

Facilitating entry into shea processing: a study of two interventions in northern Ghana

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There is considerable potential for the shea industry (Vitellaria paradoxa) to contribute to the economic empowerment of women in the Sahel Region of sub-Saharan Africa. This article examines interventions in Ghana's Upper West Region at two different processing stages of the value chain, intended to facilitate women's participation in, and enhance the benefits accruing from, shea harvesting and processing. We use the responses of the nut pickers and butter processors to qualitative and quantitative field research undertaken in 2010 to explore the constraints facing women's market participation. Results showed that mechanisms to link butter producers to markets and to sources of credit were key for the development of the shea value chain in a way that retains value locally and benefits rural producers. Complementary services also facilitated participation in the butter chains. For women to benefit, the ability to negotiate and influence the terms of trade between producers and buyers is important. Such market initiatives and interventions must be considered in the context of time management of diverse livelihood strategies. Also, how financial management and benefit sharing occur within households is sure to interact with the willingness of women to participate in new shea opportunities.

Keywords: shea, processing, Ghana, market participation, utilization of tree products

LIKE MANY OTHER INTERNATIONAL publications and pronouncements since the milestone *World Development Report 2008: Agriculture for Development* (World Bank 2007), a recent report by the African Development Bank signals the importance of the agricultural sector for poverty reduction and development in Africa (Kanu et al., 2014). Because high economic growth rates in experienced Africa since 2000 have not translated into major poverty reduction in the rural areas which support livelihoods for 90 per cent of the population, 'inclusive agricultural growth' is needed, allied to 'green growth' to meet concerns for good environmental management.

The development imperatives for Ghana, like much of sub-Saharan Africa, include poverty reduction, food security, and sustainable development within a context of

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significant but unequal economic growth and natural resource constraints. It is in an often unsympathetic agro-ecological, economic, and political context that attention is turning towards more diverse production systems, livelihood strategies, and engagement with markets by small farmers.

Another recent report highlights the need and opportunities for inclusive entrepreneurship throughout the value chains for African commodities (Agriculture for Impact, 2014). This includes value addition by processing of a wider range of rural products. But smallholder inclusion in value chains is no simple matter (Helmsing and Vellema, 2011; Poole, 2013), not least because recognition of rural heterogeneity means it is simplistic to assume that all producers are equally willing and able to access markets (Poole et al., 2013).

Trees: inclusive development of food chains in the Sahelian region

Among the approaches to inclusive growth in rural food chains is a sector-wide, multi-stakeholder approach to forestry projects, which should address the optimal management and exploitation of tree and forest resources (Kanu et al., 2014). Tree products are part of the natural and economic landscape, with potential for a greater contribution to poor rural people's subsistence and engagement with markets than hitherto recognized. Much is yet to be learnt about the relationship between trees, nutrition, economics, and well-being (Ickowitz et al., 2014). In the search for food and income security, understanding the contribution of tree crops is important.

Shea (*Vitellaria paradoxa*) is one tree whose products have been better researched. It so happens that in the shea sector, environmental conservation, income generation, and gender equity potentially meet in a triple-win situation. While natural resource endowments commonly belong in the first instance to men, harvesting, processing, and marketing in the West African shea industry are primarily in the hands of women, often individually but also through collective organizations. Thus, shea in West Africa recently has been described as 'women's gold' (Pouliot, 2012), and rural women have largely unrestricted access to both shea trees and their products. There is considerable potential for shea to contribute to the economic empowerment of women through enterprise and employment creation in the region, particularly through interventions in shea value chain development (Elias and Carney, 2005). There is now significant interest and activity from governments and NGOs to promote the shea industry as an enterprise that favours rural women in the Sahel region by encouraging greater value addition through processing and marketing by women as individuals and in groups.

