



From Power Imbalance to Interdependence: A Case Study of the Chadian Sesame Supply Chain

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Accepted: 3 January 2022

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Abstract

Smallholder farmers are crucial actors for rural development in Africa. Their participation in global agro-food chains assures a source of revenues and agricultural development. Nevertheless, their position is still marginal. Moreover, there is a lack of data about the participation of smallholder farmers in African supply chains. The paper aims to identify the power regime between farmers, processors, middlemen and exporters and analyse how collective actions and external players' intervention may modify the bargaining power in the sesame value chain in Eastern Chad. The analysis is based on qualitative data gathered from semi-structured interviews with 98 farmers and 41 stakeholders. The study applies a netchain perspective, analysing the vertical relationships along the food chain in terms of power regime and the horizontal relationships of farmers by observing the first impact of collective actions. The results reveal that the dyadic ties are characterised only by supplier and buyer dominance, and there are no relationships characterised by independence and interdependence along the food chain. Especially, farmers suffer from both buyer and supplier dominance. The analysis of the horizontal relationships reveals that only middlemen organise horizontal agreements to improve their benefit in the commercialisation. The introduction of collective actions for farmers improves their horizontal relationships with potential positive impact on the farmers' vertical relationships along the supply chain. Thus, their bargaining power may be further developed. This study offers a diagnosis of the farmers' participation in value chain and future perspectives on the collective actions.

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Keywords Smallholders farmers · Netchain · Sesame supply chain · Collective actions · East chad

Résumé

Les petits exploitants agricoles sont des acteurs essentiels du développement rural en Afrique. Leur participation aux chaînes agroalimentaires mondiales représente une source de revenus et un facteur de développement agricole. Néanmoins, leur position reste encore marginale. De plus, il n'y a pas suffisamment de données sur la participation des petits exploitants agricoles aux chaînes d'approvisionnement africaines. L'article cherche à identifier les relations de pouvoir entre les agriculteurs, les transformateurs agroalimentaires, les intermédiaires et les exportateurs et à analyser comment les actions collectives et les interventions des acteurs externes peuvent modifier le pouvoir de négociation dans la chaîne de valeur du sésame à l'Est du Tchad. L'analyse est basée sur des données qualitatives recueillies à l'aide d'entretiens semi-directifs avec 98 agriculteurs et 41 parties prenantes. L'étude adopte une perspective 'netchain' et analyse les relations verticales, en termes de relations de pouvoir, tout au long de la chaîne alimentaire, ainsi que les relations horizontales des agriculteurs, en observant l'impact premier des actions collectives. Les résultats révèlent que les liens binaires se caractérisent uniquement par la domination des fournisseurs et des acheteurs, et qu'il n'existe pas, tout au long de la chaîne alimentaire, de relation caractérisée par l'indépendance et l'interdépendance. Les agriculteurs souffrent particulièrement de la double domination des acheteurs et des fournisseurs. L'analyse des relations horizontales révèle que seuls les intermédiaires organisent des accords horizontaux pour améliorer leur bénéfice dans le processus de commercialisation. Pour les agriculteurs, la mise en place d'actions collectives améliore leurs relations horizontales et comporte un impact positif potentiel sur leurs relations verticales tout au long de la chaîne d'approvisionnement. Ainsi, leur pouvoir de négociation a le potentiel d'être encore développé. Cette étude propose un diagnostic de la participation des agriculteurs à la chaîne de valeur et des perspectives futures pour les actions collectives.

Introduction

Smallholders are crucial actors of the agro-food sector in developing countries. In Africa, estimates show that 60% of the farms have less than 1 hectare, and the farms with less than 5 hectares control most of the farmland (Lowder et al. 2016). Especially in most African countries, the size of farms is expected to continuously decrease (Lowder et al. 2016). Despite the concerns on the several dis-economies connected to small farms about production and commercialisation (Li et al. 2018), the development strategies must consider smallholders farms. First, because small farms are responsible for a large share of food and agricultural production: They supply about 70% of Africa's total food requirements, and they represent the bulk of African exports (UNCTAD 2015). In this sense, smallholder farmers are considered central to achieving of food security objectives balanced with sustainability



considerations (UNCTAD 2015). Second, empirical studies have observed the so-called inverse-relation between farm's size and productivity in several African countries, due to the fact that most of the high-yield crops need infrastructure not available in most rural areas (Larson et al. 2016). Therefore, productive farms in Africa will continue to be small. Third, because of the farming structure and the labour system, the restructuring of the African farms seems to be slower than in other parts of the world (i.e. in Asia). Improving the productivity of smallholder farms has thus the clear advantage to leverage resources already in place, such as land, family labour, social capital, farming knowledge (Larson et al. 2016). Thus, according to the literature whilst in the past the attention was mainly focused on favouring large-scale farms, nowadays also the actions on the smallholders' productivity are considered a crucial step to foster the economic growth of African countries, and farmers' income. In other words, the view on the smallholders has changed: "from being a part of the hunger problem, to now being central to its solution" (Graeub et al. 2016, p. 1).

According to figures, the average income of smallholder farms is usually lower than the national one, and the poverty rate of small farms is usually higher than other farms (FAO 2013). Being "price takers", farmers remain the weak participants in commodity markets, since they have historically limited resources, they mainly rely on traditional farming techniques and lack access to market information (Daviron and Gibbon 2002; Li et al. 2018). The extent of smallholders' participation in input and output markets partly determines their productivity, and hence their earnings. There is thus the need to reinforce their participation in the global commodity trade (UNCTAD 2015). The participation of smallholders in developing countries in the global agro-food supply chain may represent a source of hard currency, employment, and income for farmers and other actors in the value chain, such as processors or local traders. Nevertheless, farmers' effective capacity of increasing their income is strongly affected to their ability to compete in the market (Markelova et al. 2009). Despite the attention given in scientific literature and political discourses, there is need to perform case study analysis to acquire information about how small farms participate in food chains and what are the effective tools to leverage their position in the global markets (Lowder et al. 2016). According to Rutten et al. (Rutten et al. 2017), a closer, systematic analysis of local power configurations is necessary to contextualise the key relationships within large-scale land deals, but in general in global agro-food chains.

The paper aims at investigating power regimes in sesame value chains in Eastern Chad with the specific aim to identify and describe the relational features of this food chain and the position of farmers. To understand whether and how changes in system dynamics can contribute to the local development, it is essential to analyse the power system of the relationship between all the players in a developing country's supply chain. Moreover, the study focuses on the horizontal relationships between farmers, to understand the impact of collective actions in the empowerment of farmer along the food chain.

According to Lopez-Calix, sesame can be a strategic product to leverage export diversification in Chad successfully, because the climate is favourable, stakeholders, local actors, governmental bodies and international funders are keen to support



the development of the sesame value chain, and proximity to Sudan and the Middle East can be a profitable opportunity. However, at the same time, several weaknesses affect the sesame supply chain: low human capital capacities, poor organisation and low investments across the value chain, insufficient orientation toward quality, certification, and traceability, misaligned objectives of stakeholders, policy makers, and value chain actors, limited value addition and imbalanced market with fragmented producers and concentrated exporters, deficits in logistics, roads, and water infrastructure (Lopez-Calix 2020).

The paper is based on qualitative data coming from interviews with farmers, input suppliers, middlemen, processors and traders, all located in the same area, to understand the real actor's perceptions of the existing power regime and the impact of collective actions in changing those power relationships in the local area.

The paper is organised as follows. The next section introduces the background and describes the sesame value chain; the methodology presents the case study description, and data collection and analysis. Finally, our findings and propositions are shown in the third section, followed by the results' discussion and the study's conclusions.

