Development in Practice

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/cdip20

Toward territorialised dairy inclusive businesses: insights from an Egyptian case study: making dairy businesses inclusive

Annabelle Daburon, Véronique Alary, Ahmed Ali, Mona Abdelzaher Osman, Taha Hosni Abdelsabour & Jean-Francois Tourrand

To cite this article: Annabelle Daburon, Véronique Alary, Ahmed Ali, Mona Abdelzaher Osman, Taha Hosni Abdelsabour & Jean-Francois Tourrand (2021): Toward territorialised dairy inclusive businesses: insights from an Egyptian case study: making dairy businesses inclusive, Development in Practice, DOI: 10.1080/09614524.2021.1937535

To link to this article: https://doi.org/10.1080/09614524.2021.1937535

Published online: 12 Sep 2021.

DEVELOPMENT IN PRACTICE
https://doi.org/10.1080/09614524.2021.1937535

Routledge
Taylor & Francis Group

Toward territorialised dairy inclusive businesses: insights from an Egyptian case study: making dairy businesses inclusive

Annabelle Daburon, Véronique Alary, Ahmed Ali, Mona Abdelzaher Osman, Taha Hosni Abdelsabour and Jean-Francois Tourrand

ABSTRACT

Building inclusive businesses with small-scale producers in the agro-food sector presents challenges, most notably in terms of governance and sustainability. These issues were explored through a Danone Egypt Ecosystem Project that sought to promote a replicable business model of milk collection centers to secure a dairy plant's sourcing while contributing to the socio-economic development of smallholders. Quality management was used to link a value chain approach and a localised agri-food system approach. The study showed that an inclusive business relying on non-inclusive coordination had limited efficiency. Decreasing power asymmetries and distances between partners seems central to ensuring sustainability.

ARTICLE HISTORY
Received 11 December 2019
Accepted 18 May 2021

KEYWORDS
Partnership; agriculture; globalisation (inc trade, private sector); governance and public policy; labour and livelihoods; poverty reduction; region: Arab states participation

Introduction: the promises of inclusive businesses

Whether we disapprove or are delighted, global enterprises are gaining the power to influence the sustainability of our planet. Agribusiness companies with activities in the dairy sector are no exception, and enterprises such as Nestlé, Danone, and Friesland Campina are only a few examples of this phenomenon. While those giants have emerged, most of the dairy agro-food system is still worked by millions of family farmers and micro- and small enterprises across the globe. A tremendous growth potential lies in the development of the bottom of the pyramid for those enterprises (Prahalad 2012). Within these trends, new business models are emerging, such as so-called "inclusive businesses" (IB), a "commercially viable model that benefits low-income communities by including them in a company's value chain on the demand side as clients and consumers, and/or on the supply side as producers, entrepreneurs or employees" (UNDP 2008). In this paper, we will focus on the supply IB in the dairy sector.

The sustainability of milk supply chains depending on the integration and inclusiveness of small-scale producers to global enterprises is an old dilemma. IB differs from previous attempts because of the unprecedented means available to enterprises and the joint efforts of private, public, and civil society organisations. Indeed, these IB are most commonly multi-stakeholder partnerships. Dairy IB have multiplied during the last decades. Nestlé claims it collected from 600,000 producers in 30 countries in 2016, while Danone Ecosystem in 2016 promoted 27 dairy IB projects around the world. These recent initiatives raise scientific challenges regarding their contribution to sustainable development. What coordination is most effective between these different partners? How do we connect production chains with different quality standards? What impacts, expected and

CONTACT Annabelle Daburon annabelle.daburon@wur.nl Wageningen University and Research, Wageningen, 6700 HB, Netherlands

unexpected, do these inclusive businesses have on the hosting territories? How do we replicate an inclusive business model on a large scale? To contribute to answering these questions, which are by no means exhaustive (Bitzer and Glasbergen 2015), this paper investigates the efficiency of coordination mechanisms of a dairy IB. It answers the question: is a non-inclusive coordination of a dairy IB contributing to its sustainability? The main hypotheses tested is: a non-inclusive coordination of a dairy IB contributes to its sustainability. Two sub-hypothesis underly the hypothesis: H1: A non-inclusive coordination of a dairy IB strengthens stable relationships among the main stakeholders of the dairy IB; and H2: A non-inclusive coordination of a dairy IB favours the adoption of efficient strategies to reach impact. The next section details the specificity of the case study's context, the conceptual framework, and the data collected and method applied to reject the hypothesis.

Material and methods

Case study

The Danone Egypt Ecosystem Project (DEEP) – started in 2010 from a partnership between Danone Egypt, Danone Ecosystem (fundation), and CARE (NGO) – supported the analysis. Its goal was to promote a sustainable and replicable business model of a milk collection center (MCC-DEEP) collecting from smallholders to supply the Danone Egypt dairy plant. The objective was to reach 20% of the Danone dairy plant's milk supply by the end of the project's second phase in 2017. DEEP also aimed to contribute to the development of the hosting communities while increasing revenues of smallholders and contributing to women's empowerment. At the beginning of the project, MCCs-DEEP were intended to be held by agricultural cooperatives, which historically are the main local representations and organisations for the agricultural sector in Egypt. However, the lack of investment of the successive Egyptian governments in these structures had degraded their power and image among the rural population.

But why would Danone invest in such a project? The booming Egyptian demand for dairy products offered a tremendous growth opportunity, but it required Danone to secure its milk sourcing. This demand is driven by the population growth (population quadrupled during the last 60 years, amounting to 99.3 million inhabitants in 2019[1]). Furthermore, an increased consumption of animal products was also observed (Alary et al. 2017) as well as an increasing trend of cheese exports in the Middle East. To serve this increasing demand, national production increased during the previous decades (Figure 1), with a shift from buffalo to cow milk.