This article examines interventions in Ghana's Upper West Region at two different processing stages of the value chain intended to facilitate women's participation in value-addition through shea harvesting and processing. Both interventions concern local innovations in chain organization. The first intervention targeted women involved in the primary processing of shea nuts; that is, the transformation of 'wet' shea nuts to dried kernels for sale. This initiative sought to improve nut prices and quality through organic certification. The second intervention focused on the secondary processing by women of shea kernels into 'butter'. Here the organization

of women into cooperative groups aimed to improve women's access to markets and machinery. Both processing activities are widely carried out by women working independently; that is, outside any formal group or producer organization. The study uses non-group participants as a comparison group to explore the impact of the interventions on chain participation. We use the responses of the nut harvesters and butter processors to qualitative and quantitative field research undertaken in 2010 to examine interventions to overcome the constraints facing women's participation at two points in the shea value chain.

Shea (*Vitellaria paradoxa*)

Shea trees are found in the semi-arid regions of West Africa, particularly in the savannah belt which stretches from Senegal to Chad and encompasses all of northern Ghana. Here shea is a dominant tree species of the savannah parklands and trees are preserved in high numbers on farmlands. The kernels of the shea fruit are high in oils and have long been collected and processed by women in savannah communities, where they provide a useful source of dietary fats. The fat, extracted as shea butter, also has cosmetic and pharmaceutical uses as a skin preparation. The production of shea butter and processed nuts provides a valuable income source for women and rural households in this region (Chalfin, 2004).

Shea value chain

Shea nuts and butter have been traded in West Africa for centuries. However in recent decades the deregulation of trade in shea, combined with increased demand for shea both as a cocoa butter substitute and a 'natural' cosmetic product, have led to a rapid increase in demand. The domestic and regional markets for shea butter for human consumption and for industrial purposes are huge, and international markets are growing (Sidibé et al., 2014).

The status of shea nut activities as women's work has focused attention on the potential of the industry to provide promising opportunities for remote and low agricultural potential semi-arid regions offering particular benefits to women. At present women tend to occupy the primary fruit and nut collection stages of the increasingly lucrative shea value chain with end points in multinational food companies and the local domestic market (Figure 1).

Primary nut processing involves collecting shea fruits from fields and bush, boiling to remove the outer pulp, drying nuts in the sun, and cracking the hard outer shell to remove the inner kernel. Fruits are harvested and processed mainly by women and sold into local nut markets where they are bought by a range of actors including local butter processors and local nut traders. Butter making involves a series of processes starting with grinding and roasting shea kernels, milling to a paste, beating or 'kneading', and boiling with water to extract the fats. Mechanization can be introduced at all stages, but for most rural women apart from grinding the kernels these processes are performed by hand often, in work groups, to assist the labour process.