Theoretical Background

Cox et al. (2004, p. 3) defined power as “the ability of a firm to own and control critical assets in markets and supply chains that allow it to sustain its ability to appropriate and accumulate value for itself by constantly leveraging its customers, competitors and suppliers”. Many authors outline power in terms of a strategy-influencing source oriented from one chain member to another (Payan and McFarland 2005). As a result, power is viewed as an effectively applied means to gain certain objectives by utilising influence strategies once the power over another firm is attained. Power affects different traits of supply chain relationships including trust, conflict levels, collaboration, commitment, and satisfaction. Power imbalance and interdependence are the key factors that enable the sustainable management of the supply chains. If a player maximises its levels of interdependence with others in the system, it simultaneously increases its functional irreplaceability for the overall network of relationships. This, in turn, may place such a player in a unique position to exert influence in the focal relationship by successfully mobilising the support of other actors across the network of relationships (Gulati and Sytch 2007). Furthermore, it means that a single fragile actor, as smallholder farmers, can play a determinant role in the global value chain, if he is capable of managing and using properly power and interdependence (Cox et al. 2001). As a result, power is viewed as an effectively applied means to gain certain objectives by utilising influence strategies once the power over another firm is attained. Power affects different traits of supply chain relationships including trust, conflict levels, collaboration, commitment, and satisfaction. Power imbalance and interdependence are the key factors that enable the sustainable management of the supply chains. If a player maximises its levels of interdependence with others in the system, it simultaneously increases its functional irreplaceability for the overall network of relationships. This, in turn, may place such a player in a



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In supply chain management, the buyer–supplier relationships (BSR) are considered to analyse the dependence pattern, which connect the actors along the food chains in the business-to-business contexts (Brito and Miguel 2017). Such dyadic BSRs are analysed to manage inter-organisational relationships in the growing economic globalisation, characterised by the increase in international business competition and international economic interdependence. In this context, BSR acquired importance in the Global Value Chain (GVC) approach to analyse the power dependence of developing countries versus the developed ones and the multinational companies in commodity chains (Gereffi 1994).

To the vertical approaches on supply chains, scholars have put beside the contribution of other theories such as the social network analysis approach, more able to include the complex characters of Agriculture Value Chains (Raynolds 2004; Trienekens 2011). A netchain is defined as “a set of networks comprised horizontal ties between firms within a particular industry or group, such that these networks (or layers) are sequentially arranged based on the vertical ties between firms in different layers” (Lazzarini et al. 2001, p. 7). In the netchain, both vertical and horizontal relationships are analysed to show the interrelationships between vertical and horizontal dimensions in the supply chain (Lazzarini et al. 2001). Considering the BSR, a well-functioning netchain consists of two types of interdependencies: the horizontal-reciprocal interdependencies between the suppliers and the vertical-sequential interdependencies between the supplier and buyer. Usually, the former interdependencies are coordinated through mutual adjustment, by collaborative actions, formations, reciprocal feedbacks; the sequential interdependencies are managed by planned action operated by the central firm. According to Lazzarini et al. (2001) in the analysis of BSR the netchain approach can overcome the limits of both supply chain management and social network analysis. In fact, being focused on vertical ties embodying sequential interdependencies, the supply chain analysis, may not consider the sources of value that emanate from reciprocal interdependencies between suppliers, such as strong social ties and knowledge co-specialisation. On the other hand, the social network analysis approach tends to neglect the importance and distinctive nature of vertical ties based on the sequential interdependencies they generate. This approach is suitable in areas of territorial development where multiple actors are involved, and the complexity of social, economic, political and ecological systems need to be considered (Raynolds 2004; Trienekens 2011). The approach was applied in Europe (i.e. van der Heijden and Cramer 2017), but to our knowledge few studies have been proposed in Africa (i.e. Pérez Perdomo et al. 2016). In this regard, our analysis wants to add knowledge about the possible construction and evolution of an agro-food netchain (i.e. van der Heijden and Cramer 2017) in developing countries. To do so, first it analyses the vertical relationship along the food chain, in terms of



power dependence and interdependence, and then the study analyses the horizontal relationships between farmers built through collaborative actions amongst farmers.

Constraints in Farmers Participation in Commodity Food Chains and the Role of Collective Actions

In developing countries, power imbalance and buyer power over the farmers impede the supply chain development (Aggarwal and Srivastava 2016; Bjorvatn et al. 2015). Scholars agreed on some constraints afflicting value chain development in Sub-Saharan Africa, such as the constraints in the access to and the lack of performance in the market (Barret 2008; Makelova 2009), the lack of resources and infrastructures (De Shutter . In addition, weak physical and technological infrastructure impede the efficient flow of products to markets and slows down the flow of market information. Governance and institutions also affect the organisation and sustainability of the market. Developing countries are often characterised by institutional voids (Mair and Marti 2008), since government legislation, regulations and policies can limit value chain upgrading, by setting trade barriers for production materials and production technology, by imposing unfavourable taxes and by denying infrastructural investments that would benefit value chains and the flow of information. Moreover, domestic institutions show limits in managing agribusiness power, mediating corporate practices, (Manda et al. 2020), as well as in delivering coherent and multiple policies aimed at fostering inclusive sustainable intensification and rural development (Mdee et al. 2021). This results in increasing the power of elite and investors (Manda et al. 2020). Market access depends on technological capabilities of producers, availability of infrastructure (Barret 2008). Low levels of skilled labour force and know-how in the production, distribution, and marketing of agro-food products hampers the farmer's entrepreneurship and innovative behaviour in the supply chain (Svensson and Drott 2010); et al. 2017) and the institutional void (Mair and Marti 2008, 2014; Corsi et al., 2017; Mdee et al. 2021).

Although the global agro-food chains cannot do without farmers and relations of interdependency between all parties involved can accentuate points of leverage for smallholders (Rutten et al. 2017), when they access to market, their performance is negatively affected by the high transaction costs they face. Moreover, because of many intermediary players, the global commodity supply chains are long, implying limited availability of market information, unfair distribution of value-added over a large number of actors, and longer distances both in space and time (Trienekens 2011). Thus, farmers have a little capacity for bargaining power.

To improve market access, the action programmes for small farmers participating in global commodity chains are focused in creating and reinforcing an entrepreneurial culture in rural communities (Pingali et al. 2005). This means shifting the focus from only production-related programmes to more market-oriented interventions (Gyau et al. 2014; Barham and Chitemi 2009). To do so, many scholars and practitioners pointed out that the development of collaboration amongst players is crucial to cope, or at least, to reduce these issues and to fix market inefficiencies (e.g. Markelova and Mwangi 2010; Fischer and Qaim



2014; Poulton and Lyne 2009; Trebbin and Hassler 2012; Rutten et al. 2017). The recourse to the use of collective action is not new and continues to be sponsored by policy makers and practitioners all over the world as a valid growth strategy, especially for Africa, since agricultural development is linked with the smallholders' ability to produce and commercialise their products (Toenniessen et al. 2008; Bernard and Spielman 2009; Markelova and Mwangi 2010). Collective actions are usually defined as voluntary action taken by a group in pursuit of common interests or in the achievement of common objectives (Meinzen-Dick and Di Gregorio 2004). In collective action, members may act directly or through an organisation; they could act independently or with the support of external agents from governmental entities, non-governmental organisations (NGOs), and development projects. These commonly shared goal actions can enable players, above all in developing countries, to take advantage of the changes in the global value chains and deal with an existing power imbalance.

