Kenya, local marketing of horticulture products was dominated by women (Dolan, 2001) and in Tanzania, small scale retailers of perishable goods, such as leaves from pumpkin and cassava, were predominantly women (Eskola, 2005). In contrast, however, women in the Niger delta in Nigeria were found to take the main responsibility of production, processing as well as marketing of cassava, despite extensive cassava commercialization in the region (PIND, 2011). A study from Ghana (Carr, 2008) showed that men and women face different vulnerabilities depending on the crops they grow and sometimes these vulnerabilities are market oriented on a wider level.

Some studies have shown that within agricultural value chains with high value, women often participate in less visible, inadequately acknowledged nodes performing low skilled and low paid work, while men often engage in functions of marketing and other high value activities (Mayoux & Mackie, 2008). Greenberg (2013) showed women workers in the South African wine sector to be concentrated in lower paid, fragmented and insecure employment. Similar studies show women in high value cash crops like cashew nuts not participating in the commercial aspects (Kanji *et al.*, 2004). In the Kenyan horticulture value chains, Dolan and Sutherland (2002) noted a gendered wage gap caused by a concentration of women in unskilled categories of work. Moreover, women often dominate functions of production and

informal retail, while men dominate more lucrative nodes of wholesale, storage, transportation and milling, such as in the value chains of cassava in Mozambique (Donovan *et al.*, 2011) and gum arabic in Burkina Faso (Shackleton *et al.*, 2011).

In relation to access to and control over resources from value chain participation, Njuki *et al.* (2011) showed that in Malawi and Uganda, women were more likely to control the income from commodities that generated lower revenues and that were traditionally used for food and sold in local markets, such as groundnuts and beans. Men, on the other hand, often controlled income from commodities that generated high revenues and often were cash crops sold in formal markets, for instance pigs and goats.

Factors influencing gendered participation and access to and control over resources

Earlier research has identified a number of factors that may affect how and to what extent women and men are able to participate in, and to benefit from participation in agricultural value chains. One such factor relates to the gendered responsibilities in the household. In the value chains of gum arabic in Burkina Faso (Shackleton *et al.*, 2011) and dairy in Mozambique (Quisumbing *et al.*, 2014b), women were restricted from participating in collection and marketing activities far away from the household due to onerous and time consuming household duties, what is referred to as time poverty (Coles & Mitchell, 2010).

Another influencing factor is cultural and religious beliefs and practices that may restrict women from interacting with men at market places or take responsibility for marketing activities and control over revenues. This was the case in the Kenyan French bean value chain, where women were escorted to the market place in order for the husbands to verify the prices paid (Dolan, 2001). We have not seen any studies that show that it is important for women to go to the market with their husbands to make sure that the price the men get for their product is right, for example in relation to the marketing of crops like tobacco in Malawi. However, there is contrary evidence showing that the proceeds men get from the sales of their produce such as tobacco may be spent on other women that are not part of their household (Prowse, 2009).

In the fair trade cotton value chain in Burkina Faso, religious beliefs and practices contributed to keep women subordinate by restricting their possibilities to earn an income, and women passed on revenues to their husbands (Basset, 2009). Moreover, the level of education may affect women's and men's participation, where men often have higher education than women. This increases their possibilities to get higher skilled and better paid jobs (Coles & Mitchell, 2010).

Gendered physical attributes may also affect how women and men participate in value chains, since men often engage in activities that include what is perceived as heavy labor. Trade in fresh cassava tubers in Mozambique, Zambia and Malawi was dominated by men due to the heavy labor involved, including carrying and trade of large volumes of tubers (Donovan *et al.*, 2011; Hagglade *et al.*, 2012). Although this is not the only explanation, as shown by Chiwona-Karlun *et al.*, (1998), fresh sweet cassava was highly susceptible to theft and most women and poor men did not grow it to avoid theft. Finally, safety issues have been identified as a factor that may affect women's and men's participation. Shackleton *et al.* (2011) found that women did not participate in collection activities in the Zambian honey value chain due to the risks associated with traveling longer distances and spending time in the forest. Similarly it is not uncommon for women to feel threatened or fear for their safety when attempting to enter or penetrate market opportunities, particularly rural women (Chiwona-

Karltun & Tihanyi, 2015).

Methodology

The study was carried out in Mkuranga District in Tanzania's Coast Region. Specifically, the chosen site for interviews with the farmers and intermediary actors was Kimbwanindi village, located in the upland zone of the district. The village is located 80 kilometers south of Dar es Salaam and virtually all households in the village grow and harvest cassava tubers and consequently also cassava leaves. Since the value chain operates from the village to markets in Dar es Salaam, data was collected there as well, in smaller town markets along the way. Kimbwanindi was chosen as the starting point for the analysis because the International Institute of Tropical Agriculture (IITA), a collaborator in this study, was already running a cassava field trial there, and the village is located along the major road that connects with Dar es Salaam. This was deemed feasible for the marketing of the leaves as it would ensure a meaningful value chain analysis of this under-researched leafy vegetable.

Conceptual framework: Integrating a gender dimension into agricultural value chain analysis

In this study we apply a modified conceptual framework based on UNIDO (2009) and Bolwig *et al.*, (2008) who define a value chain as the series of activities required to bring a product from the input-supply stage through phases of production to its final market destination, with value added at each step, or functional node (UNIDO, 2009). For this study, the functional nodes that have been identified and analyzed are production and harvesting, brokerage, wholesale, processing in terms of pounding and drying, and retailing. Unlike others (Kaplinsky & Morris, 2001), the UNIDO framework of a value chain includes the surrounding institutions and macro-economic environment that set the conditions for the performance of core functional nodes. Hence, the framework recognizes that the core value chain is embedded in a broader enabling environment including policies, regulations, standards and institutional elements that affect how and by whom a commodity can be transformed and marketed. In addition, household consumption of cassava leaves is slowly being recognized as being an important dietary component as well as part of the cassava value chain. It is relevant to understand how cassava leaves are being utilized and in what proportions, in order to get a picture of the importance of the cassava leaves as an enterprise and for food consumption.

Three main types of actors are distinguished in the value chain framework. First, operators are the actors who both handle and possess the product at one or several stages in the chain, for instance producers, producer organizations, processors, brokers, wholesalers, retailers and supermarkets. Second, supporters are actors who not necessarily handle or possess the product, yet they have a direct impact on the chain through service facilitation such as financial or advisory services. Third, the influencers have an indirect impact on the chain's performance and functions through agricultural and trade policies and research and development focus. Influencers are; government officials, politicians, researchers and organizations (UNIDO, 2009).

The value chain analysis breaks the chain into its constituent parts to understand the structure of and dynamics within the chain (Kaplinsky and Morris, 2001), it enables insights into the organization of market relationships between actors (Quisumbing *et al.*, 2014a), and the segmentation of the chain enables an understanding of challenges and opportunities within each node as well as the context in which the chain operates (Webber and Labaste, 2007). The uneven distribution of power and benefits between various actors has been identified a

common such challenge. We use value chain analysis as a tool to understand who benefits from the production and marketing of cassava leaves, and how.

The value chain framework by UNIDO was complemented with elements from a conceptual framework developed by Bolwig *et al.* (2008) that seeks to overcome the failures of traditional value chain analyses to capture the gender dimension. The framework highlights the importance of specifically addressing gender issues related to value chain participation to assure that a gender analysis is incorporated into the methodology of the value chain strategic framework and research tools. This can be done by opting for collection of gender sensitive sex-disaggregated data through participatory methods. Moreover, Bolwig *et al.* (2008) emphasizes the importance of understanding the economy as including both productive and reproductive work. The gendered economy approach recognizes the inseparability of the market-oriented activities and unpaid work, and that the reproductive activities underpin the productive.

Integrating gender in the value chain analysis enables an examination of how roles, responsibilities and rights of men and women interact and how interactions affect the outcomes being studied, such as participation and benefiting actors. It allows for an understanding of how decisions about what type of agricultural activities to engage in depends on socially constructed gender roles, household responsibilities and potential earnings associated with different activities (Quisumbing *et al.*, 2014a).

Data collection

An integrated mixed methods approach was used for the data collection, including structured and semi-structured interviews, focus group discussions (FGDs) and observations. The data was collected during three months; seven weeks were spent in Mkuranga District to interview cassava farmers, retailers and wholesalers in Kimbwanindi village and six weeks were spent in Dar es Salaam to interview retailers, wholesalers as well as various supporting and influencing actors. Three women field assistants were hired during different stages of the study to act as interpreters.