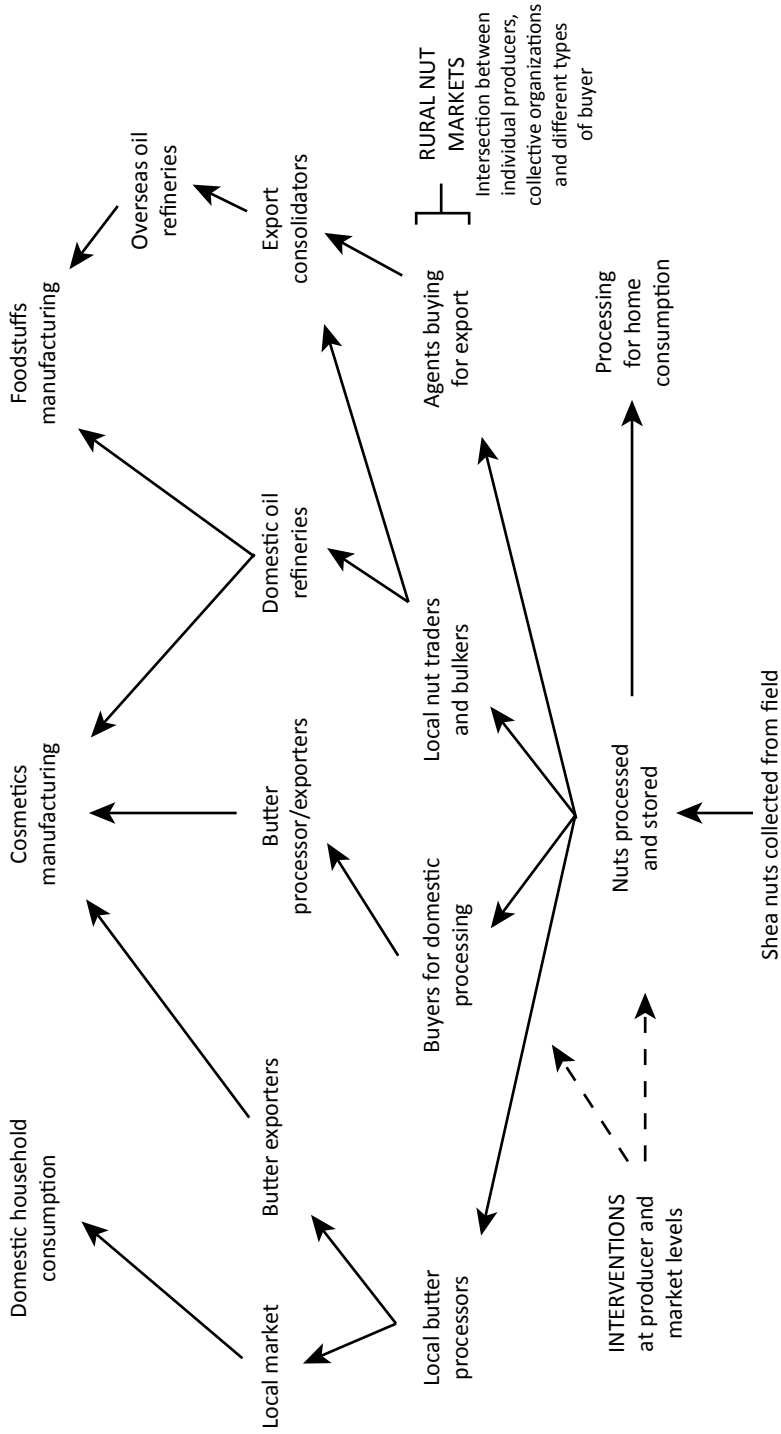


Figure 1 Shea value chain

More recently agents buying both shea kernels and butter for export have become increasingly prominent as the market has grown. Since 2002 the establishment of industrial shea butter extraction facilities and shea butter oil refineries has added further channels to the shea value chain in Ghana.

Institutional interventions in the shea value chain have been numerous but most visible are the activities of NGOs who seek to increase women's involvement in butter-making by encouraging group organization, providing training and equipment, and facilitating links with international buyers.

Research and training on the maintenance and management of shea trees has received some attention. NGOs have also sought to increase returns to those at the primary stages of the value chain by organizing harvesters, providing training in nut processing, and linking harvesters and processors with exporters.

Case studies

Intervention 1: organic certification

The Savannah Fruits Company (SFC) is a Ghanaian registered company which focuses on the production and export of handcrafted shea butter. The company sources shea butter from women's groups in northern Ghana. To provide an organic product for the international market the company sources organic certified nuts for its butter processing partners. This is achieved through a partnership with a community conservation project which, through its land management practice, is able to assure the 'organic' standards of shea nuts harvested within its territory. The community conservation project is Wechiau Hippo Sanctuary located in the Upper West Region of Ghana. SFC organized the organic certification of nuts grown on this land with financial assistance from the Dutch NGO SNV. The community is expected to benefit from this certification of the nuts on the land through improved prices and marketing for shea nuts.

At the time of the study the certification scheme was in its third year of operation. SFC registers and certifies women; provides training on organic principles and nut processing; supplies bags and collects from pickup points in each community. Collectors are paid a premium of 15 per cent after the close of the shea buying season in January. In addition SFC also pays a conservation premium to the Wechiau Sanctuary Management Board (SMB). In each community the certified harvesters form a group and nominate one or two representatives to serve as contact persons between SFC and the community.

Intervention 2: Tihitaribu Cooperative, Guli

The second intervention considered is a butter-processing cooperative in a village 4 km outside Wa, the capital of Ghana's Upper West Region. The cooperative in Guli began as a mutual self-help group in 1979. This group, based on traditional modes of group cooperation, assisted women to organize for butter processing.