Collective actions could offer one solution for different players, especially smallholders, to participate in the value chain more effectively (Markelova 2009) overtaking the constraints. Collective actions can generate scale economies in the production and commercialisation phase, by the use of collective sales and collective storages (Trebbin and Hassler 2012); they can achieve efficiency in the production, increasing the productivity, through the organisation of specific technical formation about the farming practices (Francesconi and Heerink 2011; Fischer and Qaim 2014); they can support easier access to market information and financial and human capital resources (Hulme and Shepherd 2003; Pingali et al. 2005), by facilitating the collaborative meetings of the farmers with the other actors of the food chains; collective actions supporting the formation and the education may also ensure the achievement and the effective use of new technologies and social innovation (Devaux et al. 2009) and improve the food quality, safety and traceability (Thorpe et al. 2005; Narrod et al. 2009; Trebbin and Hassler 2012; Fischer and Qaim 2014). Farmers' organisations created by collective actions provide a wide range of services and enhance the interactional structure and governance of the value chain (Fischer and Qaim 2014; Trebbin and Hassler 2012). Farmers organisation can enable players to refine their performance by providing the facilities and services linked to collective action, such as training services, managing common property resources and property rights (land, water, pasture, fisheries, forests), technology services, marketing services (input supply, output marketing and processing, market information), financial services (savings, loans and other forms of credit), welfare services (health, safety nets), policy advocacy (. Especially learning processes and availability of support facilities supplied by associations allow players to increase production and to improve and preserve product quality. Better production quantity and quality facilitate market access thanks to increased relevance and larger bargaining power for farmers along the supply chain. This leads to higher profit performances for smallholder farmers and higher levels of food security for households, both of which are expected to increase due to a more performing production and marketing process and to better price conditions achieved by collective organisations in dealing with buyers or local intermediaries (Trebbin and Hassler 2012) and women participation (Mudege et al. 2015; Stockbridge et al. 2003).



The success of collective actions depends on the commitment of all actors (Trebbin and Hasser 2012). For this reason, actions should be taken to reduce the impact of free riders. Collective actions entail transaction costs, and the likelihood of voluntary commitment of each individual depends on the cost-opportunity of participation (Markelova et al. 2009). For this reason, the internal organisation of the collective action, the possibility of tracking the performance of farming, and the provision of adequate incentives and sanctions are considered important determinants of collective actions' effectiveness (Poulton and Lyne 2005). Considering the cost in organising the collective actions, scholars have pointed out that collective marketing seems to be more beneficial in high-value supply chains than in local markets for staples and other traditional food crops (Fisher and Quaim 2012). However, considering the global characters of such value chains, usually the participation of a third actor, external to the actor's local dynamics is considered a favourable driver in the success of collective actions (Trebbin and Hasser 2012).

Sesame Value Chain in Africa

Sesame is one of the most drought tolerant crops in the world. It adapts to arid and semi-arid regions. In the current context of climate change and global warming, sesame is considered as one of the most suitable crops in West and Central Africa since it guarantees high yield even in harsh environmental conditions (Langham 2007). Moreover, it is relatively simple to grow, does not need too much irrigation, is tolerant to high temperatures, is not labour intensive, and demands few investments (Langham 2007). For all these reasons, sesame is a suitable crop for smallholder's farms in Africa, and it has potential in leveraging the income of farmers (Dossa et al. 2017). In several African countries, sesame production has shifted from being a marginal crop to one of the major exported ones, remaining based on small farms (Gildemacher et al. 2015). According to data provided by Food and Agriculture Organization of the United Nations (FAO), in 2013, about 51% of worlds' total sesame production is concentrated in Asia, nearly followed by Africa, which contributes around 45%. African production is led by Sudan. Sudan was the top sesame seed producer in 2013 and the top-eleven seed producing country out of 19 are African. This means that the majority of the sesame seeds are produced in Africa. Considering the harvesting area, the Sudanese Region (which also includes Chad) is ahead of Myanmar, India and China which are the top-three producer's countries. Nevertheless, average sesame yields are very low in Africa 4543 hg/ha compared with 5728 hg/ha in Asia (FAO 2013). In other words, despite having the largest harvested area, Sudanese Region is not the world top producer. This points out all constraints and this region is facing to improve the local sesame industry. Especially many obstacles restrain the large potential that sesame represents for smallholder farmers and for African countries as a whole. Some of these obstacles are associated with rainfall variability, land tenure, harvesting and post-harvesting system, quality of seeds, but also weak links in the value chain and the as the effective bargaining



power and power distribution along the chain play a determinant role (Gildemacher et al. 2015; Dossa et al. 2017).

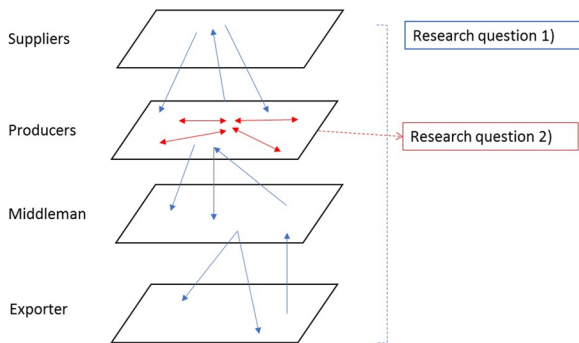
Material and Methods

The study is based on a qualitative analysis based on interviews. Qualitative research methods allow the understanding of people's points of view, and the social and cultural phenomena supply chain's actors are integrated into that may affect their participation in the supply chain (Avison et al. 1999). We adopted a buyer-suppliers relationship perspective (BSR) (Brito and Miguel 2017), where the points of view of the buyers and suppliers along the supply chain were compared and categorised considering their dominance, interdependence or independence (Cox et al. 2001; 2003).

Our analysis employed a netchain perspective (Lazzarini et al. 2001; Triekenesen 2011), being focused on both vertical and horizontal relationships. In the detail, the study wants to analyse (Fig. 1):

- How the vertical relationships are organised in terms of power regime between buyers and suppliers along the sesame food supply chain located in the area.
- How the introduction of collective actions may reinforce the horizontal relationships between farmers to strengthen their vertical relationships.

Fig. 1 Conceptual framework based on Lazzarini (2001)



The study adopts an embedded single case study design (Yin 2009). In fact, the analysis considers each type of actor along the supply chain as a sub-unit of buyer and supplier (Brito and Miguel 2017); at the same time, the analysis focused only on a single case study – the sesame local food supply chain – to operate a diagnosis of its power regimes, that to our knowledge has never been done before (Yin 2009). For this reason, the results of this research are not to make broad universal generalisations, but rather they are focused on context-specific conclusions that could be expected to replicate under similar conditions and similar contexts (Yin 2009).

Case Study

The case study is the sesame supply chain developed in Habile-Wara and Mouro Canton, part of the Sila region, in Eastern Chad, 50 km from the border with the Sudanese Darfur region (Fig. 2) (Table 1).

The study is part of a broader project, the “Support Programme for Local Development and Natural Resource Management (PADL-GRN)”, financed by the European Development Fund 10 (Orsi et al., 2017). The project’s main objective was to improve rural population’s living conditions and food security and strengthen the participatory dynamics of local development and natural resource management. The project was focused on: (i) introducing and developing new farming practices and techniques to the farmers to raise the quantity and the quality of the sesame production; (ii) supporting and strengthening the small farmer’s household production and processing capacities; (iii) improving the commercialisation of sesame-based products through entrepreneurship, business development training with the emphasis on business record keeping and marketing. Within the PADL-GRN programme 30 producer organisations (POs) were involved, each one composed of about 20 farmers. The project was first focused in supporting and training the farmers during the soil preparation and production phase, harvesting, storage, and marketing activities

Fig. 2 Sila Borders Department

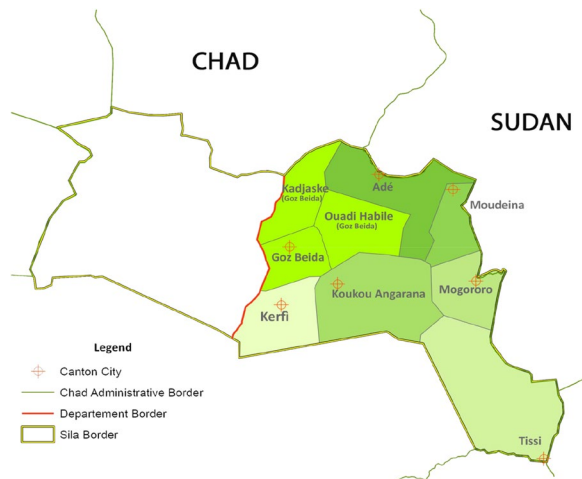


Table 1 Description of the case study

Population of Habile-Wara	74,000
Number of villages, Canton of Habile-Wara	90
Number of villages involved in the project (Habile-Wara/Mouro)	30
Average cultivated area by family (ha)	427
Irrigated surface	0 00%
Principal ethnic group	Dadjo, Kadjaksé, Ouaddai, Mouro, Salamat

of sesame products. Afterwards, the project focused on the overall relationships between actors of the agro-food supply chain to support and foster the development of the sesame industry, by improving the role and power of farmers in the value chain.