A total of 50 farmers, 25 women and 25 men, from cassava growing households in Kimbwanindi village were sampled on a snowball basis and interviewed using a pre-tested structured questionnaire. Snowball sampling was applied since a complete household list in the village was not available within the given time frame of the study, thus ruling out random sampling. Of the women respondents, 18 belonged to what they defined as male-headed households and seven to female-headed households. The structured interviews generated data concerning the households' socio-economic status, gendered division of labor and women's and men's access to resources and benefits in relation to cassava leaves. The interviews also enabled quantification of volumes, prices and number of actors in the value chain and generated information on farmers' horizontal and vertical coordination, value added activities and vertical integration. To enable investigation of the gender relations in relation to cassava leaves, the sample consisted of equal numbers of women and men respondents. The women and men respondents belonged to different households. Since sampling was done on a snowball basis, the data from the structured interviews is not representative of the village, yet important lessons can be learned that may be useful in similar contexts.

In addition to the structured interviews, 51 semi-structured interviews were conducted with different value chain actors including a subset of the sampled farmers (four women and four men), wholesalers, retailers, processors as well as influencers and supporters (Table 1).

Interview guides outlining the topics to be covered at each interview as well as a battery of

potential questions to ask were used. The interview guides as well as the questionnaire for the structured interviews were developed following sets of guidelines for gender sensitive value chain analysis (Terrillon, 2011), in order to mainstream gender analysis into all levels of the value chain (individual, household, community and national). A purposively selected sub-set of the farmers was interviewed using the structured questionnaire to broaden the information obtained from the structured interviews and to gain in-depth understanding of the gender dynamics in the production node of the value chain. Other operators were interviewed to map and quantify the value chain and to examine their access to and control over resources and benefits. Influencers and supporters were interviewed to examine the structure of the facilitating institutions and enabling environment surrounding the core value chain.

Table 1: Overview of semi-structured interviews

Respondents	Women	Men
Farmers	4	4
Retailers	17	5
Wholesalers	0	5
Supermarkets	0	4
Farmer associations	1	1
Village leader	0	1
Organizations	2	0
Universities	0	1
Government officials	2	4
Total	26	25

Two sex-segregated focus group discussions (FGDs) with eight women farmers and six men farmers were held in Kimbwanindi. These FGDs offered an opportunity to gain insights into how gender roles and resource control and access in relation to cassava leaves were discussed by groups of women and men, rather than by individuals. The discussions also facilitated triangulation and cross-checking of data generated from the structured and semi-structured interviews. The participants were recruited from the sample from the structured interviews on a convenience basis and they were each requested to invite one more person of the same sex to the discussion. This sampling strategy eventually resulted in the groups mainly consisting of former village leaders and their wives as well as other higher status villagers living close to the main road. The representativeness of the participants for the village as such is therefore low, but given their positions they were thought to contribute with a good helicopter perspective. Thus, the two FGDs are better considered as case studies that could complement other sources of information.

Finally, direct and participant observations at market places, on the farms and along the transportation roads provided valuable insights into practices and contextual issues, as well as cross-checking with data generated from the interviews and FGDs.

The study covers two types of cassava: the ‘regular’ cassava (*Manihot esculenta* Crantz), mainly cultivated for its tubers (when specifically referring to such varieties, we will use the term ‘tuber varieties’), and that now is receiving increasing attention from both scientists and policymakers, as well as the related species of tree cassava, or wild cassava (*Manihot glaziovii*), and that is cultivated for its leaves only. The latter is called *mpira* in Southern and Eastern Africa (*Kiswahili*: ‘kizamvu cha mpira’), why we will use that term when specifically

referring to this species. A case can certainly be made for these being two different crops, not least since they genetically are different species, but also since the harvesting of leaves from *Manihot esculenta* Crantz has to be done with consideration of the impact on tuber formation, while that is not the case for *Manihot glaziovii*. Yet, we treat them as one crop in this paper since value chain analyses per se focus on one commodity, and in this study this is cassava leaves, irrespective of origin. Also, *mpira* has for too long been given the backseat when it comes to cassava related R&D and interventions in Sub-Saharan Africa, most likely as a result of the undervaluation of the role of cassava leaves in local diets by researchers, policymakers, donors and practitioners. Hence, it makes sense to cover both here as a way to challenge the current undervaluation and marginalization of cassava leaves. Also, since the farmers themselves only consider them as different varieties – not different species, or crops – it made sense to cover both in the study, not least since we otherwise could have encountered a data validity problem in relation to reporting.

Data analysis

Through an iterative analytical process, the data was deductively organized and analyzed in relation to the value chain concepts. Quantitative variables were analyzed in SPSS 22 to generate descriptive statistics, and the qualitative data was transferred to NVivo 10 for descriptive analysis. Coding served as the starting point for the analysis, and were categorized and interpreted in relation to the research objectives. On the basis of the theoretical and conceptual presumptions guiding the study along with the emerging themes in the data, interpretation of the qualitative data occurred in a manner similar to what Kvale, (1996) refers to as an *ad hoc* approach, where various techniques such as counting, clustering and contrasting of statements and codes were used.

The combination of different data collection methods allowed us to approach the researched phenomena from different angles. In this way, we were able to cross-fertilize and triangulate data. When the methods' respective findings have converged and corroborated, we have taken this as further evidence for that they are reliable (Bryman, 2008). Whenever we have encountered paradoxes or contradictions, such conflicts have hinted that the phenomenon is more complex than we otherwise would have understood. This has produced new insights that sometimes have altered our interpretations.

Results and Discussion

This section is divided into several sub-sections. First, we present the cassava leaves value chain for the specific study site, since this has not been done in previous research. Thereafter, we describe and discuss the gendered participation in the value chain as well as the factors influencing gendered participation.

The cassava leaves value chain

Applying the above described conceptual framework, the data analysis resulted in a value chain map (Figure 1) which outlines the core functions and operators in the cassava leaves value chain in Mkuranga District. Kimbwanindi village is the point of departure and the value chain extends to Dar es Salaam. The major product flow, following the bold arrows in the figure, goes from small producers, via wholesalers from Kimbwanindi, nearby villages or Dar es Salaam, to retailers at fresh markets in Dar es Salaam who finally sell to urban consumers. The numbers in each function refer to the number of operators identified in each functional node.

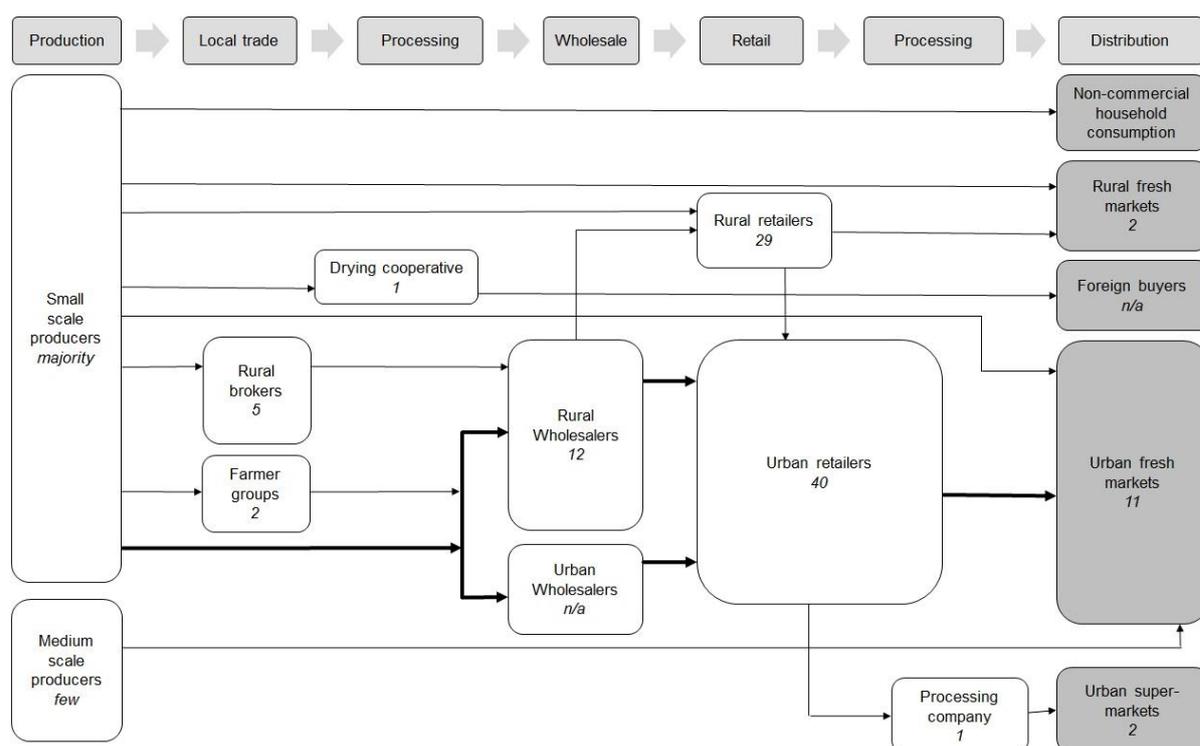


Figure 1: Conceptual map of the cassava leaves value chain.