In 2002 the Guli group was linked to the Government of Ghana Agriculture Sector Support and Improvement Project (AGSSIP) by the Regional Technology Transfer Center (RTTC) to access a grant in the form of shea butter-processing equipment, and they set up a processing centre in which the equipment was installed. The women's group became registered as a cooperative in 2004 with the assistance of a local organization called Youth Action on Reproductive Order (YARO). YARO has supported group development, savings and loans schemes, and quality management in butter processing.

In 2008 RTTC linked the group to a buyer in Accra (Ideal Providence) seeking butter for export. The buyer provided new machinery and premises to site the machines and create a space for weighing, packing, and storing butter. Butter is collected from the store on a monthly basis. Payment is made to the cooperative; the secretary is then responsible for dispensing payment to each woman according to the number of 25 kg boxes she has supplied. The buyer has also contributed a pre-school to the community.

In 2010 there were 181 registered members of the cooperative. The cooperative provides loans to members and also makes applications for group loans. These are then disbursed among members.

Research methods

Intervention 1 sought to investigate the impact of the community partnership with SFC on nut harvesting activity. The partnership is expected to benefit nut harvesters by offering a secure buyer and a higher price. We sought to explore what women perceive to be the benefits of participation in the SFC project and to determine whether participation is associated with increased levels of nut harvesting (i.e. increased participation in the value chain).

To investigate the impact of certification on women's participation in shea nut harvesting and kernel production, a questionnaire survey of nut harvesters was carried out in 2010. A total of 90 nut harvesters were selected from the following groups: 1) women certified as organic harvesters for at least 3 years; 2) women within the organic certification zone who are not certified; and 3) women outside the certification zone but operating in similar ecological and market conditions.

In addition to the questionnaire surveys, a total of 14 key informant interviews were conducted with experienced shea harvesters to elucidate oral histories concerning the changing role of shea in local livelihoods.

For Group 1, women were randomly selected from the SFC list of harvesters. The Wechiau sanctuary development zone contains 18 certified harvester groups in 17 villages. Every other village was selected to provide a sample of nine villages. In each village women were sampled in proportion to the total number certified in that village. However, there was no pre-existing list of non-certified women. To sample non-certified women, certified women were asked to name women they knew who were not certified. A corresponding number of non-certified women were selected randomly from this list (Group 2).

In the area adjacent to the sanctuary all communities within 10 km of the sanctuary edge were listed. Two communities were selected according to the availability of village lists, and respondents were selected randomly from these lists (Group 3).

The research was carried out after the establishment of the SFC partnership; hence it was not possible to monitor nut harvesting in the groups before and after the intervention. Certified members are self-selected and may represent the more active harvesters in the community. The study does not therefore treat the non-certified women as control groups to measure intervention impact, but seeks to compare levels of nut harvesting activity between different groups and consider reported changes in nut harvesting between participants and non-participants.

Respondents were asked for the total quantity of nut kernels produced in the previous season (number of 90 kg bags); the number of hours spent on different shea-related activities (harvesting, boiling, drying, and shelling); and the number of days these tasks were spread across. They were asked how this had changed compared with five years previously (before certification began) and the reasons why. Marketing decisions and nut sales from the previous season were recorded (quantity, buyer type, and prices) and income from sales calculated. Women were asked if they would like to increase the time spent on nut harvesting and processing. Certified organic collectors were asked about their motivations for joining the group.

Open-ended questions elicited further information from both sets of respondents, and were supplemented by informal interviews and observation by researchers and staff of the NGO SNV, and information from key informants within SFC.

Intervention 2

To explore the perceived effects of cooperative membership, shea butter processors were surveyed in the village of Guli and three districts within the wider Wa municipality. A total of 60 women were surveyed, 30 cooperative members and 30 non-members. Open-ended questions elicited further information from both sets of respondents, and were supplemented by informal interviews and observation by researchers and staff of the NGO SNV, and information from key informants from the cooperative management.

For members of the cooperative every sixth woman on the list of members was selected. There were no butter producers who were not members of the cooperative in this village. Non-members were therefore sought within three neighbouring districts of the Wa municipality.

In these communities, there were no lists of processors. With the assistance of a community leader the first non-member processor was identified and interviewed. From then on, a snowballing technique was used, whereby each non-member processor interviewed identified/recommended the next processor to be interviewed. This process was repeated until 30 processors were interviewed. Women were asked about the quantities of butter they produced, butter sales (quantity, buyer, price) and gross income from butter sales was calculated. Women were asked how this had

changed in the past 5 years (for Guli women this was before the recent relationship with an export buyer was established).