In this context, many global and national dairy companies competed for this growing market and struggled to secure their local raw material sourcing despite the instability of the Egyptian pound

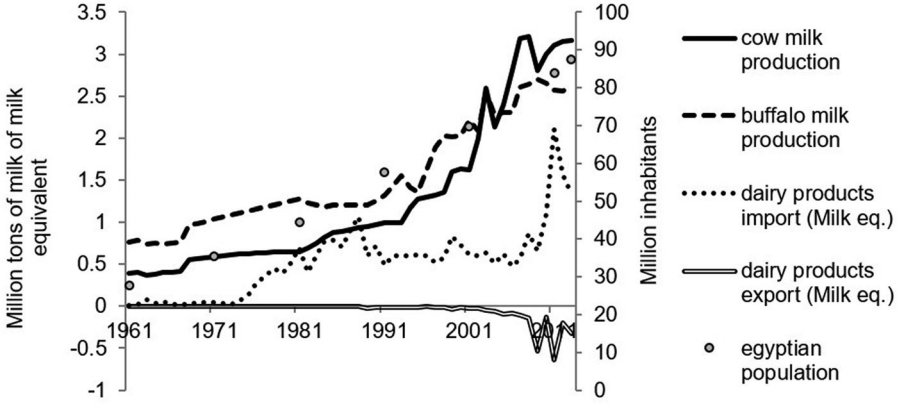

Figure 1. Evolution of the population, the national milk production (buffalo and cows), imports and exports between 1961 and 2013 in Egypt (source: Faostat).

(e.g. the Egyptian pound lost 50% of its value following devaluation in 2016; in January 2017, the inflation rate reached 29.6%[2]). Megafarms housing thousands of dairy cows emerged in Egypt, especially in the New Reclaimed Land (NRL)[3] supported by the government. However, smallholder farmers (called *fellahin*, the core of the rural population) are the main dairy producers in Egypt. For these farmers, the average agricultural utilised area is one hectare (ha), and 95% of Egyptian farmers work on less than two ha, with small herds of one to two large ruminants (Alary et al. 2017). Their milk is channeled through an important diversity of family enterprises to urban and rural consumers (Daburon et al. 2016; Alary et al. 2017). Highly atomised, this large amount of raw milk is appealing to companies wanting to win new market shares.

A composite conceptual framework

Several concepts were articulated to build a relevant analytical tool and test the hypothesis. Dairy supply IBs are composite projects. They combine diverse stakeholders, interests, and many expectations such as return on investment, rural development, and improvement of milk quality. This paper proposes an original framework to encompass this complexity.

First, these IB are production chains. As such, both a *filière* approach and *value chains* approach are at the core of the proposed framework. A *filière* approach, from the francophone literature, is a techno-economic approach that monitors technical operations along a production chain (Lançon, Temple, and Biénabe 2016). It is used to describe the local dairy sector that is not specifically related to an IB's investing company. The *value chain* approach refers to analysis of a company's production stages to identify possible competitive advantages at different stages in the production chain (Bijman and Bitzer 2016). It can be used to analyse the IB's specific value chain. In any production chain, quality management is central, and as such, is part of the developed framework. It is especially true for dairy due to the perishability of the products as well as the public health risks. "Quality is the degree to which a set of characteristics of an object fulfills requirements" (ISO 2015). Quality management encompasses two objectives: improving the quality and managing quality heterogeneity (creating value despite quality variations of products). Two categories of qualities can be attached to a product: intrinsic and extrinsic (Pant et al. 2015). Intrinsic qualities are associated with the product, such as composition qualities (e.g. fat or protein content) or sanitary qualities (e.g. total bacterial count). Extrinsic qualities are associated with the product throughout its life: production process, consumption, or recycling (e.g. carbon balance, water footprint, or the number of jobs a product created). Dairy supply IBs aim to ensure that large dairies can collect milk from smallholders. Both have different appreciations of what milk quality means and how to measure it. Thus, one of the main challenges of an IB is to articulate these various perceptions of quality in a common quality management system.

Finally, because quality is a result of practices in a socio-ecosystem, it appears relevant to territorialise our analysis of IBs as a third component of our framework. More than analyzing the quality construction and management of a product, a territorial approach offers a valid perspective regarding an IB's impact on associated communities. A territory is a "space appropriated by a social group with the feeling of this appropriation" (Duteurtre et al. 2016). A localised agri-food system (SYAL) approach is used in the framework to encompass this perspective (Chiffoleau and Touzard 2014). "SYAL are concrete stakeholders organizations providing productions and agro-food services (farms, food enterprises, commercials, services, restoration …) associated by their characteristics and their functioning to a specific territory" (authors, translation) (Cerdan et al. 2017, 136–137). Studying them reveals the link between the individual, the product, and a territory (Muchnik, Cañada, and Salcido 2008). In this study, the SYAL organised around dairy products will specifically be investigated (hereinafter referred to as the dairy SYAL).

To summarise, the proposed systemic conceptual framework for dairy IB combines a vertical perspective of its value chain, embedded in a *filière* and coupled with a territorialised analysis using the localised agri-food system (SYAL) concept, both linked by a quality management perspective (see Figure 2). A structural and functional analysis of the IB was made. It allowed us to evaluate its coordination and the impacts of such coordination on reaching IB objectives both at project and local level.

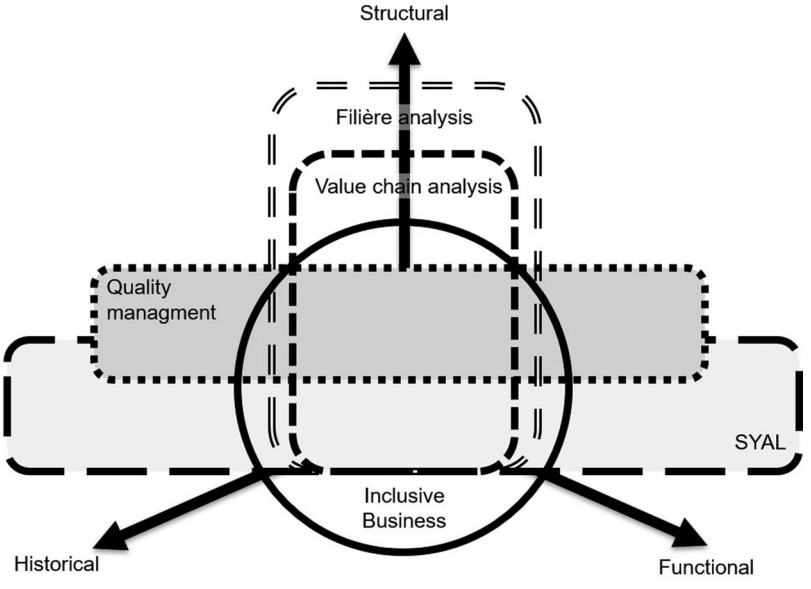

Figure 2. Conceptual framework proposed for the analysis of a dairy supply inclusive business (Legend: SYAL for Localised Agri-food Systems).