*The numbers refer to the number of identified operators in each functional node. Bold arrows indicate major product flow.

Production and harvesting

Findings from the structured interviews show that all but one of the 50 sampled cassava growers in Kimbwanindi village harvest cassava leaves, and two thirds are engaged in marketing of the leaves (Table 2).

Table 2: Household production and marketing of cassava leaves

	Households (n = 50)	Share (%)
Harvesting cassava leaves, from any variety	49	98
Mean acreage, tuber varieties	1.17	n.a.
Mean number of <i>mpira</i> plants	32.47	n.a.
Harvesting leaves from tuber varieties	31	62
- Harvesting leaves from tuber varieties only	7	14
Harvesting <i>mpira</i> leaves	42	84
- Harvesting leaves from <i>mpira</i> only	18	36
Harvesting leaves for household consumption	49	98
- Household consumption main purpose for harvest	36	72
Harvesting leaves for marketing	33	66
- Marketing main purpose for harvest	13	26

Hence, the market participation level of households in relation to this specific crop product is surprisingly high, with a few households harvesting substantial volumes with a clear marketing strategy. However, the majority of the households (almost three quarters), still mainly harvest the leaves for household consumption, only selling off the surplus. These observations could nevertheless be an indication of that it is not only the cassava tubers that are slowly transforming from strictly being considered a subsistence crop in Tanzania but also the leaves. Moreover, these observations confirm earlier findings that since cassava leaves, though commonly consumed, have not been documented in scientific literature, their commercial value has never been understood (Oomen & Grubben, 1978).

Farmers in Kimbwanindi village mainly cultivate cassava varieties referred to as sweet as opposite to bitter (Chiwona-Karlun *et al.*, 2015). The farmers and the village leaders argued that the sweet varieties perform better due to the prevailing soil conditions. But this may also be due to the fact that the National Root and Tuber Crops Research Programme, supported by IITA, has been engaged in distributing improved sweet cassava varieties that are higher yielding and more disease tolerant (Mkamillo & Jeremiah, 2005). The farmers usually cultivate a combination of varieties of *Manihot esculenta* Crantz as well as *mpira* (*Manihot glaziovii*). The farmers and most urban consumers consider the leaves of *mpira* softer, smoother, easier to prepare and tastier than the leaves from the tuber varieties. Therefore, *mpira* is popular even though its tubers are not edible. The farmers interviewed typically cultivate the tuber varieties in their fields, while *mpira* is planted around the field and house borders to mark property boundaries. Therefore, the different cassava varieties do not compete for land. On average, the sampled households cultivate 1.17 acres of cassava tuber varieties and have 32 *mpira* plants.

Marketing activities in rural and urban areas

The farmers interviewed typically market their cassava leaves through direct sourcing at the farm gate. The most common buyer are wholesalers who bulk cassava leaves from many small farmers. The structured interviews with farmers show that the majority (88 percent) of the households that sell cassava leaves sell them to small or large wholesalers or local brokers, who in turn sell the leaves to wholesalers at collection points along the main road that runs through Kimbwanindi village. The visits by the wholesalers to Kimbwanindi are irregular and according to the farmers, the majority do not inform the farmers before arrival. This indicates that trade occurs on an *ad hoc* basis, and it is thought to reduce the farmers' (both women and men) incentives to increase their engagement in the commercial production of cassava leaves.

Because of a high urban demand, majority of the wholesalers transports the leaves in larger volumes to Dar es Salaam for final marketing, while only a few sell smaller volumes to retailers and street vendors at local markets in the district. During evenings, truck drivers pick up wholesalers with cassava leaves and other agricultural products, such as other leafy vegetables, beans and passion fruit, to be sold in Dar es Salaam. In the value chain used in this research, truck drivers are categorized as supporters since they merely facilitate transportation of the cassava leaves but do not possess or handle the products themselves. In addition to wholesalers, some retailers from Dar es Salaam source cassava leaves directly from the farms, while a few come from nearby villages to sell the leaves at markets or along the streets around Kimbwanindi. The demand for cassava leaves in the rural markets is substantially lower compared to the markets in Dar es Salaam. This is most likely due to a

combination of the abundance of cassava leaves on the farms, coupled with a diversity of other green leafy vegetables at their disposal as opposed to urban residents, who increasingly buy cassava leaves to supplement their diets. This was stated during several structured and semi-structured interviews with farmers, retailers, the manager of a processing company and wholesalers.

The urban wholesalers operate as important market facilitators for the farmers in Kimbwanindi village. In Dar es Salaam, the products are offloaded at the wholesale market at night and the wholesalers sleep at the market until it opens at around 5a.m. Three main wholesale markets for leafy vegetables in Dar es Salaam where cassava leaves from Kimbwanindi are sold were identified. These were Tandika, Ilala and Kariakoo, located in the southern and central parts of the city.

The retailers in Dar es Salaam sell substantially larger volumes of cassava leaves in comparison to their rural counterparts in Mkuranga district. While the rural retailers interviewed may sell on average of six bundles per day during the rainy season, the urban retailers sell more than ten times as much, with a mean of 64 bundles per day. However, the volumes sold by various retailers in Dar es Salaam vary significantly. The street vendors sell between five and ten bundles per day in the rainy season, which is similar to the rural retailers, whereas those at fresh markets sell between 20 and 300 bundles, depending on the specific market place.

Processing of cassava leaves

Two types of processing of cassava leaves have been identified in the value chain: pounding and drying. Drying is a preservation method, however, in this study it is to be considered a processing method.. Pounding in combination with boiling of cassava leaves is a necessary process to remove the anti-nutritional cyanogenic glycosides and make the leaves ready for human consumption. The process is performed with traditional and manual equipment and it is time and energy consuming. With changing urban lifestyles there is increasingly demand for pre-processed cassava leaves by urban residents who are now spending less time on cooking. Approximately 15-20 urban retailers and one processing company in Dar es Salaam were identified to exploit this emerging demand for pounded leaves. They add value to their products by selling already pounded leaves packed in plastic bags or boxes, primarily to consumers but increasingly to supermarkets. Traditional manual equipment (wooden mortar and pestle) is used for the process. Pounded leaves sold at fresh markets are sold at a 10-30 percent higher price than unprocessed leaves, while the company that delivers to supermarkets raises the price by 400 percent. At the markets around Kimbwanindi, pounding of cassava leaves for marketing purposes is rare. This is due to the lack of an appropriate surface for pounding, such as a hard floor that is elevated from the dusty ground. Many retailers also live far away from the market in which they work, making transportation of pre-pounded leaves difficult. Even if these processing constraints were removed, the demand for pre-processed leaves in the rural areas is assumed to be low due to the limited need for convenient foods there as compared to the city.

Drying of cassava leaves is performed by a farmers' cooperative in Mkuranga town called the District Cassava Farmers Organization (DCFO). No farmers in Kimbwanindi had heard about the organization, but four villages in the district are associated with it. Farmers in these villages who are mostly women, pound and dry the leaves in solar dryers that have been availed by the cooperative. The dried leaves are then delivered in sacks to the DCFO office which sells consumer packages to supermarkets in Dar es Salaam and to foreign buyers.

Drying is only possible during the dry season since the humidity during the rainy season increases deterioration and infections of the leaves. This is an area that needs further investigation as nutrition quality and food safety issues are likely to occur when processing and storage is compromised.