Background information on the Guli cooperative was obtained from discussions with cooperative staff and SNV.

Findings

Intervention 1: harvesting, collection, and processing

The mean estimated time spent to produce one bag (90 kg) of nuts was a total of 72 hours over a period of 24 days. The average number of bags produced for the 2009 season was 3.4 per woman.

Comparing the groups inside and outside the sanctuary showed that similar quantities were produced. The data therefore do not suggest that the certification scheme has increased the quantity of shea nuts processed by women (Table 1).

Although there was no evidence of higher nut volumes for women in the certified zone, responses concerning perceived changes in nut harvesting activity and incomes indicated the following differences between the groups:

- Certified harvesters were significantly more likely to report that they had increased the time they spend harvesting compared with five years ago.
- Harvesters in the certified zone (whether certified or not) were more likely to report an increase in shea income in the past 5 years.

Increased time spent harvesting can be both 'intentional' and 'unintentional', for example, some women reported spending more time on nut harvesting

Table 1 Primary shea processing activity

	<i>Certified harvester</i>	<i>Non-certified (within zone)</i>	<i>Non-certified (outside zone)</i>
Respondents	33	26	31
No. of 90 kg bags produced (2009)	3.6	2.9	3.5
Mean income from shea sales (Ghana Cedis) (2009) ²	81.6	67.4	74.4 ¹
Respondent reporting increased time on shea 2004–2009	27 (82%)	16 (67%)	17 (55%)*
Respondent reporting increased income from shea 2004–2009	30 (91%)	22 (92%)	21 (68%)*
Respondents who wish to increase activity	29 (88%)	22 (92%)	23 (74%)
Respondents who believe they have an influence on pricing	25	4	2

Notes: 1 For women who sell by the bowl this recollection is harder to make and was not possible for all respondents. In contrast SFC sellers usually receive this in one or two payments.

2 US\$1.00 = 3.22 GH Cedis (rate valid as of 10 November 2014)

* Differences significant at $P < 0.05$ (Chi-squared test)

as a consequence of poor nut yields or changing access to trees (for example in widowhood) which means that collecting nuts takes longer. Similarly, ageing was also given as a reason for taking longer to collect nuts. These were also the main reasons given for spending less time on nut harvesting.

Women within the sanctuary zone are more likely to report increases in time spent harvesting due to market factors. However, the main reason for increased time spent on nut harvesting by certified women was related to difficulties with access.

Harvesters inside and outside the zone who reported increased shea income in the past 5 years attributed this to a generally improved market and better prices. Activity by NGOs and other agencies in the shea sector was also cited as a reason for increased income – again for certified and non-certified harvesters alike.

Respondents were asked if they would like to increase the time spent on nut harvesting and processing. Harvesters within the sanctuary zone appeared to be more willing to consider this (Table 1). The main reason given was in order to increase incomes; a few women referred to the strong market for shea. Reasons for not wishing to increase shea harvesting activity were ageing or poor health and conflicts with farming and domestic duties.

Motivation for certification

A range of reasons for choosing to become a certified picker were given by respondents (Table 2). Women selling in the market tend to sell in small quantities as and when they need money, especially for food purchases in the lean season between June and September when food stocks are lowest. Selling nuts can be tedious if the market is slow; they must carry small quantities of nuts to the market several times before they are purchased. In addition nuts are sometimes purchased on credit with risk of non-payment.

The most frequently cited reason for choice of sales channel was the premium obtained from SFC. Other important reasons were the fair measurement they

Table 2 Reasons for becoming a certified picker

<i>Reason</i>	<i>Rank</i>			<i>Total</i>
	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	
Better price / Payment of premium	11	14	2	27
Fair measurement	7	6	4	17
Farmgate purchase	7	1	3	11
Unity	4	1	1	6
Lump payments	1	2	4	7
Access to an assured market	2	0	0	2
Group needed to access external support	1	0	1	2
To receive training	0	1	0	1
Other	0	1	0	1
Total	33	26	15	74

received from SFC, reflecting the poor deal women sometimes receive from market buyers where nuts are bought by the bowl and there is potential for cheating due to non-standard measures. Women trusted the transparent way in which SFC transactions are carried out. SFC also purchases nuts from centralized purchasing centres in each community which saves women time transporting and marketing nuts.