Materials

The data collection was conducted during the *Socio-economic Impact Assessment of DEEP* (SIADEEP[4]) 2014–2017. Two contrasting geographical areas were investigated that included most of the DEEP interventions: Beni Suef (old land) and Beheira (NRL) (Figure 3). In these areas, three types of locations were investigated: villages with an MCC-DEEP, villages where an MCC-DEEP was planned in 2014, and control villages not related to DEEP.

Multiple data collections were used to mobilise the conceptual framework summarised in Table 1 and detailed in the paragraphs below.

Value chain analysis

In 2014, a socio-economic and technical diagnosis of smallholders based on a farm survey (Table 1, A) addressing the land and livestock systems (structural and functional approaches of the farm system) and the overall living conditions (housing, sources of revenues, perceptions, and history) was conducted. In each village of the studied area (Figure 3), almost 30 farms were investigated according to their commercial link to an MCC-DEEP (supplying milk directly, through a milk trader or without a commercial link with an MCC-DEEP). In total, 88 farmers in Beheira and 87 farmers in Beni Suef were included in the analysis. In addition, a socio-economic and technical diagnosis of dairy enterprises (milk traders and MCCs-DEEP) (Table 1, B) was conducted through an empirical study based on a semi-structured questionnaire addressing their historical (business history), structural (equipment, human resources), and functional (activities, practices, business network) dimensions. In all, 74 interviews were conducted during an annual monitoring covering three years from 2013–2016.

Localised agri-food system (SYAL)

The localised agri-food system was conducted in the village of Halabeya. Several factors motivated this choice. The village was home to one of the oldest MCCs-DEEP (since 2011). It was considered the

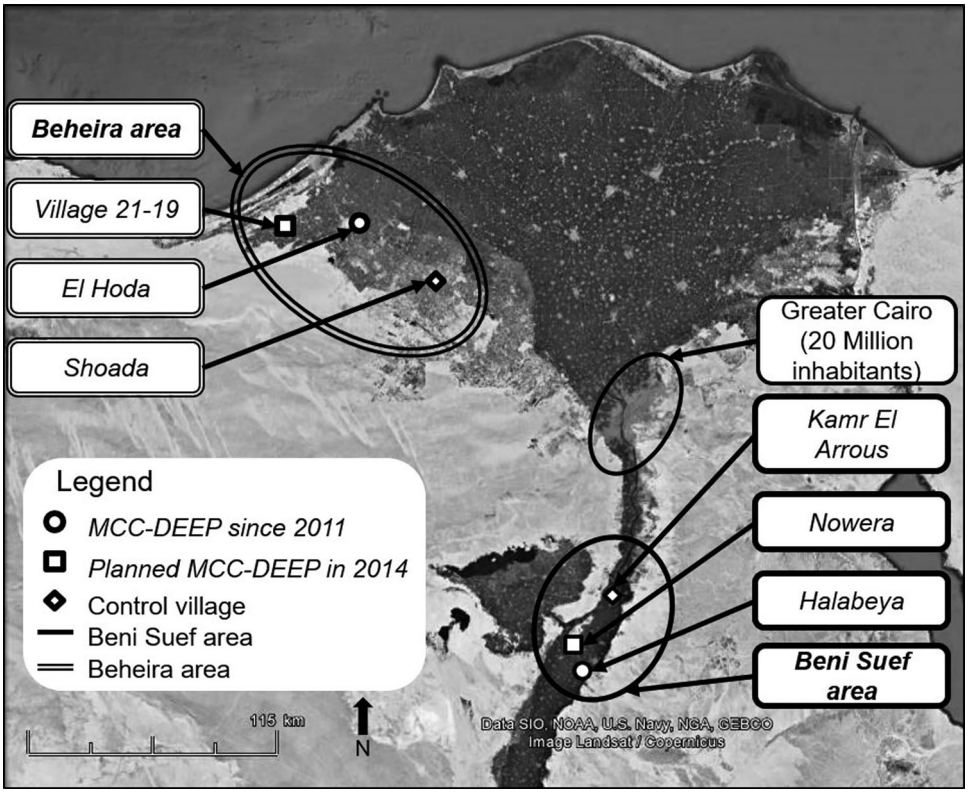

Figure 3. Investigated areas and villages during the socio-economic impact assessment of the Danone Egypt Ecosystem Project.

Table 1. Data collection per conceptual framework component.

Code	Object	Period	Area	Method	Detail	Sample
Value chain analysis						
A	Farming systems	2014	Project area	Semi-structured interviews	Socio-economic and technical diagnosis of smallholders (including milk marketing)	175 farmers
B	Dairy enterprises (milk traders and MCCs-DEEP)	2013-2016.	Project area	Annual monitoring using semi-structured interviews	Socio-economic and technical diagnosis (including milk marketing)	74 interviews
Localised agri-food system (SYAL)						
C	Evolution of agricultural services network of milk producers	2015	Halabeya	Semi-structured interviews	Tangible and intangible services. Social network analysis	30 farmers
D	Focus group discussion (FGD) Halabeya	2016	Halabeya	Multi-stakeholder participatory workshop	Evolution of the milk market and impact MCC (including milk quality management)	3 FGD with 9 participants each
Milk quality management						
A, B, C, D	Milk quality management investigated in each study					
E	Danone milk quality data	Jan 2012–2014	Halabeya – El Hoda	Danone milk quality analysis of each MCC (source: Danone Egypt)	Tested parameters: fat, protein, and total bacterial count	Monthly average

most successful MCC-DEEP of the project by its developers and maintained a commercial link with Danone Egypt all through the years, unlike the other MCCs-DEEP. Thus, it offered the longest perspective on the ongoing dynamic.

The village was considered as a territory (cf. 1.2). A diagnosis of the evolution of agricultural services network for the milk producers was made (Table 1, C). Tangible (financial, milk collection, veterinary, agricultural input, and feed) and intangible (knowledge sources for feeding practices and hygiene practices) services were investigated for each producer (30 interviews with Halabeya producers). Using Gephi (an open-source network analysis and visualisation software), representations and statistical data on this network were produced evaluating the impact of MCC establishment.