Horizontal and vertical coordination and vertical integration

Corresponding to previous findings on cassava in Tanzania (Sewando, 2012), both men and women farmers in Kimbwanindi village are only loosely organized in their activities related to the marketing of cassava leaves. This is indicated by the identification of only two farmer groups with approximately ten members each in the village who engage in marketing of the leaves. But this could also be indicative of external interventions such as donor supported projects that have no link with local agricultural extension and thus scaling-up and uptake is limited. The high demand for cassava leaves in Dar es Salaam does not seem to have been known by the majority of the farmers in the village. As found in the Tanzanian conventional spice value chain (Akyoo & Lazaro, 2007), the limited horizontal coordination at village level constrains farmers' possibilities to increase their incomes. It reduces their market information and thereby their chances to negotiate fairly with buyers of cassava leaves. The creation of cooperatives or farmer groups could enhance farmers' collective bargaining power vis-à-vis traders and facilitate improved vertical relationships with downstream operators. Moreover, horizontal coordination was found to be more common among downstream operators on Ethiopian spices (Meaton *et al.*, (2015).

Vertical coordination is more common among operators closer to the consumer end of the value chain. According to both farmers and the intermediary actors, urban retailers and wholesalers such as the processing company, supermarkets, restaurants and customers engaging in foreign trade have easier access to buyers of larger volumes of cassava leaves. In relation to this and due to women and men farmers' limited access to market information, local brokers, retailers and wholesalers sometimes hide information from the farmers regarding prices and demand for cassava leaves in urban markets. This exploitation of farmers is thought to be a strategy by buyers to push down prices for profit maximization. This was also noted to happen in relation to traditional vegetables, not least ALVs, in Malawi and Mozambique (Chagomoka *et al.*, 2014) and charcoal in Senegal (Ribot, 1998). This highlights the importance of increasing farmers' bargaining power and access to markets and market information by lowering the transaction costs they currently face.

The integration of the interviewed farmers into marketing functions is also limited, since only 10 percent of the sampled households engage in wholesale or retail selling of cassava leaves. The farmers' low level of vertical integration is thought to be due to their limited market information concerning the higher demand and prices in Dar es Salaam. This influences their bargaining power relative to wholesalers, brokers and retailers negatively and effectively reduces their opportunities for earning higher incomes from the direct marketing of cassava leaves.

Distribution of financial benefits between value chain operators

Table 3 presents an overview of buying and selling prices of core operators and their related gross profits from trade with cassava leaves. Since many retailers and wholesalers sell cassava leaves on a weekly basis, quantities and total incomes from cassava leaves are reported in bundles of 10-15 branches and Tanzanian shillings (Tsh) per week. For the retailers and wholesalers who trade cassava leaves on a daily basis, quantities and incomes are multiplied

by seven. The profits are generally higher for the operators closer to the consumer end of the value chain, which is often the case in agricultural value chains (Chagomoka *et al.*, 2014).

Table 3: Quantification of the cassava leaves value chain.

<i>Operator</i>	<i>Selling price (Tsh/bundle)</i>	<i>Buying price (Tsh/bundle)</i>	<i>Gross profit (Tsh/bundle)</i>	<i>Quantity (bundles/week)</i>	<i>Gross income (Tsh/week)</i>
Farmers selling at farm gate	50-200	n/a	50-200	2.5-150	125-30k
Farmers selling at market place	50-300	n/a	50-300	60-300	3k-90k
Farmer groups	200	150	50	50	2.5k
Processors; DCFO	700	350	350	10-20	3.5k-7k
Processing company	4 000	1 000	3 000	300-360	900k-1 080k
Urban wholesalers	200-250	50-200	50-200	1 400-3 500	70k-700k
Rural wholesalers	75-250	50-200	50-200	100-300	5k-60k
Urban retailers	500-1 000	200-250	250-800	140-2 100	35k-1 680k
Rural retailers	300-500	50-100	250-400	14-70	3.5k-28k
Supermarkets	7 000	4 000	3 000	100-120	300k-360k

*1000 Tsh = 0.481 USD (2015-05-28). *k* = 1000 Tsh. One bundle = 10-15 branches. n/a = not applicable. Local brokers were not included in the table due to lack of data.

The processing company, urban wholesalers, retailers and supermarkets appear to be the operators receiving the highest profits from participation in the value chain. This can be traced to a combination of factors, including their higher selling prices, the larger quantities traded per day and the fact that they trade on a daily basis. Some of the urban fresh market retailers receive the largest gross profits (as high as 1 680 000 Tsh (757 USD) per week) of all operators, which is several hundred times more than what the average farmer earns. The finding that intermediaries such as the retailers and wholesalers receive higher gross profits than the farmers conforms to findings by others (El-Sayed *et al.*, 2015). Together with the fact that farmers who sell at markets receive higher profits, this suggests that incomes accrued to producers may increase through increased vertical integration. Relative to farmers and local brokers in Kimbwanindi village, retailers and wholesalers seem to have better access to financial capital and market information, easier access to urban markets, and they have a higher horizontal coordination than the farmers. This is thought to increase their bargaining power relative to the farmers, local brokers and urban customers, since they are able to negotiate and push prices at both ends. Also this is consistent with previous research (Ribot, 1998). In contrast, the farmers' limited market information, in combination with their limited resources, reduce their bargaining power, and puts them in a situation where they become dependent on the intermediary operators who buy from them at the farm gate for their

incomes from cassava leaves. Again, these conclusions match findings by others (Meaton *et al.*, 2015).

The role of supporters and influencers

Findings from the semi-structured interviews with core operators as well as supporters and influencers show an overall limited support by the enabling institutions that surround the core value chain of cassava leaves. This is evident in the fact that the supporters and influencers have limited knowledge and interest of engaging in the development of cassava leaves production and markets, on local, regional and national levels. The limited external support, the limited horizontal and vertical coordination in the value chain and an absence of regulations, quality standards and taxation related to trade with leafy vegetables are thought to give the local brokers, wholesalers and retailers an important role in mediating the cassava leaves from farm to consumer. This corresponds to findings in other agricultural value chains in Tanzania (Eskola, 2005). Additionally, as also found by Eskola (2005), while transaction costs are low for women and men farmers who sell at farm gate, there is at the same time a large gap between the gross profits of the farmers and the final price paid by the consumers. Research and development on cassava leaves is limited in Tanzania and in Africa at large. Despite the common use of cassava leaves for human consumption in both rural and urban areas of the country, little attention appears to have been given to this leafy vegetable by researchers, development practitioners and policy makers to increase the knowledge and awareness of its importance and role. This situation is, however, in no way unique for cassava leaves, but seems to be a general problem facing Tanzanian food systems (Ruteri and Xu, 2009).

Gendered participation and access to and control over resources in the value chain

Based on structured and semi-structured interviews as well as observations, the results show that, overall, the value chain is dominated by women, particularly within the functions of production and marketing at farm level as well as retailing (Figure 2). This is corresponding to what also others have observed regarding low-value crops including ALVs (Aklilu *et al.*, 2007; David, 2015; Dolan, 2001; Eskola, 2005; FAO, 2011; Njuki *et al.*, 2011; Quisumbing *et al.*, 2014b; Oomen & Grubben 1978). Local brokers in Kimbwanindi selling cassava leaves to wholesalers are men and, although the precise numbers of women and men wholesalers could not be established, more men than women were reported by farmers, wholesalers and retailers to be engaged in wholesale too; what appears to be a common trend for value chains in Sub-Saharan Africa (Donovan *et al.*, 2011; Haggblade *et al.*, 2012; Shackleton *et al.*, 2011).