Research Context

Chad is amongst the world's poorest countries with a yearly gross domestic product per capita of around \$2000 (UNDP 2016). The Human Development Index, which focuses on sustainable and equitable progress, ranked Chad 186 out of 187 countries in 2014 (UNPD 2016). In Eastern Chad, the main income-generating activities are agriculture and livestock. The key long-standing challenge for smallholder farmers is low productivity stemming from the seasonality variation as well as lack of access to water, agricultural inputs, credit, markets, and technology. In addition, uncertainties regarding land tenure and inadequate access to land have been a supplementary critical challenge to smallholder farming since the pressure on resources due to the arrival of the Sudanese refugees in the area between 2005 and 2010 (OXFAM 2012). Climate and political instabilities, lack of infrastructure and elevated production costs have exacerbated food insecurity in the area. For this reason, international aid programmes have promoted several collective actions involving trainings, collective input purchase, sharing know-how, building collective storehouses, and integrated sales programmes. Therefore, the farmers' consciousness of being part of the chain arose since the beginning of international aid agencies activities (AFC and UNHCR 2014).

Historically cotton was the main Chadian cash-crop. Cotton industry was concentrated in the South and the value chain was highly organized. Over the past two decades, the system went through regular crisis, causing the worsening of food insecurity in rural areas (AFC and UNHCR 2014). Sesame production was promoted in the area to better diversify the agricultural production. It had ritual use only, and its cultivation was authorized exclusively to male and initiates; women and non-initiates were excluded because of their "impurities". Locals believe sesame have therapeutic and aphrodisiac properties; it is often used as a medicine or tonic and crops receive protection for cult initiation. Although today we can observe that the sesame can be approached, cultivated, and manipulated



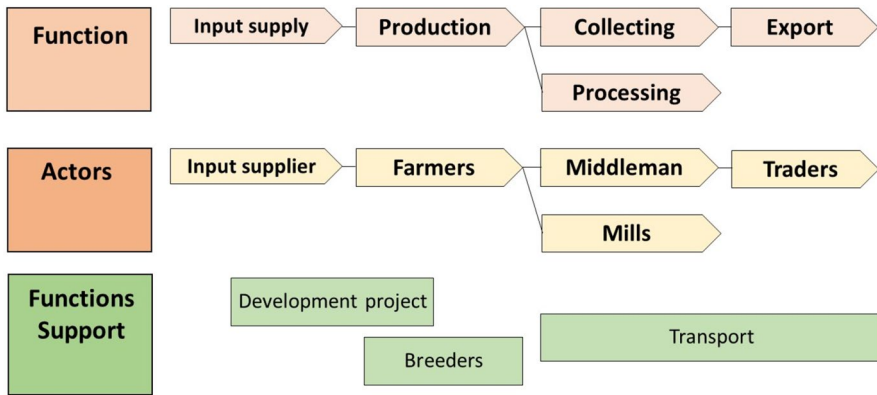


Fig. 3 Sesame Local Value chain, based on Porter (1985) based on empirical evidence

by all family members, the cultivation is still something mystical and some rituals are practiced at the time of sowing and harvesting (Ossobaye 2011). Sesame is marginally consumed locally, since most of the oil consumed by local people is derived from peanut oil. Only the arrival of refugees from Sudan in 2009 has increased the local consumption of local sesame oil. According to estimates, the Chadian exports of sesame have increased from 2007, and they are dedicated to African markets, especially to the neighbour Sudan, Nigeria, and Cameroon (UNIDO 2015). The sesame production in Chad reached 170.000 tonnes in 2019. In 2015, when data collection were carried out, more than 150.000 tonnes were harvested, in line with previous years (FAOSTAT 2021).

For the weak economic system of Chad, sesame can be a strategic product to successfully leverage export diversification to foster economic growth. In fact, Chad's climate is potentially favourable to sesame, producers and processors are interested in developing both chains, and few players are exporting to key markets. International assistance and government support are available to develop the agricultural sector, physical, linguistic, and cultural proximity to Sudan and the Middle East that can benefit from Chadian sesame value chain, as the global and regional demand are increasing (Lopez-Calix 2020).

The sesame local supply chain is divided into five functions carried out by five different types of actors: input suppliers, farmers, processors, middlemen and exporters (Fig. 3). Each one deals with a specific stage of the product cycle from upstream to downstream. The core players are adjoined by the support activities, such as seed and tools suppliers, breeders supplying fertilisers, public support to agricultural production, development programmes.

- The input suppliers are key players in the local chain because they provide input, namely seeds, because other inputs (e.g. fertilizers, agrochemicals) are not available. Input suppliers usual supply the weekly village markets of the region. Usually, they work according to the potential need for seeds, the previous harvest



and the market forecasts. They commercialise different kinds of seeds. Input suppliers meet the farmers in the villages.

- The production involves a large portion of families in the region: about 79% of families that cultivate it, associated it with a cereal and the tools used in the production process are the same for each crop. Nevertheless, the sesame represents a marginal production for the families: in the area farmers produce around 3 sacks of sesame per year, whilst they produce 10 sacks of sorghum 13 of peanuts 6 of millet (data derived from interviews).¹ Sesame seeds can be planted alone or combined with sorghum, millet, peanuts, or beans. The sowing takes place around the middle of the rainy season, after mid-July; this characteristic makes sesame an interesting crop in terms of work scheduling since other crops, such as peanuts, are seeded as quickly as possible. The sesame producers practice a non-mechanised family farming. The tools used in the production process—hoe, rake, sickle—are handcrafted and local forged with recycled materials. Often the phase of ploughing is carried out manually, with the help of the hoe; based on data collected from questionnaires, the plough drawn by animals (donkeys or horses rarely) is used only in 40% of families in cases of availability.
- The process mills of the region can process peanuts, sesame, and soapberry at the same time. Most of mills' activity is dedicated to processing peanuts and soapberry. The sesame, however, covers only between 10 and 15% of the total raw material transformed into oil.
- Middlemen (also called *pisteur*) are key players in the local chain: they are the linkages between supplier (farmers) and buyers (exporters). Middlemen usually supply the weekly village markets of the region and their incomes depend on the commission offered by the local traders. Usually, they work following the purchasing order made by exporters for a certain number of sacs. Usually, they are specified in the sesame commercialisation, and seldom they deal with the commercialisation of other crops. Middlemen meet the farmers in the village markets (Koutoufou, Tcharaw, Koukou-Angarana, Kerfi, Ablelaye, Goz-Beida, Aradib, Louboutigue) (Fig. 2).
- Exporters manage the demand of sesame. Usually, they are in contact with different *pisteurs* and work on international traders requests. They usually manage orders for 400 sacks per week. The trend in demand and the price formation entirely depends on Forbaranga's market which is the first and principal market beyond the Sudanese border.