At the end of the diagnosis, three participatory workshops (Table 1, D) in 2016 explored the farmers' perceptions of the evolution of the local milk market, milk quality, and hygiene practices. Nine inhabitants of Halabeya were selected according to their role in the dairy SYAL, their gender, and age. This participatory workshop included dairy small-scale producers (*fellahin*), veterinarians, MCC-DEEP staff, cooperative managers, cooperative members, non-cooperative members, milk traders, feed traders, and animal traders.

Milk quality management

To complete the data collected during the data collection evoked previously, a dataset provided by Danone on the milk supplied by MCCs-DEEP from their openings until October 2014 gathered the quantity of milk accepted and rejected by the company and quality parameters (fat and protein content, total bacterial count) (Table 1, E)

Multiple discussions in the course of the SIADEEP project (2014–2017), with key informants related to this case study (Danone staff, NGO staff, veterinarians, cooperative members, consumers, dairy products retailers, dairy managers, public decision-makers) completed the oriented data collection with qualitative data.

Method

A systemic approach underlies the use of the conceptual framework on the IB case study. The first step focused on understanding and analysing the IB value chain and the supply chain (*filière*) in which it is embedded. Dedicated attention was paid to exploring the diversity of stakeholders, the links binding them, and the power asymmetries among them. For that, we combined data extracted from the farmers' (A) and dairy enterprises' monitoring (B) to support a descriptive statistical analysis.[5]

The analysis of the SYAL aimed at describing and understanding IB anchorage and impact within a territory. Data extracted from the social network analysis provided a dynamic statistical description of agricultural services' evolution in the village (C). To validate and enrich this source of data, participatory workshops were organised (D).

Our last analysis focused on the milk quality management and evolution. The governance and coordination analysis within the IB's value chain aimed to understand the milk management strategies along the chain: at the producers (A) and intermediaries level (B). In addition, milk quality parameters (E) completed the understanding of the milk quality management at project level. The analysis carried in Halabeya specifically (C, D) gave a detailed understanding of the impact of the IB on milk quality management in a community hosting an IB. By doing so, the efficiency of the IB coordination regarding milk quality management has been evaluated.

Results

A non-inclusive coordination of the IB challenging stability of DEEP stakeholders, relationships

Since the 1980s, the Egyptian dairy sector has rapidly evolved from non-professional to professional and dynamic. Thus, in 2011, when the DEEP project started, the dairy *filière* was dense, dynamic, and highly competitive. It contributed to the revenue creation both for fellahin and milk traders. These two

populations, far from being homogeneous, presented important structural and social diversity (Daburon et al. 2016; Alary et al. 2017). Thus, MCCs-DEEP were developed in this rural dairy sector that was embodied by family enterprises. They emerged as a product of association sealed by contracts between the developers of the project: Danone Egypt, Danone Ecosystem, CARE, and rural cooperatives. These micro-businesses were at the extremity of long governance chains, often anchored internationally. Hence, the distance[6] (Princen 1997) between the diverse stakeholders of the project was important.

The creation process of the MCC-DEEP model involved Danone Company, Danone Ecosystem, and CARE. No cooperative member, or local representatives were involved in the MCC-DEEP design process. Hence, a non-inclusive coordination was adopted by DEEP to set up MCCs. One MCC model was conceived for Egypt despite the diversity of actors, especially among fellahin and milk traders, and its corollaries, the diversity of needs. The hosting community's interests were represented by the NGOs despite their limited knowledge of the diverse rural areas and the farmers' reality. In this context, the ability to replicate a relevant business model in the diversity of Egyptian territories seemed highly unlikely.

During the running phase of DEEP, the coordination of the MCCs and IB remained similar to the creation phase and did not involve directly any local representatives. Tensions built up over the years between the different stakeholders. "Business comes first", expressed many times by Danone Egypt staff, illustrated their prevailing rationalities. The NGO had committed by contract to ensuring a minimum milk quantity from the MCCs-DEEP to Danone plants. By accepting this commercial responsibility, the NGO became a commercial intermediary, far from its core mission and its supposed representation of the inhabitants' best interests. On a day-to-day basis, the NGO meddled in the commercial links that were supposed to be built between MCCs-DEEP and Danone Company. Besides the fact that it went against the potential autonomy of the cooperative, tensions due to commercial decisions of Danone Egypt reflected directly on the NGO. Ultimately, its position prevented the NGO from properly weighing the strategies adopted to run MCCs-DEEP. In this configuration, tensions could only increase between the developers.

If the autonomy of MCCs-DEEP was a goal at the beginning, it was abandoned early in their lives. MCC-DEEP managers in the village mentioned that they were "caught by the throat", meaning they had very limited control of their capital. Whether it was for milk prices, their marketing channels, their staffs, the equipment, the training they received, or the services they provided to their community, MCC-DEEP managers had very little to say, and both Danone (Egypt and Ecosystem) and CARE interfered in many of their decisions. Ultimately, MCCs-DEEP were driven by coercive mechanisms. Tensions also spread within the villages where MCCs-DEEP were located. MCC managers were held responsible for the rapid milk price variations or the milk price offered. To bypass this permanent control, MCC-DEEP managers adopted subversive strategies. For example, they rapidly ignored exclusivity to Danone. An example is the deal made between a MCC-DEEP and an independent milk trader. The latter would sell its own milk on behalf of the MCC-DEEP to Danone, giving it the opportunity to market a large quantity with a secured payment. The MCC-DEEP would sell its collected milk to a local dairy with higher prices and lower quality standards than Danone. Thus, a coercive strategy ultimately led to a sensitive situation regarding Danone's plant sourcing traceability.

From these results, we can reject the first sub-hypothesis (H1): a non-inclusive coordination of a dairy IB strengthens stable relationships among the main stakeholders of the dairy IB. However, despite building tensions, did the non-inclusive coordination adopted by DEEP favour the adoption of efficient strategies to reach DEEP impact objectives (H2)?