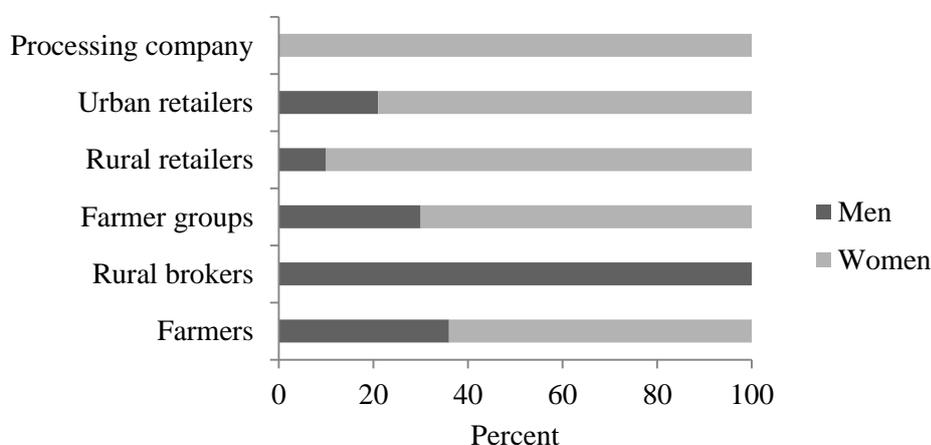


Figure 2: Gendered participation in the value chain nodes

Gendered participation on farm level

We now consider a sub-sample of the surveyed households that only includes those with both women and men household members present ($n = 41$). Table 4 shows that women household members participate to a larger extent than the men household members in the harvesting and processing of cassava leaves. This has also been noted for other ALVs (Bioversity International, 2013). Furthermore, in over half of the households (at 59 percent), women alone are responsible for the harvesting of the leaves, and slightly more so in relation to tuber varieties. This might be due to that the leaves are then rather considered a by-product of less importance than when cassava is grown only for the leaves, which is the case with *mpira*. Approximately one third of the households, harvesting of the leaves is done jointly by women and men. Hence, very few men are harvesting cassava leaves on their own. Processing of cassava leaves for household consumption is also an activity almost exclusively performed by women.

Table 4: The farming households' gendered division of labor in relation to cassava leaves.

	Total sample $n=41$ *	Women only	Men only	Men and women
Harvesting leaves from tuber varieties	40**	24	3	13
Harvesting <i>mpira</i> leaves	38	21	3	14
Processing leaves for household consumption	41	38	0	3
Mainly harvesting for household consumption	29	19	2	8
Mainly harvesting for marketing purposes	11	5	1	5
Marketing cassava leaves	30	18	4	8

* Respondents living in only-men (2) or only-women (7) households were removed from the sample to increase the representativeness of data related to gendered participation.

** One household does not harvest cassava leaves from their own farm.

Out of the sampled households where both women and men are present, marketing of cassava leaves is primarily done by women alone (57 percent) while in 30 percent of this sub-sample, women and men share the marketing responsibilities. Since the *mpira* leaves are almost exclusively preferred by consumers, many households sell these, while retaining the less-marketable leaves from the tuber varieties for their own consumption. In the few households where only men sell the leaves, the average number of *mpira* plants and the volumes of cassava leaves harvested turned out higher than in those where women are responsible for marketing. This suggests that when men household members engage in cassava leaves production, it takes on a more commercial orientation.

Gendered participation in retail and wholesale

The structured interviews and the semi-structured interviews with farmers, retailers and wholesalers reveal that the majority of the retailers at the rural markets are women who trade with low volumes of cassava leaves, typically between two and ten bundles per day of varying weights. The wholesalers interviewed also asserted that all local brokers are young men. Men are perceived to dominate the positions as wholesalers, although respondents asserted that several women were also engaged in wholesale. Respondents in a quarter of the surveyed households selling cassava leaves said that the buyers of their leaves were all women, while a

third reported a mix of women and men. The remaining nine percent reported that the buyers were only men. But the quantities bought by these women have not been established. Drawing on observations and interviews, we conclude that large-scale urban wholesalers are mainly men, while the small-scale wholesalers more often are women. This suggests that men are involved to a higher degree than women at nodes of the value chain where larger volumes are traded and where consequently higher gross profits are made from trade as has been reported in other value chains (Donovan *et al.*, 2011 and Shackleton *et al.*, 2011).

Moreover, data from the structured and semi-structured interviews and the FGDs suggest that men wholesalers not only trade with larger quantities of cassava leaves than women do but with a different trade portfolio of crops, including pineapple, cassava tubers, mango, and passion fruit in addition to cassava leaves. Women wholesalers tend to trade more with beans and other leafy vegetables such as Amaranths, spinach, and leaves from sweet potato, beans and pumpkin in addition to the cassava leaves.

The retail function of the cassava leaves value chain is dominated by women. In Kimanzichana and Mkuranga fresh markets, all retailers are women. A few men had earlier been retailing cassava leaves but due to the low profitability they had turned to other businesses. About ten women street vendors sell cassava leaves and other leafy vegetables in Mkuranga town, the largest town in the district. In Dar es Salaam, even though the majority of the retailers are women, more men are involved than in the rural areas. Interviews and observations suggest a distribution of 4:1 of women and men retailers in the urban fresh markets. Urban fresh market retailers purchase cassava leaves from wholesalers either at wholesale markets designated for leafy vegetables or from farmers and wholesalers who come early in the morning to sell at their market spot before opening hours.

Observations and interviews with retailers and wholesalers revealed that pounding of cassava leaves for marketing purposes is done almost exclusively by women. A common reason given for this pattern was that pounding according to tradition is performed by women. This is not surprising as many of the tasks that are drudgery often are assigned to women. In addition to the women retailers, a small processing company in Dar es Salaam also pounding leaves was identified. The company consists of three women; one manager and two employees who pound and package the leaves. The cassava leaves are purchased from an urban retailer, pounded and packed into plastic boxes of 200 grams and then delivered by motorbike to two supermarkets. The company receives weekly orders equal to 75-90 fresh bundles of leaves of the size traded by retailers at fresh markets. This type of processing actor is perceived as new and emerging in the value chain, creating innovative vertical market linkages between various operators. The manager was optimistic about future business opportunities since she experienced a high, and increasing demand for the product among middle class consumers in Dar es Salaam. This might also be due to an increasing awareness by the middle-class to consume local foods perceived to be healthy, such as ALVs. This is an area that requires further research.

Gendered implications of the lack of facilitating institutions and an enabling environment

The value chain is dominated by women and the men who are involved operate mainly in the functions of production, wholesale and brokerage. Therefore, the low external support may have particularly negative implications for women's generation of income. This is similar to the Zambian honey value chain (Shackleton *et al.*, 2011). Based on the findings in this study, organizations and public and private actors are advised to acknowledge and increase the support of informal markets, as is the case for the cassava leaves markets. For instance, NGOs, private actors, research organizations or governmental institutions can increase

horizontal coordination through gender sensitive establishment of farmer groups or develop appropriate mechanized processing equipment. This could save labor and increase women's bargaining power and opportunities for enhanced participation in marketing.

Moreover, the findings suggest that both women and men operators occupy positions in the value chain with high gross profits. The majority of the urban retailers, who sometimes receive the highest incomes, are women. But women also dominate one of the least profitable nodes of the chain: the farm, since it is mainly women farmers harvesting and selling cassava leaves at farm gate. Moreover, almost all small-scale market and street retailers are women, and these are also low income generating activities. The men who participate in marketing have been found to trade with larger quantities in Dar es Salaam, often as wholesalers, hence generating higher incomes than many of their women counterparts.

Factors influencing gendered participation and access to and control over resources

Data from the semi-structured interviews and FGDs suggest that the gendered participation by farmers in cassava leaves production and marketing relate to local perceptions of women and men's different abilities, roles and responsibilities. Based on their biological and social characteristics, women were identified as suited to handle light weight and low value products like cassava leaves. With men considered physically stronger than women, they were identified as more able to handle heavy goods, while it was argued that women could take on the responsibility for the not-so-heavy leaves. Such justifications are obviously disregarding the fact that women usually are responsible for fetching both firewood and water, which also are heavy goods, suggesting that what is justified in the name of biology could rather be just another norm grounded in gendered perceptions of women and men's roles and responsibilities.

Similar justifications have also been noted in relation to other value chains (Donovan *et al.*, 2011; Haggblade *et al.*, 2012; Quisumbing *et al.*, 2014b; Shackleton *et al.*, 2011). Furthermore, social gender norms identified men as household heads and breadwinners with the main responsibility for income generation and women as the ones mainly responsible for the reproductive household work including child care, cooking and cleaning. This led the participants to argue that men must focus on high-value crops while women could take on the responsibility for the low-value crops, since whatever income they generated would only be considered complementary to that of the men. Elsewhere ALVs have been reported to be traditionally within the women's domain (Diouf & Ba, 2014).