Informal discussions with certified harvesters at Wechiau, the main village in the sanctuary zone, also supported the value women place on receiving a lump payment. Selling in bulk to SFC afforded women the chance to receive a lump sum for their nuts and the potential to use this income for more substantial purchases. Finally, women described how participation in the certification scheme demonstrates unity with the community and the broader Wechiau development project.

Of the 26 respondents who were eligible for certification but had not joined the scheme, the majority (65 per cent) indicated that they were not certified because they had been absent or unavailable at the time of registration rather than because they had made a decision not to sign up to the scheme. Five women indicated that they did not have time to attend the SFC training and one did not want to have to wait for SFC to come and buy nuts. Finally some respondents stated 'other household members are selling to SFC' as a reason which suggested that there may be benefit in maintaining some diversity of sales outlets for households. Overall, the majority of non-certified women expressed an interest in taking part in the scheme.

Influence on pricing

The area of greatest difference between women inside and outside the certification scheme concerned perceived influence over pricing.

In each community in the sanctuary zone a member is selected to represent the group at meetings with SFC. As a mechanism to transmit information and enhance empowerment it appeared to be successful: women in the certification scheme were more likely to feel that they had some influence over the prices they receive for their product (Table 1). Outside of the certification scheme the only recourse women had if they were unhappy with prices, was to refuse to sell their nuts at that time. While shea prices tend to double over the course of the season, the immediate economic situation of many women and households meant that few were able to store nuts until the price improved, and they were compelled to sell at prevailing prices.

Through SFC, women members of communities in the Wechiau Hippo Sanctuary gained certification as organic producers of shea, enabling them to form coordinated commercial alliances with SFC serving the export market for organic shea butter. Results did not suggest that accreditation and enhanced access to higher value markets enabled the participants to increase throughput. It is difficult to separate economic outcomes due to the intervention from those due to external market conditions. Results concerning time spent on shea handling were ambiguous, but pointed towards greater confidence of and ease in undertaking transactions with a trusted buyer. In this sense, market access had primarily transaction cost-reducing and empowerment effects: sellers enjoyed greater control of sales, in terms of

pricing, timing, and payments, and could deal with confidence with the buyer from a position of community cohesion.

Intervention 2: butter processing

The values for data collected on nut processing (both in terms of volumes and time spent) for a number of cases were unfeasibly high and therefore considered unreliable. We therefore concentrate here on women's reported *changes* in butter making in the past 5 years.

Women who were members of the cooperative were significantly more likely to report that they had increased the time spent, and income derived from butter making over the past 5 years compared with non-members (Table 3). Increased capacity to purchase and process nuts was the main reason given for allocating more time. All the butter processors surveyed, regardless of cooperative membership, had access to mechanized grinding and crushing. In all sites women also come together in informal work groups during the 'kneading' stage of butter making (a labour intensive process of beating the ground paste). Members of the cooperative attributed their higher incomes to the presence of an assured buyer and to bulk selling of butter. In contrast the lack of buyers was the most often cited reason for reduced income among the respondents who were not cooperative members.

The response to whether harvesters would like to increase the amount they produce was overwhelmingly negative for both groups (26 and 24 out of 30). However, the reasons for not wishing to increase time spent on butter are quite different (Table 4). Women within the cooperative viewed access to nuts as a limitation on production whereas those outside are more likely to cite lack of a market as a reason for not wishing to increase production.