The non-inclusive coordination of DEEP produces inadequate strategies at project level

In link with the second hypothesis related to the strategic choices made by the non-inclusive coordination of DEEP, we first observe that the foreseen sourcing strategy for MCCs-DEEP had limited adequacy with the actual dairy context. The strategy adopted supposed that the milk supply depended fully on farmers' direct sales to the MCCs. Indeed, Danone and CARE managers had an impression of

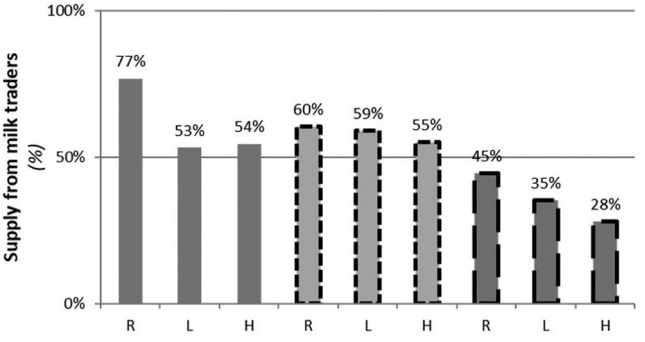

Figure 4. Average percentage of milk supplied by milk traders to the four investigated MCCs-DEEP between 2014–2016 during the three milk production periods: R: Ramadan (1 month period – June and/or July); H: high milk production (October to May); L: low production (June to September).

a narrow liquid milk market in rural territories, far from the dense and dynamic market that in fact exists. Thus, MCCs-DEEP were supposed to be supplied by farmers who delivered their milk themselves. The MCC-DEEP services offered to secure this supply (training, feed, veterinary) were designed for farmers. Private milk traders were not acknowledged in the sourcing strategy, and no plan was conceived to ensure their contribution. However, in 2014 and 2015, they provided more than 50% of the milk supply of the four MCCs-DEEP studied (Figure 4). In 2016, this percentage declined based on the demand of Danone and CARE managers and on the contraction of the market due to the economic crisis in Egypt (milk traders were favouring direct milk marketing instead of MCC-DEEP supplies). Despite their crucial roles and repeated demands from the MCC-DEEP local managers, no services were offered to milk traders to secure their supply in the period investigated.

Second, regarding the effect of the milk quality improvement strategy, mixed trends are observed at the project level. Figure 5 shows the results of the analysis (conducted by Danone at its plant's gate) of the total bacterial count (TBC), fat, and protein content of the milk delivered by the two oldest MCCs-DEEP (Figure 5). A decrease of TBC can be observed throughout the years, indicating an improvement of the sanitary quality of the milk. However, fat and protein content also seemed to decrease, indicating a degradation of the composition parameters of the milk that departed from Danone standards, thus calling into question the relevance of the milk quality improvement strategy.

Finally, the initial context of milk production and the quality evolution made potential inadequacy between MCCs-DEEP's actual milk quality and Danone standards unavoidable (Figure 6). Indeed, in any specific month, 40% of the milk supplied by MCCs-DEEP was rejected at Danone's plant gate. Despite this very high ratio, no strategy was implemented to support MCCs-DEEP to deal with such financial losses. Indeed, because their milk was rejected after being held for six to 12 h in isolated but unrefrigerated trucks, the MCCs-DEEP had to find new buyers for their loads. All key players in the dairy market knew the position of the MCCs-DEEP and their lack of regular commercial alternatives, so these rejected loads were sold at limited prices (even below their purchase price) to dairies. The frequent rejection led to the high economic precariousness of the MCCs-DEEP (Daburon 2017).

These three results support the rejection of H2. They illustrate how the non-inclusive coordination of the IB produced inadequate strategies regarding milk sourcing, milk quality management, and risk management, consequently hampering the ability of DEEP to reach its objectives. What were the implications and impact of this coordination at the local level?

The non-inclusive coordination of DEEP produces inadequate strategies at the local level

Halabeya, the showcase village engaged in DEEP in 2011, was home to 10,000 inhabitants in 2015, according to its cooperative members. The unemployment rate reached 40%, and approximately

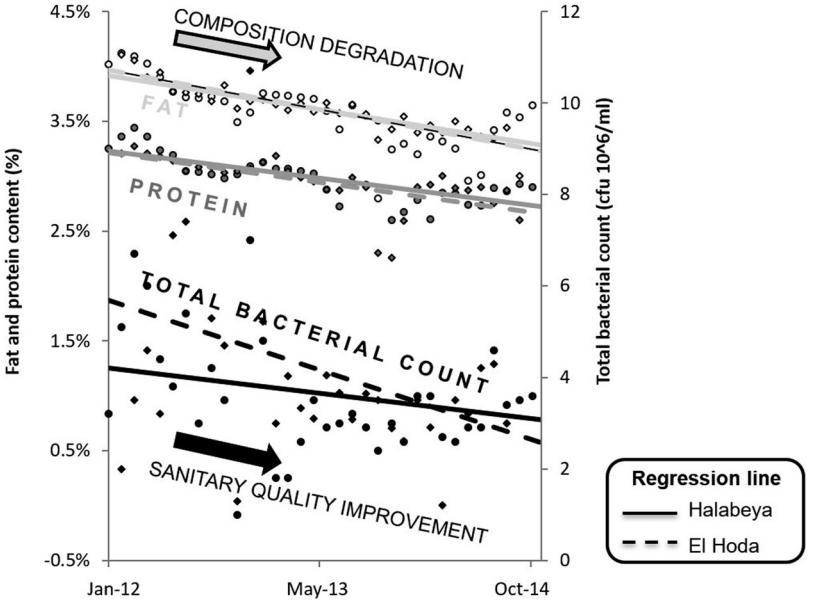

Figure 5. Evolution of three milk quality parameters (fat, protein content, and total bacterial count) of the milk delivered to Danone plant by the two oldest MCCs-DEEP (Halabeya and El Hoda) (sample: monthly average January 2012 to December 2014 – raw milk from truck at plant gate) (source: Danone Egypt).

2,500 farmers practiced agriculture. The village territory covered legally 460 ha, of which 70% were arable land. Only 23% of the village inhabitants owned land, the rest being tenants. Land ownership was required to be a voting member of the cooperative. Consequently, the representativeness of its board, which is also in charge of MCC-DEEP management, can be questioned.

Besides these structural facts about Halabeya, the evolution of its milk market before and after the opening of the MCC-DEEP was assessed during focus group discussions (Figure 7) with a qualitative method. It appeared that before the opening of the MCC, 50% of local milk was collected by local milk traders, the rest being processed at home by the producers to be consumed or sold in the local market. After five years of the DEEP project and the presence of MCC-DEEP, this market has changed. The herd increased at the village level, and 50% of the milk produced went to the MCC-DEEP. Another 20% of the produced milk went to five local milk traders (one stopped its activity), while 30% was processed by fellahin and consumed or marketed in the local market. Only one local milk trader contributed to the MCC-DEEP supply, the rest of its supply coming from five milk traders collecting outside Halabeya. The MCC-DEEP mainly marketed its milk to Danone plant or another private milk processor adopting opportunistic strategy.