Data Collection and Sample

Data collection occurred between March and July 2015 implicating different stages. In the first phase, open-ended interviews were carried out to the relevant

¹ In Chad sesame is often bought in a local unit called a *coro* equivalent to about 2.5 kg; usually a sack contains about 40 chorus.



stakeholders in 28 villages of the 2 cantons Habile-Wara and Mouro to understand the background context. In the second phase, semi-structured interviews were carried out with 98 farmers, during weekly meetings with the PO. Based on these interviews we identified the relevant actors of the local sesame food supply chain. Thus, we applied a snowball approach to select the actors (Yin 2009) and in this way we were able to include the total of the players involved in the sesame food supply chain within our research area. Therefore, in-depth semi-structured interviews were organised to understand how power is shared between the local sesame food supply chain actors. These interviews were submitted to 4 input suppliers 15 processors 8 middlemen and 8 exporters. In this phase, also 6 more farmers were contacted to better clarify some points that showed up during preliminary analysis of questionnaires data.

The interviews analysed several elements of the local sesame supply chain and were divided in several parts: (i) identification of the actor of the interview; (ii) the analysis of the different steps of the activity carried out by the actor, the number of people related to the actor, the places where the activity is located, other activities related to the sesame production; (iii) about the provision, where the provision is made, which actors are included, how the prices and quantities are decided; (iv) about the stocking, selection and transportation, if and how these activities are done; (v) about the sale, who and how many actors are buying the product, how are the mechanisms for the contracting, what are the criteria to be informed and define the price; (vi) what kind of constraints and future development the actor recognises. Specific questions were addressed to farmers' perception about their participation in the collective actions.

The analysis is based primarily on such in-depth interviews, although the contribution of every data collected was determined in the analysis phase to contextualise and verify findings. In fact, following a Rapid Rural Appraisal (RRA) approach (Chamber 1980; FAO 2014; Notenbaert et al. 2017) to fully understand the condition of food security in these never investigated case studies and the impact of projects in the agro-food value chains, the analysis of the interviews was joined by background qualitative data coming from: (a) field work; (b) active and passive participation; (c) observation of participants and non-participant; (d) formal and informal interviews; (e) focus group interviews; (f) questionnaires; (g) official and unofficial documents analysis. The aim of this stage was to characterise livelihood besides the cultural, socio-economic, demographic, and agricultural situation in the area, in particular, regarding access to resources, mechanization in agriculture, access to land and land tenure, agricultural input and output.

Data collection were conducted orally by one of the authors in collaboration with two local operators, essentially due to some difficulties: most of the respondents are illiterate and only local Arabic speaking. Researchers took notes of each answer after translation into French.



Data Analysis

The data analysis follows two steps. First, the interviews were analysed to evaluate each dyadic relationship in terms of power regimes in the buyer–supplier perspective, thus analysing the vertical relationships between buyer and supplier. To do so we have categorised each dyadic relationship in the power matrix (Cox et al. 2004). The power matrix recognises four types of relationships: buyer dominance, supplier dominance, in-dependence, or inter-dependence (Table 2).

According to Cox et al. (2004) the Buyer Dominance is possible when the dependence of the buyer on the supplier is low. In this situation, supplier power is low because the buyer is highly critical for the supplier's business and there is almost no alternative to supply somewhere else. On the contrary, Supplier Dominance is high when the dependence of the buyer on the supplier is low. Supplier power is high because the buyer is not critical for the supplier and there are alternatives/substitutes available for the supplier. The situation in which both buyer and supplier show a high level of dependence on each other is called Interdependence, whilst when both buyer and supplier show a low level of dependence on each other is called Independence.

The power matrix is the analytical tool used to understand the organisation of supply chain actor strategies. The matrix is constructed based on three primary variables: the relative value, the relative scarcity, the criticality of the resources and the information advantages that arise in exchange transactions for buyers and suppliers. The presence or absence of each variables indicates player positions in the matrix (Cox et al. 2001, 2004). Each party within a transactional exchange can be located in one of the four basic power positions: Buyer Dominance, Interdependence, Independence and Supplier Dominance. The analysis studies the current situation of power imbalance and the factors explaining it; it approaches whether and how the existence of such power imbalance results in a different relational mechanism implemented by the powerful in the dyadic relationship. Once all the dyadic relationships were analysed individually, we draw comparisons between them and let patterns and differences emerge.

After this first diagnosis, we used the data collected through the interviews to analyse how collective actions have acted on the horizontal relationships between farmers in their role as buyers and suppliers in the food chain.

Results

Power Allocation in the Sesame Supply Chain in Eastern Chad

In the following section, findings are presented and analysed. First, each dyadic relationship between players was evaluated in terms of power regime and whether it could be categorized as buyer dominance, supplier dominance, in-dependence, or inter-dependence. Such operation allowed us to map the different relationships according to the power matrix (Table 3). Table 3 shows the results of the power



Table 2 Power Matrix with variable specification coming from Cox et al. (2004)

Attributes of Buyer Power Relative to Supplier	High	BUYER DOMINANCE	INTERDEPENDENCE
			<ul style="list-style-type: none"> ■ Few buyers – many suppliers ■ Buyers has high % share of total market for supplier ■ Supplier is highly dependent on buyer for revenue with few alternatives: the criticality of the resource is relatively low (low operational and commercial importance) and the scarcity of alternative is low (i.e., availability of other suppliers) ■ Supplier has no information asymmetry advantages over buyer
	Low	INDEPENDENCE	SUPPLIER DOMINANCE
		<ul style="list-style-type: none"> ■ Many buyers – many suppliers ■ Buyers has high % share of total market for supplier ■ Supplier is highly dependent on buyer for revenue with few alternatives: high levels of resource criticality and high levels of scarcity ■ Supplier has no information asymmetry advantages over buyer 	<ul style="list-style-type: none"> ■ Many buyers – few suppliers ■ Buyers has high % share of total market for supplier ■ Supplier is highly dependent on buyer for revenue with few alternatives: criticality of the resource is relatively high and the scarcity of alternative is high (i.e., limited availability of other suppliers) ■ Supplier has no information asymmetry advantages over buyer
		Low	High
		Attributes of Supplier Power Relative to Buyer	

matrix, as well as the evidence from the interviews are included in the respective sections to demonstrate actors' point of view, following the methodology.

As it possible to see in Table 2, the analysis of the interviews has revealed that the vertical dyadic relationships amongst the local sesame supply chain actors are characterised only by supplier and buyer dominance (Table 2). Currently, interviews indicate that there are no relationships of in-dependence and inter-dependence amongst the different actors. In other words, all the relationships reflect an existing power imbalance between players.

In the sesame supply chain case studies, it is possible to observe supplier dominance twice (Fig. 4). First, in the relationship between input suppliers and farmers. Being local input suppliers low in number, sesame farmers are forced to buy products only from the few available. In other words, the criticality of the resource input suppliers offer in the local market, lead farmers to face lack of alternatives. Consequently, the dominance of the input supplier is visible in the price making. According to farmers, the price of inputs is very high and not negotiable (Table 3). By observing the input suppliers' points of view, the prices proposed to farmers are high and not negotiable because the seed market is not steady (Table 3). Even



Table 3 Power matrix results of local sesame supply chain

Relationship	Buyer Power	Supplier Power	Relationship type	Interviews source
Input Supplier vs Farmer	Low	High	Supplier dominance	F, seeds provider: "My prices are different every year. They depend on the previous year harvest and on current demand. They are not negotiable" Z, seed provider: "This business is not steady. I have few clients and I can't reduce prices for them." L, farmer: "I don't have money to buy seeds, the prices are too high for me." Bachir Ahamat, farmer: "It is difficult for me to have ready money in the period between the harvests, so I must sell all my courtyard animals and my agricultural products, including those I earmarked as seeds for the following campaign."
Farmer vs Processor	Medium	High	Supplier dominance	Farmer: "I sell to middlemen to quickly get money for my family" M., processor: "During 3 months amongst the year I am forced to stop my business since farmers are not bringing their products to my mill. In addition, in post-harvest periods, farmers prefer stocking sesame waiting for the price rising, as a result I depend on their willing and I can't secure my business"
Farmer vs Middleman	High	Low	Buyer dominance	Bachir Ahamat, farmer: "When I need ready money urgently, I have no choice and I have to sell my product to any middleman offering me cash although with not negotiable price." Ahamat Noh, middleman: "I purchase depending on prices applied by wholesalers to Chadian sesame, in Foraranga market at the Sudanese border. I receive prices information by phone by my cousin who works there. When I negotiate with farmers of Habile Ouara, I know which is the maximum price I can offer for one sack, to have a good profit. If the farmer regrets, I give up and I can close the deal." Mahamat Yussuf, middleman: "Middlemen often meet at Sunday market, in Goz Beida, or at Thursday market, in Kerfi, to enter into a sales agreement, precisely about what price we will apply for each sack."