Table 3 Reported change in income from and time spent on butter activities

	<i>Coop member</i> <i>n=30</i>	<i>Non-member</i> <i>n=30</i>
Respondents reporting increased income from butter 2004–2009	23 (77%)	5 (17%)
Respondents reporting increased time on butter 2004–2009	17 (57%)	5 (17%)
Respondents wishing to increase activity	4 (13%)	6 (20%)

Table 4 Reasons for not wishing to increase time on butter processing

<i>Reason</i>	<i>Coop</i>	<i>Non-coop</i>
No nuts available	18	1
Did not wish to commit more time (domestic responsibilities)	6	7
No market buyer	1	11
Ageing or poor health	1	5
Total	26	24

Benefits of cooperative membership

The main reason for joining the cooperative for the members interviewed was the access to an assured buyer (Table 5). In addition to the certainty that this provides it also makes marketing easier (no need to carry butter to market) and reduced the overheads of marketing butter individually.

Women in the cooperative received other benefits as a result of membership. In Guli cooperative members contributed to the wages of a woman who minded their children while their mothers were working. Members also received training in nut storage, butter making, and group organization.

The Tihitaribu Cooperative, which has a long history, found that its operations were boosted from 2008 onwards by commercial linkages with a private buyer supported by investment in improved processing facilities. More than half (57 per cent) of women in the cooperative reported increased butter-making activity over the past 5 years and attributed this to increased capacity associated with the cooperative to purchase and process nuts. This suggests that the cooperative has had a positive impact on women's participation in shea processing. In contrast to the Wechiau intervention, the investment in processing has led to an increase in scale: shea throughput has increased as women dedicated more time to the enterprise. Growth is perceived to be limited by the availability of nuts. The attraction of participation in the intervention was, as in Wechiau, the higher prices in an assured

Table 5 Reasons for cooperative membership

<i>Reason given</i>	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	<i>Total</i>
Assured buyer	18	3	–	21
Ease of marketing	5	3	–	8
Bulk purchasing	3	5	–	8
Group unity	3	1	1	5
To access other assistance	1	0	–	1
Butter price	0	1	–	1
Reduced overheads	0	3	–	3

Table 6 Comparison of reasons for participation in shea intervention

	<i>Accredited harvesters (n=33)</i>	<i>Butter cooperative members (n=30)</i>
Improved price	82%	3%
Fair measurement	52%	–
Ease of marketing (bulk purchase from village)	33%	63%
Assured buyer	6%	70%
Unity with group/community	18%	17%
To receive training/external support	9%	3%

local market for processed nuts. Among non-members the absence of a buyer was the main reason given for lower incomes and reluctance to increase investment in butter.

Discussion

It is evident from these studies that NGO interventions in rural enterprises can effect improvements in market access by smallholders. It is equally evident that propitious market conditions manifested in increasing demand and rising prices were important external factors. A comparison of the survey results for the two interventions highlights the different constraints to participation that operate at these different points in the value chain.

Access to an assured market was less important for nut harvesters than butter sellers. The market for nuts is almost guaranteed, storage is not a problem, and capital requirements for nut harvesting are very low. The organic certification did not increase market participation or the productivity of shea nut harvesters. However, participants strongly perceived other benefits from participation and certification did impact on the participation of harvesters in the value chain by initiating a dialogue between producers and buyers that previously did not exist. This may have benefits for participants in the future as a result of being able to negotiate directly with export buyers and offer bulk purchases.

The finding that, despite reported claims to have increased time spent on nut harvesting, certified nut harvesters do not appear to be producing more, may be due to the growing competition among harvesters for nuts. This was evidenced in the survey by the number of respondents who cited increased travel for nut harvesting, and also in the qualitative interviews which described the effects of increased competition on access to trees. For nut harvesters, therefore, this research suggests that time and access to trees were the main constraints to increased participation.

If demand for shea continues to increase, incentives to preserve and develop the shea resource will become critical. The SFC organic certification scheme operates within an existing community conservation project and is therefore not a typical sustainability scenario. The question of how the increased value of shea nuts can create incentives to conserve rather than over-exploit this resource is crucial but this is beyond the goals of this research. Although this research did not probe issues of conservation and regeneration of trees, recent research in neighbouring Burkina Faso showed that both *in situ* conservation through natural regeneration, and selection and replanting are proven techniques (Audia et al., 2014).

The constraints to participation in the butter market were chiefly access to export markets: the demand in local markets is limited and competition is constrained. This is illustrated by responses to the question on increasing production. A high proportion of nut harvesters were interested in increasing production in contrast to butter makers who were not. However, in the butter cooperative group the reason for this is given as a lack of nuts, and in the non-cooperative group, lack of access to markets.