Despite this market evolution over the five-year project, the milk quality institutions remained similar in the village. The legal framework was still non-operative. Certainly, the MCC-DEEP introduced milk composition tests to farmers. But organoleptic quality controls were still the most common practices. Understanding of these tests by inhabitants remained limited, challenging the trust between inhabitants. Furthermore, the MCC-DEEP was unable to purchase inputs to perform these tests.

Considering that breeding and hygiene practices of farmers are largely products of tangible and intangible agricultural services networks available for producers, the role of the MCC-DEEP in those networks was analysed (Table 2). After five years of activity, the MCC-DEEP succeeded in playing a role in mainly providing farmers with knowledge about hygiene practices. Except for the milk collection, the MCC-DEEP played a marginal role to deliver feeding, veterinarian, agricultural inputs, or any other tangible service. Local family businesses provide most of these services.

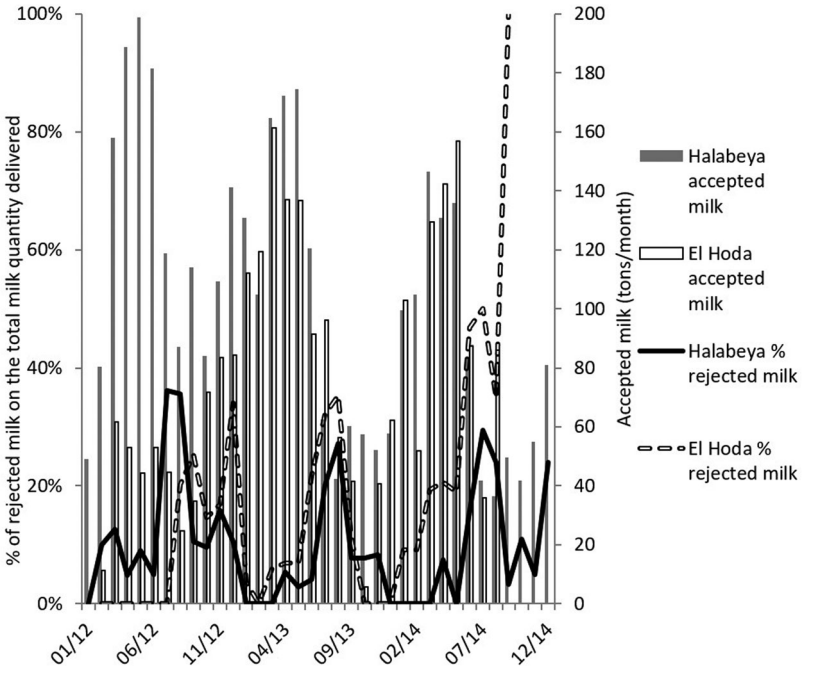

Figure 6. Quantity of milk accepted and percentage of milk rejected on the milk delivered by Danone between June 2012 and December 2014 for the two oldest MCCs-DEEP, Halabeya (Beni Suef) and El Hoda (Beheira).

It is worth paying special attention to the financial services available to farmers. Access to bank credit is rare. The high fees and the limited guarantees that producers can provide prevent it. The MCC-DEEP did not offer any official financial services. Milk production and markets are profoundly entangled with the financial management of those families. While producing milk ensures regular cash revenue, a herd is also a productive way to save money. Milk collectors also play a crucial role. They can provide cash money to their suppliers for expenses such as feed, medicines, or

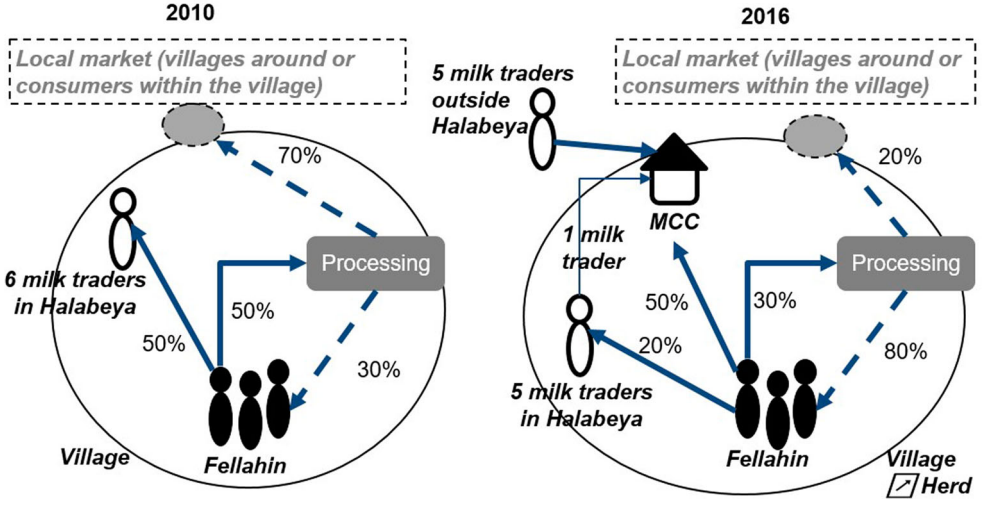

Figure 7. Representation of the Halabeya milk market evolution developed during a focus group discussion with a panel of nine inhabitants from Halabeya in Beni Suef in 2016.

Table 2. Main source of knowledge for producers regarding hygiene practices and dairy cows feeding practices (workshops, sample of nine village inhabitants).

Rank	Hygiene practices	Dairy cow feeding practice
1	*Family*	
2	*Veterinary*	
3	*MCC – milk trader*	*Neighbours and experimented, old inhabitants*
Un-ranked	*Woman with a milk separator, internet, neighbours, and friends (to ensure confidentiality)*	*MCC-cooperative, internet, feed retailers, university, agricultural faculty*

food through advance payments for milk (called *sulfa* – 50% of the weekly milk payment of the family being commonly accepted as a limit). Larger amounts of money could also be lent for specific events (diseases, deaths) even if producers mainly borrowed their money within the family circle. Finally, the relationships between a producer and his milk trader were commonly secured by an *ardiat*. At the beginning of their collaboration, a *fellah* can contract a debt (the amount varying according to his herd size) with his milk trader. He needs to clear it to break his commercial link, or a new milk trader can buy it from the first milk trader.