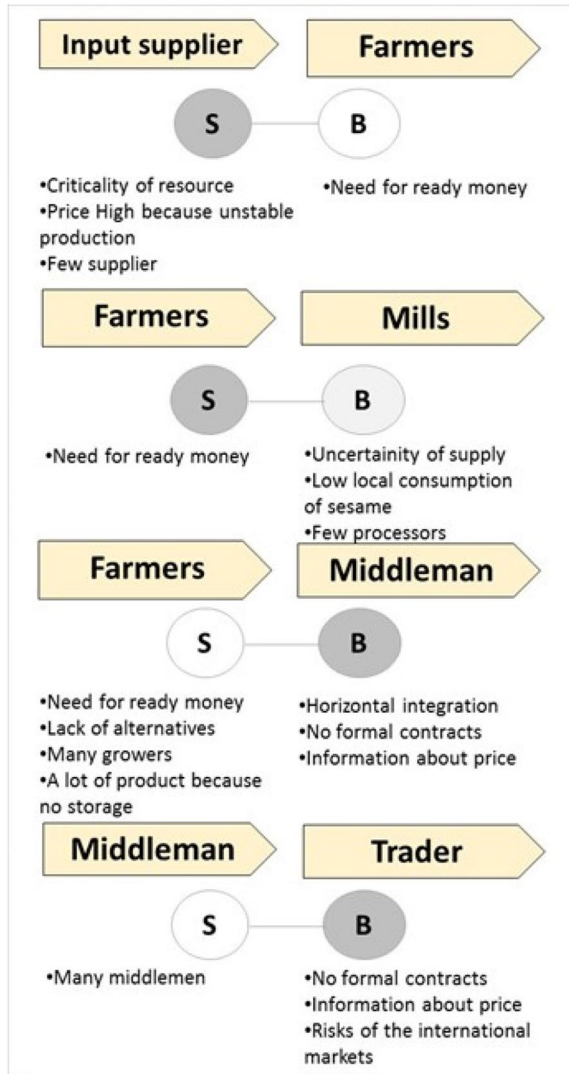


Table 3 (continued)

Relationship	Buyer Power	Supplier Power	Relationship type	Interviews source
Middleman vs Exporter	High	Low	Buyer dominance	Alhadi Rachid, exporter: "Depending on my international business contacts, I am capable of deciding the crop right quantity and the proper price to ask for at any moment." A, exporter: "I export also other goods. When international demand for sesame is high I make big orders, otherwise I focus on the other goods." "No single middleman can afford transportation costs; therefore, we need support from the exporter" A, exporter: "There are many middlemen in town, so I can decide who to trust" K, middleman: "I never try to negotiate with the exporter because he can get angry with me and stop working with me,"



Fig. 4 Factors of power imbalance in the dyadic relationships between the actors along the sesame food supply chains

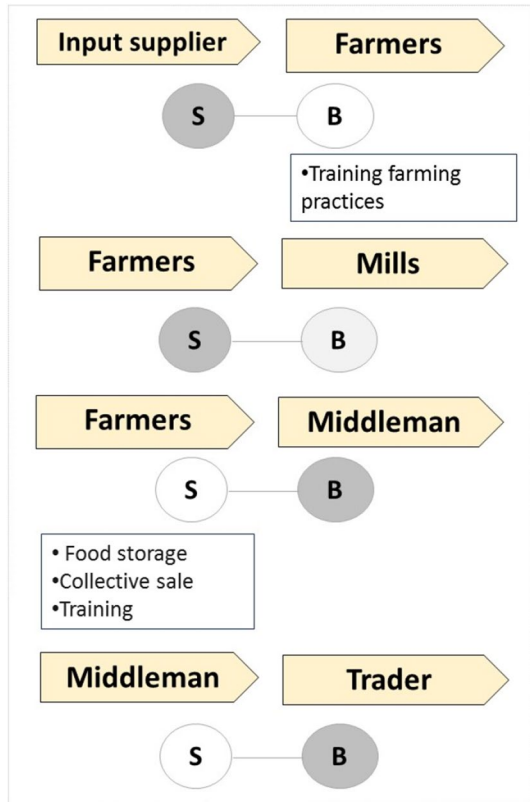


though the sesame is not the only seed that input supplier commercialise, it seems too risky and input suppliers exploit its dominance in the relationship with farmers. In fact, compared to other seeds, like beans and groundnuts, sesame is a cash crop produced for export and, in case of a decrease of the external demand, cannot rely on the internal one.

To overcome the dominance of input suppliers, a strategy developed by farmers is to conserve part of their output, instead of selling it, for the next sowing. However, this behaviour entails the potential loss of earning in periods of the year where ready money is an urgent need for the families' daily needs and for small scale agricultural



Fig. 5 The action of collective actions to improve farmer's position along the food supply



investments. For this reason, few farmers pursue this strategy and when they do it, they may limit the household expenditure or farm investments.

The second supply dominance is between farmers and processors (Table 3). The reason why farmers are in a dominant position compared to processors relies on the fact that sesame is a single harvest crop, and consequently, farmers can decide whether and when it is profitable selling or processing during the year. Processors in the area are not numerous, so even though they could possess decent bargain power in negotiations, they face a significant uncertainty regarding availability of raw material. Nevertheless, processed sesame is not a priority good in the local market, as mentioned before, since it is demanded mainly by Sudanese refugees and most of the sesame produced by the farmers is commercialised to be processed abroad. Processors have alternatives since they can process other goods, e.g. corn for producing flour, and thus their power is not low (Table 3).

Relationships between farmers and middlemen, and between middlemen and exporters revealed a buyer dominance (Table 3). In the relationships between farmers and middlemen, farmers denounce no bargaining power, especially due to the



lack of alternatives to sale their products. One reason is that farmers are many, whilst middlemen are less in number, so whilst middlemen can choose from which farmers to buy the products, farmers cannot decide to which middleman to sell the product. In this dyadic relationship, the buyer has the certainty of a steady supply due to the abundance of growers in need to sell a product that cannot be stored properly in the household. Moreover, middlemen go to the villages directly to farmers, hampering the possibilities of farmers to acquire information about the market beyond the middleman. Such information asymmetry also depends on the fact that middlemen have access to price information thanks to their upstream relation with exporters dealing with foreign markets.

This results in a high level of farmers' dependence on the middleman, whilst middlemen do not depend at the same degree on farmers (Table 3). Therefore, since no formal contracts exist between suppliers and buyers, the prices are decided directly when the product is ready to be sold, and farmers need to have ready money, middlemen are in the condition to drive prices down. Moreover, not only middlemen have access to price information, but middlemen have also elaborated a strong horizontal integration to decide the purchasing price of the sesame. Such strategy is a strategy to push down the purchasing price, and at the same time a way to acquire information. According to the interviews, the need to coordinate the efforts to push price down mainly depends on the power dominance of exporters over middlemen.