Moreover, as found in the horticulture value chains in South Africa (Barrientos *et al.*, 2001), Kenya and Zambia (Tallontire *et al.*, 2005), women farmers in Kimbwanindi report the lack of time as a main reason for not being able to engage in trade at market places. This is thought to be a consequence of the burdensome household responsibilities that tie them to the homestead during large parts of the day. Moreover, despite a willingness to sell at urban markets, some women are not allowed by their husbands to go there due to restrictions regarding interaction with other men. This has also been observed as a constraint in the value chains for non-timber forest products in Zambia, Ethiopia and Burkina Faso (Shackleton *et al.*, 2011).

Respondents argued that the higher participation of men in wholesale and brokerage was due to the larger and heavier volumes involved, again with reference to the biological differences between women and men (c.f. Donovan *et al.*, 2011; Haggblade *et al.*, 2012; Quisumbing *et al.*, 2014b), as well as the necessity for wholesalers to travel to Dar es Salaam during dark

hours, which was considered a safety risk for women (c.f. Shackleton *et al.*, 2011). Some women respondents currently working as retailers both in rural and urban areas argued that they were unable to engage in wholesale since they lacked the necessary financial capital for buying the larger volumes required for this activity, while others identified their lack of confidence and business skills as the main reasons for not growing their business. These different explanations for the gendered participation in the cassava leaves trade are clearly influenced by gendered norms regarding women's and men's capabilities, roles and responsibilities as well as a gendered practice translating into women's and men's unequal access to resources in relation to and benefits from various trading activities. Some of these gendered challenges, such as dealing with heavy volumes, could easily be resolved if for instance transport became more accessible or through the mechanization of processing activities related to cassava leaves.

Both women and men retailers and wholesalers argued that pounding is traditionally an activity for women, while a man who pounds cassava leaves is considered weak. A woman retailer argued that men feel inferior when performing the same tasks as women. In contrast, a man retailer argued that he did not pound his leaves because he received higher profits from unprocessed cassava leaves and his customers expressed concerns over the quality of the water used for washing the leaves before pounding. Both these cultural and profit-making perceptions require untangling in future research undertakings so as to come up with appropriate interventions.

Conclusion

Drawing on structured and semi-structured interviews with various cassava leaves value chain stakeholders, focus group discussions with farmers as well as direct and participant observations in Mkurunga District and Dar es Salaam, this paper provides insights into the under-researched cassava leaves value chain in Tanzania, paying particular attention to its gendered dynamics. We have shown that the cassava leaves value chain in Mkurunga District is in its formative stages. It is characterized several loosely organized small-scale farmers with relatively weak spot market relationships to their mostly urban buyers in Dar es Salaam. The leaves are traded at a low price. This situation has also been reported for other ALV value chains (Smith & Eyzaguirre, 2007 and Chagomoka *et al.*, 2014). In light of the forgoing observations, it is of little surprise that the cassava leaves value chain is dominated by women, since women have been observed to participate in marketing nodes to a larger extent when the value chain involves a low value product mainly sold at local markets (c.f. Oduol *et al.*, 2013; Oduol & Mithöfer, 2014; Dolan, 2001 and Eskola, 2005). It has also been noted in relation to other agricultural value chains, women and men are concentrated at different nodes of the chain, and they do not benefit from participation to the same extent.

Women farmers are mainly responsible for harvesting and selling the leaves to brokers and wholesalers at farm gate. This is done on an *ad hoc* basis and for a low price. Somewhat surprisingly, as many as two thirds of the farmers we interviewed sell leaves. In most cases, they sell off surpluses not used for own household consumption. Indeed, this appears to be a common scenario for ALVs. Reasons highlighted by the farmers for the predominance of women at this node included the persisting low value of the leaves and that cassava leaves were considered convenient for women to deal with since they are a light weight to carry. When men farmers engage in cassava leaves production, they seem to have a more commercial orientation than the women and grow more *mpira* plants.

Farmers in Kimbwanindi village get low prices for their leaves due to a combination of factors including; a lack of market information and, lack of horizontal coordination and

vertical integration. Since the traders visit the farms on an *ad hoc* basis, this reduces the farmers' incentives to increase their engagement in commercial production of the leaves. Also, women reported to be constrained by their reproductive responsibilities at home which prevented them from taking the leaves to market places themselves. Time poverty as a constraining factor for women's market participation has also been observed in Burkina Faso (Shackleton *et al.*, 2011) and Mozambique (Quisumbing *et al.*, 2014b). Some women also reported that their husbands did not allow them to go to the market, a problem also found in Kenya (Dolan, 2001). These are serious gender issues that need planned and concerted multi-sectoral intervention to be properly addressed.

The limited coordination among farmers leads to reduced bargaining power relative their buyers. Therefore, increased horizontal coordination, for instance through the creation and strengthening of farmer groups, would provide a promising pathway to enhance women's bargaining power. This may enable them to capture more of the value of cassava leaves, leading to increased incomes. This is also thought to reduce their transaction costs, which is also a constraint to increased participation in the value chain. Farmers' increased coordination may as well have positive effects on the effectiveness of the trading exchanges between farmers and their buyers.

As we consider the traders, not surprisingly, it turns out that in general men are mainly involved at nodes where larger volumes are traded and where higher gross profits are made, especially in wholesale. Many of the retailers are women, both in Mkuranga District and in Dar es Salaam. While the rural retailers sell small volumes and it is a trade largely considered unprofitable by men, the urban retailers are quite successful. A few of the women retailers in Dar es Salaam also pound the cassava leaves before they sell them, thereby adding value. This turned out to be an underexploited market niche, given the increasing demand from time constrained urban residents for pre-processed products that can be quickly prepared. This has been reported as being the general case for ALVs (Smith & Eyzaguirre, 2007; Chagomoka *et al.*, 2014), although there are few studies that have actually looked at the rising demand for processed "traditional foods", time poverty and urbanization in Africa. Indeed, this would be an innovative area for research on ALVs and health perceptions of the rising middle class in Africa. That so few retailers are involved in processing cassava leaves, and that no entrepreneurs that have specialized in only pounding or in other ways of processing cassava leaves could be identified, is likely due to the drudgery of the task. Introducing technologies to address this may provide incentives to expand such businesses. In rural areas, no equivalent demand for pounded cassava leaves exists, and it was even rarer to find such in markets there.

The fact that the majority of the large wholesalers were men was traced to a combination of reasons. Some women retailers reported lack of capital to enable them to trade in bulk, safety issues relating to traveling to Dar es Salaam, and the need to be physically able to carry heavy loads. Other women retailers reported that they did not have the confidence and business skills to expand their businesses to engage in the wholesale trade.

There is a need for policy makers, NGOs and private and public actors to increase the support for the cassava leaves value chain, together with those of other ALVs. This should be done through increased research on the role of cassava leaves for rural and urban populations and development of appropriate technologies for mechanized processing. Governmental institutions and organizations should also recognize the important role that cassava leaves are likely to play for the many women who engage in the value chain yet receive little support due to its informal structure. Increased support through encouragement and creation of farmer groups may have the possibility to increase the bargaining power of the women who engage in the value chain and thereby increase their incomes. Furthermore, the market value of ALVs

remains largely undervalued compared to exotic vegetables. Contributing to changing this perception through information campaigns and the collection and development of suitable recipes could be a step towards improving the value of cassava leaves. Valuable agribusiness opportunities should also exist in upgrading the cassava leaves value chain to integrate smallholders into emerging and restructured markets, not least supermarkets (Chagomoka *et al.*, 2014). To achieve produce synchronization and quality assurance, contract farming may be a way forward.

Finally, future research on cassava is recommended to also include the leaves and to consider their importance in enhancing diets especially in low-income households and as a source of income, particularly for women. Little effort has also gone into looking at the quality trait issues when it comes to cassava leaves preferences. That farmers keep the *mpira* cassava trees in spite of the fact that they do not yield any tubers is not by coincidence but preference. Hence, there is also a lesson learning opportunity in relation to that for scientists, donors and policymakers. Such research could also enable an understanding of trade-offs and synergies between the two value chains of cassava tubers and leaves. The value of such an approach should also be clear when it comes to research on other crops, including ALVs, where more than one product is obtained, such as sweet potatoes and cowpeas among other crops.