This detailed analysis of the impact DEEP in Halabeya show a very limited efficiency of the strategies promoted by the non-inclusive coordination of DEEP. It contributes to rejecting H2: a non-inclusive coordination of a dairy IB favours the adoption of efficient strategies to reach impact.

Building inclusive coordination in IB value chains – probing an alternative coordination

Based on these observations, an alternative coordination mechanism of dairy IB was conceived during three workshops with local stakeholders (Figure 8). This model integrates a village coordination cell, gathering local stakeholders (dairy SYAL, inhabitants) and MCC staff to favour the local anchorage of the inclusive value chain. At the village level, its purpose is to design required services in the territory using existing material and immaterial resources for the local stakeholders that are directly or indirectly related to the IB's value chain. It should generate a village dynamic by creating new business opportunities in the SYAL. Thus, during the participatory workshops in Halabeya, the heterogeneous group was able to build a consensus on the priorities to strengthen the local dairy SYAL (first being the improvement of knowledge about animal feeding systems) and to co-construct strategies to reach them while enforcing the position of the MCC-DEEP in their village. It suggested a real potential for such a collective action in IB coordination. The NGO could facilitate the creation and empowerment of such an organisation. By doing so, the NGO would return to its core mission of support instead of being commercially involved as is currently the case. Furthermore, the territory would acquire a representative organisation able to integrate IB coordination. Indeed, the village coordination cell could join the steering committee of the IB's project alongside the investing company and the NGO's managers. In charge of designing the modality of investment and collaboration in the IB, they would jointly design a business model and manage it. If the workshop participants were enthusiastic about adopting such a coordination process in the IB, DEEP management staff expressed a limited interest for it.

Discussion

Rejecting hypothesis

Is a non-inclusive coordination of a dairy IB contributing to its sustainability? To answer this question a first sub-hypothesis has been tested: a non-inclusive coordination of a dairy IB strengthens stable relationships among main stakeholders of the dairy IB. DEEP IB adopted a non-inclusive coordination both during the design phase of the MCCs and during the running phase of the IB. The growing tensions during the period of the project among key stakeholders of this IB support the rejection of H1.

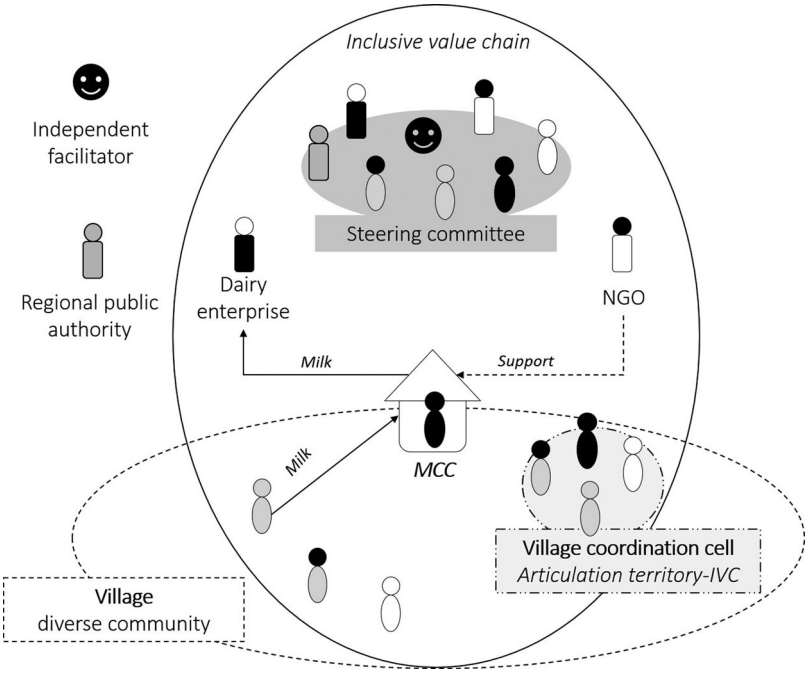

Figure 8. Illustration of an inclusive coordination mechanism of dairy inclusive business tested during three workshops in Halabeya (Beni Suef) with diverse local stakeholders (farmers, veterinarians, MCC staff, inhabitants).

The second sub-hypothesis, H2, tested was: a non-inclusive coordination of a dairy IB favours the adoption of efficient strategies to reach impact. At the project level, inadequate strategies, adopted and promoted by the IB coordination, regarding milk sourcing, milk quality management, and risk management, hindered the ability of DEEP to reach its objectives. At the local level, a detailed analysis of Halabeya, the showcase village of this IB, revealed a limited efficiency of the strategies promoted by the non-inclusive coordination of DEEP. These two converging results underpin the rejection of the second sub-hypothesis. By rejecting both sub-hypotheses, the main hypothesis can be rejected: a non-inclusive coordination of a dairy IB contributes to its sustainability. It seems that there is room for alternative coordination for IB, with a stronger inclusive quality. As illustrated in Halabeya, an alternative hypothesis could be that inclusive coordination of dairy IB contributes to its sustainability.

Analytical framework: room from improvement

The composite analytical framework proposed is greater than the sum of its parts. Research on value chains tends to expound the common vision of a linear flow of products and information in which economic rationalities prevail (Arato et al. 2017). As such, encompassing horizontal dimensions and social and political approaches in value chain analysis and in IB analysis seems essential. The need to combine global scale analysis with local realities is also important. Thus, combining a SYAL analysis with a value chain approach seems highly relevant to serving various purposes. If SYAL enriches the value chain approach, the reverse is also true. Indeed, the strong local component of the SYAL is enriched with the more global perspective of the value chain approach. Furthermore, SYAL has little to do with commodity products. By joining SYAL and value chain approaches, a pathway opens to consider products not only as potential commodities but also in their spatial and social diversity. Finally, using quality management to combine both approaches emerged as highly relevant in the IB analysis. It gives an opportunity to study its coordination, from a vertical perspective

to a horizontal one, with each stakeholder being directly or indirectly related to quality management. Furthermore, by using the intrinsic and extrinsic qualities of a product, the agri-chain multifunction is approached (Petersen, Nüssel, and Hamer 2014). In the IB analysis, it serves the purpose of not only understanding their impact from a technical or economic perspective, but also of addressing the diversity of IB's objectives (socio-economic as well as environmental or food-safety–related).