The buyer dominance between exporters and middlemen depends on the fact that exporters are the only actors with a direct connection to the international sesame market. Since in the area sesame is mainly produced to be sold abroad, exporters are thus the key-actors for the reliability of the entire food chain, ensuring the local permanence of the supply chain. The direct and exclusive connection with the international market allows exporters to take advantage of information asymmetry. As in the previous buyer dominance, no formal contracts are stipulated between buyers and suppliers. Exporters are reluctant to enter in long-term agreements with middlemen because of the price volatility of the agricultural goods, and particularly in local sesame market. Nevertheless, according to interviews, exporters are in a non-binding informal agreement with a few middlemen, thus revealing a relationship between supplier and buyer grounded on mutual trust built over time, which has a strong personal characterisation. However, such mutual trust is not a driver for improving the bargaining power of middlemen. Interviews also reveal that exporters have more means than middlemen, such as transports, storehouses, and all facilities that middlemen cannot afford. In this way the entire transaction of middlemen depends on the possibilities of exporter to transport and stock the sesame. In other words, middlemen cannot work independently from exporters.

Evidence also revealed that considerable entrepreneurial risks counterbalance the exporters' power: capital requirements to ensure supplier payments in advance, transport costs from the local market to the warehouse and up to the border, custom duties, middlemen commissions as well as facing changes in supply and demand. Especially the low quality of the product sometime offered by the farmers, could result in an unexpected product refusal by international buyers or a further depreciation of the product.



Table 4 First impact of collective actions on buyer and supplier power

Relationship	Potential Buyer Power	Potential Supplier Power	Potential Relationship type	Interviews source
Input Supplier vs Farmer	low	low	Independence	<p>Fatime Mahamat Katir, farmer: "Development action foster me to join the farmers' association and it's allow me to have access to training about production, to inputs and input suppliers, and as a result to have a better harvest."</p> <p>F, farmer: "Some people of our village assisted to PADL trainings and reported new sowing techniques"</p> <p>Usman Gammar Yaya, farmer: "Since 2008, I was forced to work on a different plot every year due to lack of fertility and availabilities of land. I was very grateful to know that I don't need to leave my plot again and I can invest to improve soil quality, such as crop rotation or intercropping."</p> <p>D, farmer: "For the first time I have been able to stock my sesame until May in the collective warehouse"</p>



Table 4 (continued)

Relationship	Potential Buyer Power	Potential Supplier Power	Potential Relationship type	Interviews source
Farmer vs Middleman	High	High	Interdependence	A, farmer: "In Kerfi we tested a collective sale: the negotiation was very complicated and took a long time. It was successfully, though." G, farmer: "During the collective sale I perceived we had higher bargaining power." Mariam Djibrine, farmer: "I had no relationship with markets operators. I have only one option available to sell my sesame, that is, wait for a middleman come to me. Now with the OP, I can stock properly and safety, I can sell later in the year, when the price rise and not immediately after harvest. Last but not least, I can participate to the collective sale. I feel stronger and powerful."

Figure 3 sums up the dyadic relationship and the main factors driving the power regime. In detail, upstream phases show a prominence of supplier dominance, whilst downstream phases reveal a buyer dominance, with farmers being under both supplier and buyer dominance. Even if farmers are central in providing the primary good of the local sesame food chain, they are the unique actor with no buyer and/or supplier dominance in the main food chain. The unique exception is the relationship with the processor for which they could hold a decent power bargaining, but that is not exploitable due to the marginal importance of the local consumption of sesame in farmers' economy. Such a unique position mainly depend on the lack of information (information asymmetry in Fig. 3) and the need for ready money, making them a weak actor in the moment of negotiation. Moreover, whilst for farmers sesame is the critical resource, and they experience a lack of alternatives, this is not the case for input supplier; at the same time, the lack of alternatives is detectable when farmers sell the product to middlemen.



External Agent PADL-GRN Intervention and Consequences on Supply Chain Governance

The collective actions proposed by the intervention of the external agent PADL-GRN were focused on improving the horizontal relationships at the farmers' level. As middlemen have adopted this strategy to improve their bargaining power along the food chain, in the case of farmers, horizontal integration are considered as a way to improve their marketing power along the vertical relationship of the supply chain. Table 4 shows the first impact of such action, in terms of potential bargaining power improving. According to interviews, in the first stages of the project, collective actions especially result in a progressive independence of farmers from both input suppliers and middlemen. At this stage, whilst farmers still suffer from several constraints and thus their bargaining power is still low, collective actions just act in lowering a part of the farmers' counterpart power.

One kind of collective action put in place by the project was the provision of trainings. Considering the low quality of the sesame produced, the initial aim of the trainings was to improve the productive competences of farmers. These trainings have effectively enhanced the efficiencies and the quality in the production phase and, consequently, have led to a significant improvement in the farmers' performances. With an increasing productivity, farmers may have the possibility to harvest more and better products and can afford the stocking of part of the sesame for the next sowing, instead of selling it all. Through the trainings, farmers had access also to the production of inputs and basic services. For example, respondents highlighted the new role of the producer organisation in managing common property and resources (land, water, pasture, forests). As we see in the context section, the arrival of Sudanese refugees in the last ten years created a pressure on resources; that put into effect a drop in farmers' power. During the trainings, organisers gathered the issue and decided to negotiate for members a medium to long-term agreement to assure 5 to 10 years using the same plot of land. In the end, this action resulted in a more efficient organisation of the production and thus in better performance during the harvest.

To facilitate the flow of information and acquire new competences, during the trainings, meetings were also organised between input suppliers and farmers, to reduce the supplier dominance of the dyadic relationships.

Collective actions have tried to strengthen the horizontal relationships of farmers in the marketing phase. During the project, different kinds of collective actions were organised: trainings, collective sales, and the provision of collective infrastructure. To improve the horizontal relationships collective actions had the objective to increase the collaboration attitude amongst farmers covering all the phase of the sale process. First, the provision of common logistic services such as common storage of products helped farmers to be able to afford a more efficient logistic. Common storehouses have the advantage to improve the quality of the storage, and thus the quality of product to be sold, as well as increasing the scale economy of farmers, with benefits for the collective sale. Second, collective sales further improve the scale economy, and were determinant in improving the farmers attitude toward middlemen. As



farmers are increasingly collaborating, they become more conscious of their own power over the middlemen – their buyers – and become more resistant to surrender to market pressure. Especially, when there is a huge amount of product, middlemen feel the pressure of losing the market of more product. As interviews show, farmers' perception of the role of horizontal relationships supports the idea that collaboration between them became increasingly important in the value chain.

Doing collective sales and collective storehouse, farmers have the possibility to lower middlemen power, since they can finally afford to choose the better season to seek selling their product, and in the meantime storing the product in a safe common warehouse, without the fear of losing the produce.

So, bargaining power can shift in favour of farmers when considering the output, marketing, processing, and market information, because of higher quantities and quality of marketable surplus. Therefore, another uncertainty is tackled: the difficulty to relate with powerful actors, especially to middlemen.

Since the intervention of an external driver in the area, the interviewed individual players declared their improved awareness in being part of a system. Such new-born consciousness has led actors to strongly consider networking through new strategies to impair uncertainties. To increase security, buyers and suppliers are tending to join in formal or informal long-term agreement along the chain to guarantee the reliability of the whole activities.

Figure 5 shows to which actors the collective actions are addressed and their impacts. As can be seen, collective actions are addressed only to farmers and are focused on improving their bargaining power in the situation where they are not in dominance. While in upstream food chain, collective actions are essentially organising trainings to improve the farming practices of farmers, in the downstream food chain, collective actions are more focused in improving the marketing capabilities of farmers which pass through their horizontal relationships.