Acknowledgements

This work is part of a larger project entitled *Evolving gender relations in transforming cassava value chains and implications for intrahousehold nutrition and health. The case of Tanzania*. The project is carried out by the Swedish University of Agricultural Sciences (SLU) in collaboration with the International Institute of Tropical Agriculture (IITA) in Dar es Salaam and the International Food Policy Research Institute (IFPRI) in Washington, D.C. We are grateful to two anonymous referees for thoughtful and constructive comments on an earlier draft. The paper also greatly benefited from the thoughtful and constructive comments provided by the participants in the Agri-gender and PIM write-shop in Berlin, especially Cheryl Doss, Dina Najjar, Jemimah Njuki, Netsayi Noris Mudege and Rhiannon Pyburn. The research on which this paper is based has also resulted in a Master's thesis in agricultural development from the University of Copenhagen, Denmark. We are grateful to Christian Pilegaard Hansen from the University of Copenhagen who supervised the student during the research project. We also wish to thank Malimi Kitunda and colleagues at the Tanzania Food and Nutrition Centre, Adebayo Abass and colleagues at IITA for field support and Catherine Magesse, Ester J. Amon and Eshe Mzee from the Mwalimu Nyerere Memorial Academy for their field assistance. We also owe thanks to all the others in Mkuranga District and Dar es Salaam who have contributed towards this research. Special thanks are extended to the many farmers and traders who we interacted with during the project. Funding has been provided by the University of Copenhagen, Åforsk Foundation, the Nordic Africa Institute, PLAN-Denmark and the Swedish Research Council FORMAS and Sida (Swedish International Development Cooperation Agency).

References

- Achidi, A.U., Ajayi, O.A., Bokanga, M., & Maziya-Dixon, B. (2005) 'The Use of Cassava Leaves as Food in Africa', *Ecology of Food and Nutrition*, 44(6), pp. 423-435.
- Achidi, A.U., Ajayi, O.A., Maziya-Dixon, B. & Bokanga, M. (2008) 'The effect of processing on the nutrient content of cassava (*Manihot esculenta* Crantz) leaves', *Journal of Food Processing and Preservation*, 32, pp. 486-502.

Adetunji, A.R., Isadare, D.R., Akinluwade, K.J. & Adewoye, O.O. (2015), 'Waste-to-Wealth Applications of Cassava—A Review Study of Industrial and Agricultural Applications', *Advances in Research*, 4(4), pp. 212-229.

Aklilu, H.A., Almekinders, H.M., Udo, H.M.J. & van der Zijpp, A.J. (2007) 'Village Poultry Consumption and Marketing in Relation to Gender, Religious Festivals and Market Access', *Tropical Animal Health and Production*, 39(3), pp. 165-177.

Akyoo, A. & Lazaro, E. (2007) 'The spice industry in Tanzania: General profile, supply chain structure, and food standards compliance issues', *DIIS Working Paper 2007/8*, Copenhagen: Danish Institute for International Studies.

Alderman, H., Chiappori, P. A., Haddad, L., Hoddinott, J., & Kanbur, R. (1995) 'Unitary Versus Collective Models of the Household: Is it time to shift the burden of proof?', *The World Bank Research Observer*, 10(1), pp. 1-19.

Anaeto, M., Sawyer, A.F., Alli, T.R., Tayo, G.O., Adeyeye, J.A and Olarinmoye, A.O. (2013) 'Cassava Leaf Silage and Cassava Peel as Dry Season Feed for West African Dwarf Sheep', *Global Journal of Science Frontier Research*, 8(2), pp. 1-4.

Barrientos, S., McClenaghan, S. & Orton, L. (2001) 'Stakeholder Participation, Gender, and Codes of Conduct in South Africa', *Development in Practice*, 11(5), pp. 575-586.

Basset, T.J. (2009) 'Slim pickings: Fairtrade cotton in West Africa', *Geoforum*, 41, pp. 44-55.

Bioversity International. (2013) 'African Leafy Vegetables Come Out of the Shade', Rome: Bioversity International.

Bolwig, S., Ponte, S., du Toit, A., Riisgard, L. & Halberg, N. (2008) 'Integrating poverty, gender and environmental concerns into value chain analysis: A conceptual framework and lessons for action research', *DIIS Working Paper 2008/16*. Copenhagen: Danish Institute for International Studies.

Bradbury, J.H. & Denton, I.C. (2014) 'Mild method for removal of cyanogens from cassava leaves with retention of vitamins and protein', *Food Chemistry*, 158, pp. 417-420.

Bryman, A. (2008) '*Social Research Methods*', 3. ed. Oxford: Oxford University Press.

Carr, E., R. (2008) 'Men's crops and women's crops: the importance of gender to the understanding of agricultural and development outcomes in Ghana's central region', *World Development*, 36(5), pp. 900-915.

Cernansky, R. (2015) 'Super Vegetables', *Nature*, 552, pp. 146-148.

Chagomoka, T., Afari-Sefa, V. & Pitoro, R. (2014) 'Value Chain Analysis of Traditional Vegetables from Malawi and Mozambique', *International Food and Agribusiness Management Review*, 17(4), pp. 59-86.

Chiwona-Karltun, L., Mkumbira, J., Saka, J., Bovin, M., Mahungu, N. M., & Rosling, H.

(1998) 'The importance of being bitter – a qualitative study on cassava cultivar preference in Malawi', *Ecology of Food and Nutrition*, 37(3), pp. 219-245.

Chiwona-Karltun, L., Nyirenda, D., Mwansa, C.N., Kongor, J.E., Brimer, L., Haggblade, S. & Afoakwa E.O. (2015) 'Farmer Preference, Utilization, and Biochemical Composition of Improved Cassava (*Manihot esculenta* Crantz) Varieties in Southeastern Africa', *Economic Botany*, 69(1), pp. 42-56.

Chiwona-Karltun, L. & Tihanyi, K.Z. (2015) 'Gender and agribusiness entrepreneurship in Africa', In: Christy, R.D., Karaan, M., Mabaya, E. and Tihanyi, K.Z. (eds.). *From principles to best practices. A making markets matter guide to managing African agribusinesses*, Market Matters Inc., pp. 119-134.

Coles, C. & Mitchell, J. (2010) 'Gender and agricultural value chains: A review of current knowledge and practice and their policy implications', *ESA Working Paper No. 11-05*, London: Food and Agriculture Organization of the United Nations.

David, S. (2015) 'Getting a Piece of the Pie: An Analysis of Factors Influencing Women's Production of Sweetpotato in Northern Nigeria', *Journal of Gender, Agriculture and Food Security*, 1(1), pp. 1-19.

Diouf, M. & Ba, C.O. (2014) 'Contribution of African Leafy Vegetables to Food Safety and Income Generation in Senegal', *Acta Horticulturae, ISHS*.

Dolan, D. (2001) 'The 'Good Wife': Struggles over Resources in the Kenyan Horticultural Sector', *The Journal of Development Studies*, 37(3), pp. 39-70.

Dolan, C.S. & Sutherland, K. (2002) 'Gender and Employment in the Kenya Horticulture Value Chain', *Discussion Paper 8, Globalisation and poverty*.

Donovan, C., Haggblade, S., Salegua, V.A., Cuambe, C., Mudema, J. & Tomo, A. (2011) 'Cassava Commercialization in Mozambique', *MSU International Development Working Paper No. 120*. Michigan: Michigan State University.

Eggum, B.O. (1970) 'The protein quality of cassava leaves', *British Journal of Nutrition*, 24, pp. 761-768.

El-Sayed, A.F.M., Dickson, M. & El-Naggar, G. (2015) 'Value Chain Analysis of the Aquaculture Feed Sector in Egypt', *Aquaculture*, 437, pp. 92-101.

Eskola, E. (2005) 'Agricultural marketing and supply chain management in Tanzania: A case study', *Working Paper Series No. 16*, Dar es Salaam: Economic and Social Research Foundation.

FAO. (2011) 'African Leafy Vegetables in Kenya-Local biodiversity in production, market and consumption', http://teca.fao.org/sites/default/files/technology_files/FSNL_Fact_sheet_AfricanLeafyVegetables-12oct2011.pdf [Accessed: 2016-01-15].

FAOSTAT (2015) 'Production statistics of cassava in Tanzania',

<http://faostat3.fao.org/browse/Q/QC/E> [Accessed: 2015-05-26].