It is clear from the study that mechanisms to link butter producers to markets were important for enabling participation in the shea value chain. Services such as pre-finance (to allow purchasing of nuts) and investment in processing infrastructure also facilitated participation. In most cases, women need external support to locate and establish trading relationships with buyers. In Guli the link between the buyer and the coop was facilitated by an outside agency (the RTTC intervention). Overall, facilitating access to buyers was critical in both interventions. Mechanisms to increase women's participation were factors such as well-organized and registered groups, and simple transparent contracts between the buyer and each producer.

Conclusions

Shea in the Sahel provides the basic conditions for a triple win: shea value chain development unquestionably contributes to women's empowerment, and the industry has significant potential for economic development, and for stabilizing ecological fragility in marginal areas like the Sahel. The exploration of the interventions in this study found that women's participation in the value chain can be enhanced. While there is a degree of specificity of the agroecological and human contexts in the region, lessons about promoting women's participation in rural markets are likely to have relevance for many other situations where development can benefit from interventions targeted at women's activities of significant economic potential. Kitchen gardening, small livestock production, and dairy processing offer opportunities that can lead to increasing commercialization through careful targeting at entrepreneurial individuals and organizations.

This research into shea stopped short of a thorough analysis of prices and costs, and further work is necessary with larger sample sizes to quantify the economic benefits and distributional effects of the interventions. Moreover, deeper qualitative studies of women's decision-making are needed to understand the relationships between and within complex (i.e. polygamous) households, access to resources, allocation of time, and interactions between households, communities, collective enterprises, and external traders.

Participants in both of these interventions reported benefits from shea-related activities. As was found in the study by Sidibé et al. (2014) in Mali, in the one case, the participation of women and the sustainability of the interventions were found to be enhanced through the impacts on the value chain organization, which in turn increased the sense of empowerment of the participants. In the other case, the cooperative established new formal arrangements, transparent communications, and shared investments with the buyer enabling the cooperative to meet the buyer's demand for quality and quantity of shea product. The successful linking of the buyer with the producer group has been critical for value chain development through the role of the intervening agency in improving market access.

Two mechanisms for promoting shea value chain development are therefore highlighted by this study:

- Collective organization of producers helps to overcome issues of small scale and quality control at the primary processing stage.
- Value chain development is achieved by linking producer groups to buyers at the secondary processing stage. In these cases the role of the intervening NGOs was essential in improving market access.

These relationships may be subsequently strengthened by buyers' investments in productive and social infrastructure, pre-finance arrangements, end of season premiums, and simple, transparent contracts. Such interventions have the potential to kick-start entrepreneurship and sustainable commercial linkages.

Two other more general but equally important insights emerge from the data about factors underlying livelihood strategies among Sahelian peoples for encouraging interventions to increase opportunities for market access. Both concern women's decision-making and merit further research. Whether they are market-led initiatives, NGO project interventions, or public sector development policies and programmes, understanding the rural household context is essential:

First, market initiatives and interventions must be considered in the context of time management of diverse livelihood strategies. Harvesting and processing shea is subject to a time constraint. Particularly for women who have multiple household responsibilities, rural production includes other economic activities, notably production of staple foods, which require substantial and peak investments of time and effort. There are perennial challenges in balancing economic needs with reproductive and caring functions, likely to become all the more significant as predominantly male migration takes labour out of the household and leaves women with greater responsibilities. Related to this are the dimensions of age and stage of life, which both influence the capacity to invest time and energy in arduous physical activities.

Second, it is a 'given' that negotiated and more secure sales agreements are highly advantageous to suppliers of rural produce. However, issues of household financial management need to be considered in relation to the optimal contractual terms for women's market participation. It is evident that both immediate cash flow requirements and the advantage of female control over lump sum payments affect the women's incentives to invest time in shea. How financial management and benefit sharing occurs within households – specifically between men and women – is sure to interact with the willingness of women to participate in new shea opportunities. Understanding the impact of these intra-household dynamics on market participation and female inclusion, and what changes are occurring to so-called traditional behaviour, requires more work.

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