Discussion and Proposition

This study employs a netchain perspective (Lazzarini et al. 2001) on the local sesame supply chain in Eastern Chad to analyse both the vertical BSR in terms of power regime (Brito and Miguel 2017; Cox et al. 2004), and the impact of collective actions on the horizontal relationships between farmers. The study thus adds information on the development of agro-food netchain in African commodity chain, following literature claims (Triekenesen 2011; Lowder et al. 2016). To fully recognise the actors' perception, the study is based on a qualitative analysis of the interviews.

The findings presented above reflect the power dependence structure on the dyadic relationship in terms of resources and information flow. The analysis of the vertical ties reveal that all the sesame supply highly depends on the global market, which is reflected backwards on the sesame food chain. Following the literature on vertical BSR power regimes (Brito and Miguel 2017; Cox et al. 2004), in our case study, no interdependence or independence are recognisable in the vertical ties. Following the netchain approach (Lazzarini et al. 2001), most



of the actors' level show no horizontal relationships, except for the middleman. The result is that even if they are providing the primary source of the food chain, essential for the food chain to exist, farmers are the actors that most of all pay the global supplier dominance. Farmers experienced both supplier and buyer dominance in the sesame supply chain in eastern Chad. As already observed in literature (Barret 2008; Svensson and Drott 2010; Triekenens 2011; Tran et al. 2017), this is caused by lack of information on market, lack of awareness on their role in the sesame supply chain, the family's economic uncertainty that lead to sell the product at the lowest price, the difficulties in managing the provision. As our study points out, also the low quality of the product, make the supply chain more vulnerable on the global competition, and more dependent on the price fluctuations. Moreover, considering the increasing importance of quality standards in the global trade, the quality of the product could be another factor in hampering the participation of small farms (Bolwing et al. 2013). Thus, the need of collective actions is an important part of the development' programmes of small African farmers.

Results show that up to now in the case study analysed, the collective actions have favoured: (a) the establishment of preferential terms, (b) the information flow within the chain, (c) a reduced sense of fear 9d) a disposition to cede part of power. They thus can be considered as a way to reinforce the horizontal relationships with benefit for the netchain development. The collective actions have acted in sustaining the development of a netchain as formulated by Lazzarini et al. (2001), which is proposed in the literature as an effective mean to support rural development (Raynolds 2004; Trienekens 2011; Pérez Perdomo et al. 2016; ; van der Heijden and Cramer 2017).

Results from the questionnaires and in-depth analysis provide evidence supporting the following propositions on how power and dependencies could be properly exercised to manage the supply chain profitably.

Firstly, we can infer that, analysing supply chains in developing countries, arguably we unearth a structure reflecting a power dependence on the dyadic relationship in terms of goods exchange and information asymmetry. According to Lazzarini et al. (2001) strengthening the interrelationships between the horizontal and vertical dimensions in value chains creates an efficient netchain and affect positively the creation of a profitable supply chain, as it involves players from upstream to downstream Lazzarini et al. (2001). In particular, the role of the farmers in the value chain can be enhanced by strengthening both the horizontal (collective actions between farmers and cooperative approach) and vertical (integration for the processing activities in the farmers associations) relationships. This leads to the following proposition.

Proposition 1 *The creation of an efficient netchain have a positive role on the maturation of a successful food chain as well as affecting positive the weakest player.*

Secondly, relationships are grounded on two bargaining positions: supplier dominance or buyer dominance, which have implications for the power-sharing within



the chain. Power imbalance is a typical feature of captive systems, in which one player is obliged to accept unfair trading conditions due to his bargaining weakness. High levels of asymmetries strongly hinder a fluent flow of goods and information exchanges along with the whole supply chain, blocking resources in the hands of the most powerful (Aggarwal and Srivastava 2016; Bjorvatn et al. 2015). The concentration of resource in this context reduces the chance for farmers and processors, in particular, to cumulate capital and invest in small scale equipment that can increase the income in short-medium term.

Proposition 2 *Power imbalance negatively affects the implementation of a successful set of connections between players representing a barrier to future chain development.*

Thirdly, there is evidence suggesting that the recent intervention of an institutional external player, PADL-GRN, has led to restructure dependencies, as suggested by literature (Riisgaard 2009; Markelova et al. 2009). Although under-ripe chains are still characterised by a moderate level of uncertainty and power imbalance, data show a propensity for shifting such levels of dependence towards power interdependence. When players capitalise on levels of interdependence within the system, they simultaneously increase their irreplaceability for the overall network of relationships (Gulati and Sytch 2007). The introduction of farmers collaborations through the collective actions may support such irreplaceability (Markelova et al. 2009).

Proposition 3 *Each single actor can be determinant in the value chain, if he is capable to manage and use properly power and interdependence. Shifting levels to an embedded system and embeddedness are positive assets to develop.*

Finally, horizontal relationships, fortify through the intervention of the external player, remodel power allocation, with important consequences also along vertical relationships within the chain. As a result, collective actions at horizontal level are capable of ensuring entry into high value markets and improving bargaining power, transforming the structure of the supply chain from captive to relational.

Therefore, the system shifts from a multitude of single players acting in dyadic relationships to an integrated and consistent net, vertically coordinated. In the sesame market in East Chad the single actors are so small that cannot positively affect the value chain and in general the local development. Collective actions and hierarchical coordination can be the flywheel for the change of the paradigm.

Proposition 4 *Combining horizontal relationship reinforcement and vertical process integration, dependencies are supposed to decrease whilst interdependencies intensify; power allocation is supposed to be remodelled, overcoming uncertainties, and reaching system stability.*



Our findings reveal that collective actions and cooperation between farmers may have strengthened their interdependence in the supply chain, by increasing its functional irreplaceability for the overall network of relationships.

Nevertheless, collective actions are most of the time short- or medium-term actions. Although the intervention of external actors is considered relevant in the literature, it is true that it should also provide tools to foster the long-term sustainability of such actions (Markelova et. al. 2009). To structure the groups of farmers and to improve their performances in global commodity chain, public governance actions need to accompany the actions of collective actions. For example, policies that reduce marketing costs for smallholder's farms, that expand the uptake of improved technologies (Barret 2008), standards, norms and regulations supported and enforced by local governments and NGOs (Barret 2008; Rissgaard 2009; Muradian and Pelupessy 2005). Our study has been focused only on the short-term effect of collective actions, highlighting that even in the short-term period of a developing project positive effects are possible.

Considering our purpose, our study has been focused only on the impact on the farmers; further studies should analyse not only the long-term impact on the farmers' performances, but also the impact in the other supply chains actors.

Conclusions

Through this paper we offer a new empirical study adopting power perspective in developing countries. This study explores an under-ripe food chain in a developing country, and based on questionnaires, in-depth interviews as well as participant observation, investigates the role that an external intervention and collective actions play in the distribution of power along the agro-food supply chain in developing country.

Findings confirm that power imbalance is a typical constraint to the formation of stable food chains especially in rural areas, shifting levels of dependencies towards interdependence can strengthen horizontal relationship encouraging collective actions as well as vertical integration between players at different levels. Developing a fair power relationship within the chain promotes goods exchanges, contributes to food security, and transforms the current fragmented and weak system in an advanced, integrated, competitive, inclusive and sustainable system. Improving power/dependence structure could allow local supply chains to meet the growing international demand, which requires consistent stocks and high standards.

The reason for the underdevelopment of African economies are normally attributed to external and global strength but a relevant contribution to development goals (e.g. food security, food safety, gender issues and social inclusion, etc.) can start from actions at the local level to get over local structural weaknesses.

Funding Open access funding provided by Università degli Studi di Milano within the CRUI-CARE Agreement.



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