Greenberg, S. (2013) 'A gendered analysis of wine export value chains from South Africa to Sweden', *Agricultural Economics Research, Policy and Practice in Southern Africa*, 52(3), pp. 34-62.

Haggblade, S., Andersson Djurfeldt, A., Banda Nyrendah, D., Bergman Lodin, J., Brimer, L., Chitundu, M., Chiwona-Karltun, L., Cuambe, C., Dolislagerm M., Donovan, C., Droppelmann, K., Jirstrom, M., Mudema, J., Kambwea, E., Kambewa, P., Nielson, H., Nyembe, M., Alexandre Salegua, V., Tomo, A., & Weber, M. (2012) 'Cassava commercialization in Southeastern Africa', *Journal of Agribusiness in Developing and Emerging Economies*, 2(1), pp. 4-40.

Howeler, R., Lutaladio, N. & Thomas, G. (2013) 'Save and grow cassava. A Guide to Sustainable Production Intensification', Rome: Food and Agriculture Organization of the United Nations.

Kanji, N., Vijfhuizen, C., Braga, C., & Artur, L. (2004) 'Cashing in on Cashew Nuts: Women Producers and Factory Workers in Mozambique', *Chains of Fortune Linking Women Producers and Workers with Global Markets. London. Commonwealth Secretariat*, pp. 75-102.

Kapinga, R., Mafuru, J., Jeremiah, S., Rwiza, E., Kamala, R., Mashamba, F. & Mlingi, N. (2005) 'Status of Cassava in Tanzania – Implications for Future Research and Development', In: FAO and IFAD (eds.) *A review of cassava in Africa with country case studies on Nigeria, Ghana, the United Republic of Tanzania, Uganda and Benin*. Rome, Food and Agriculture Organization of the United Nations and International Fund for Agricultural Development.

Kaplinsky, R. & Morris, M. (2001) 'A Handbook for Value Chain Research', Report prepared for IDRC. Brighton: Institute of Development Studies.

Kennedy, E., & Peters, P. (1992), 'Household food security and child nutrition: the interaction of income and gender of household head', *World Development*, 20(8), pp. 1077-1085.

Kvale, S. (1996) *Interviews: An introduction to qualitative research interviewing*, 1 ed., Thousand Oaks: SAGE.

Lancaster, P. & Brooks, J. (1983) 'Cassava leaves as human food', *Economic Botany*, 37, pp. 331-348.

MAFAP. (2013) 'Review of food and agricultural policies in the United Republic of Tanzania', *Monitoring African Food and Agricultural Policies (MAFAP) Country Report Series*, Rome: Food and Agriculture Organization of the United Nations.

Mayoux, L. & Mackie, G. (2008) *Making the Strongest Links – A practical guide to mainstreaming gender analysis in value chain development*, Addis Ababa: International Labour Office.

Meaton, J., Abebe, B. & Wood, A.P. (2015) 'Forest Spice Development: the Use of Value Chain Analysis to Identify Opportunities for the Sustainable Development of Ethiopian

Cardamom (Korerima)', *Sustainable Development*, 23 (1), pp. 1-15.

Mkamillo, G.S. & Jeremiah, S.C. (2005) 'Current status of cassava improvement programme in Tanzania', *African Crop Science Conference Proceedings* 7(7), pp. 1311-1314.

Nassar, N.M.A. and Marques, O. (2006) 'Cassava leaves as a source of protein', *Journal of Agriculture and Environment*, 4(1), pp. 187-188.

Njuki, J., Kaaria, S., Chamunorwa, A. & Chiuri, W. (2011) 'Linking Smallholder Farmers to Markets, Gender and Intra-Household Dynamics: Does the Choice of Commodity Matter?', *European Journal of Development Research*, 23, pp. 426-443.

Nweke, F.I., Spencer, D.S.C., & Lynam, J.K. (2002) *The cassava transformation. Africa's best kept secret*, Michigan State University, East Lansing.

Oduol, J., Place, F., Mithöfer, D., Olwande, J., Kirimi, L. & Mathenge, M. (2013) 'Improving Participation in Agricultural Commodity Markets for Smallholder Avocado Farmers in Kenya: Assessing Growth opportunities for women in Kandara and Marani Districts', Nairobi: Egerton University, Tegemeo Institute of Agricultural Policy and Development.

Oduol, J.B.A. & Mithöfer, D. (2014) 'Constraints to and Opportunities for Women's Participation in High Value Agricultural Commodity Value Chains in Kenya', *Working paper no 2014/11*, Maastricht: Maastricht School of Management.

Oomen, H. & Grubben, G. (1978), *Tropical leaf vegetables in human nutrition*, Amsterdam, Royal Tropical Institute.

Overå, R. (1993) 'Wives and traders: women's careers in Ghanaian canoe fisheries', *Maritime anthropological studies*, 6(1-2), pp. 110-135.

Phuc, B.H.N., Ogle, B. & Lindberg, J.E. (2000) 'Effect of replacing soybean protein with cassava leaf protein in cassava root meal based diets for growing pigs on digestibility and N retention', *Animal Feed Science and Technology*, 83, pp. 223-235.

PIND. (2011) 'A Report on Cassava Value Chain Analysis in the Niger Delta', Foundation for Partnership Initiatives in the Niger Delta, PIND, Nigeria.

Prowse, M. (2009) 'Becoming a bwana and burley tobacco in the Central Region of Malawi', *The Journal of Modern African Studies*, 47(4), pp. 575-602.

Quisumbing, A.R., Meinzen-Dick, R., Raney, T.L., Croppenstedt, A., Behrman, J.A. & Peterman, A. (2014a) 'Gender in Agriculture – Closing the Knowledge Gap', The Food and Agriculture Organization of the United Nations, FAO. And Springer Science + Business Media B.V. Dordrecht, Netherlands.

Quisumbing, A.R., Rubin, D., Manfre, C., Waithanji, E., van den Bold, M., Olney, D. & Meinzen-Dick, R. (2014b) 'Closing the Gender Asset Gap – Learning from Value Chain Development in Africa and Asia', *IFPRI Discussion Paper 01321*, Washington DC: International Food Policy Research Institute.

- Ribot, J.C. (1998) 'Theorizing Access: Forest Profits along Senegal's Charcoal Commodity Chain', *Development and Change*, 29, pp. 307-341.
- Ruteri, J.M. & Xu, Q. (2009) 'Supply Chain Management and Challenges Facing the Food Industry Sector in Tanzania', *International Journal of Business and Management*, 4(12), pp. 70-80.
- Sewando, P.T. (2012) 'Urban Markets-Linked Cassava Value Chain in Morogoro Rural District, Tanzania', *Journal of Sustainable Development in Africa*, 14(3), pp. 283-300.
- Shackleton, S., Paumgarten, F., Kassa, H., Husselman, M. & Zida, M. (2011) 'Opportunities for enhancing poor women's socioeconomic empowerment in the value chains of three African non-timber forest products (NTFPs)', *International Forestry Review*, 13(2), pp. 136-151.
- Smith, F.I. and Eyzaguirre, P. (2007) 'African Leafy Vegetables: Their Role in the World Health Organization's Global Fruit and Vegetables Initiative', *African Journal of Food, Agriculture, Nutrition and Development*. 7(3).
- Tallontire, A., Dolan, C., Smith, S. & Barrientos, S. (2005) 'Reaching the marginalised? Gender value chains and ethical trade in African horticulture', *Development in Practice*, 15(3-4), pp. 559-571.
- Terrillon, J. (2011) '*Gender Mainstreaming in Value Chain Development – Practical guidelines and tools*', Netherlands: Corporate Network Agriculture SNV.
- Tschirley, D., Snyder, J., Dolislager, M., Reardon, T., Haggblade, Goeb, S.J., Traub, L., Ejobi, F. & Meyer, F. (2015), 'Africa's Unfolding Diet Transformation: Implications for Agrifood System Employment', *Journal of Agribusiness in Developing and Emerging Economies*, 5(1), pp. 102-136.
- UNIDO. (2009) 'Agro-value chain analysis and development – The UNIDO approach', *Staff Working Paper*, Vienna: United Nations Industrial Development Organization.
- Webber, M. & Labaste, P. (2007) '*Using value chain approaches in agribusiness and agriculture in sub-Saharan Africa: A methodological guide: tools that make value chains work - discussion and cases*', Washington DC: World Bank.