The analytical framework used on DEEP can be applied in any context thanks to the highly adaptive concepts combined to create it. However, the extensive data collection was very resource-consuming. Precise but cumbersome to implement, the methodology could be eased by focusing on collective data collection, mainly through participatory workshops. Such a methodology raises the question of the selection of "relevant" territorial actors to involve. From the current experience, trying to ensure a wide representation of local actors that are as diverse as possible appears crucial. It ensures consideration of multiple points of view on *filière*, value chain, and territory will be analysed. Overall, such a methodology could also become a means to activating collective action by building new links among unknown actors in a territory. More than only an IB analytical framework, it could become an action framework for the IB stakeholders and could be used as part of the routine of the coordination mechanisms. Such methodology converges with the collaborative trans-sectoral coordination proposed during DEEP analysis.

Inclusive coordination proposal

DEEP analysis pointed out the difficulty of scaling up such a project by replicating one business model in a diversity of contexts. Standardising an inclusive design process of the business model that is adapted in each context seems more relevant to ensuring improved relevance for a territory's resources, whether material or immaterial (Bijman and Bitzer 2016). In line with the need to associate territories in IB development, the sectoral strategies applied for decades appear limited. In agricultural development, farmers' cooperatives, despite their central role, are not sufficient to face resource competition at a territory level. Going forward with this conception of development, it seems appropriate to tie IB to cross-sectoral and multi-actor collective action at a territory level (Devaux et al. 2016). This is not specific to just the Egyptian case study – several IB examples also demonstrated interest in such collaborative coordination mechanisms (Chamberlain and Anseeuw 2017).

To build such a collaboration process, a common goal is required among the diverse stakeholders. Forging this alliance on milk quality management (sanitary and composition aspects) seems appropriate. Indeed, it is a central concern for all the participants. Furthermore, coordination of IB could also progressively encompass extrinsic qualities. Thus, a bridge on the life quality of inhabitants in the associated territories could be built. Several conditions are required for such a proposal to become a reality. State support is essential. Such an organisation would have to acquire state approval and guarantee its transparency in the Egyptian context, where state security is highly sensitive. Thus, associating with a local state representative is needed. By doing so, IB would gain coherence with the local politics and access to public resources. Another condition for such a coordination mechanism to work is to associate with an independent facilitator that would be in charge of balancing power asymmetries in a group. Like a midwife, he/she would help the working group collaborate. To guarantee his/her position in the working group, this person would have to come from an independent organisation (private or public) and be collectively paid by the different stakeholders. Furthermore, raising awareness of power asymmetries' effects on IB sustainability among the different stakeholders would be necessary. Finally, adopting specific strategies to reduce the distances between partners could also help. Using role playing or games, sharing experiences or organising training to improve empathy and understanding of the reality of each stakeholder (e.g. visits for the company and NGO to villages and farms and visits for the farmers to their respective facilities) are only a few examples.

But why could such collaborative coordination be so relevant to ensure IB sustainability? First, it could allow the various objectives of the IB stakeholders to be addressed. As evoked, profit creation

of the investing company can conflict with the prior objectives of the other IB stakeholders, such as local development, job creation, or environmental concerns. Milk quality, especially its intrinsic qualities, is a shared objective and could initiate such collaborative coordination. By succeeding in shifting the focus on its extrinsic qualities in a balanced collective action, it could be possible to address the objectives of the various stakeholders. By strengthening the multipurposes of such an IB and thus ensuring the renewed interests of the stakeholders to participate, such collaborative coordination could favour a lasting partnership. From competition rationalities, collaboration could emerge. It could allow the creation of strong trust bonds, the essential backbone that enables a lasting commercial relationship to flourish. Adopting such a mechanism supposes conceiving of concerted IB, in which the value created is actually shared in the involved territories. By doing so, the call of Porter and Kramer (2011) for enterprise to favour value sharing would actually be answered. Furthermore, by strongly grounding IB value chains in their territories, the relevance of strategies based on existing resources could increase. As competition for resources increases all around the world, creating resource management organisation at the territory level is needed to mitigate the inevitable tensions that will emerge from divergent interests.

To build such a collaborative process, strengthening the ability of an inclusive business to address the existing power asymmetries inherent to this type of project should be a priority in the future. Such asymmetries have to be considered barriers to overcome in the process of collaboration and the achievement of sustainability. But more than money, time is also needed to forge this collaboration and build trust among the diverse stakeholders.

Conclusion

IBs continue to multiply around the world. The dairy sector is particularly promising to host such initiatives because global players co-exist with smallholders. By studying the DEEP project, a dairy IB in Egypt, precious insights on coordination mechanisms have been revealed. In this case study, a non-inclusive coordination was adopted by DEEP promoters. Distance and power asymmetries among the stakeholders generated tensions among them. Coercive coordination mechanisms led by the investing company promptly prevailed. Ultimately, the strategies adopted by this giant had a very limited adequacy in the territories where it invested, and the sustainability of their project appeared highly compromised. To prevent such a vicious circle from arising in IBs, three recommendations could be followed. First, IBs should be tied to cross-sectoral and territorialised collective action. Indeed, the sectoral dairy approach narrows the inclusion spectrum. In a context of high resource competition, using a multi-actor approach could foster the emergence of local collective management and prevent conflicts. Second, replicating an inclusive design process of business models within each territory is needed to scale up IB. Indeed, replicating one business model for a diversity of territories appears to be non-sustainable. Third, power asymmetries and distance among stakeholders in IB need to be overcome in the future coordination mechanism. Raising awareness of the consequences of power asymmetries, involving public regional representatives, using facilitators, decreasing the distance between the diverse stakeholders, or building transparent monitoring and decision support tools are some, but certainly not all, possible examples.

Notes

1. According to the Egyptian Central Agency for Public Mobilization and Statistics.
2. According to the Egyptian Central Agency for Public Mobilization and Statistics.
3. New Reclaimed Land: desert land converted into arable land through irrigation promoted by the Egyptian government since the 1950s, versus the highly fertile "old land" that is historically cultivated on the Nile River banks and its delta.
4. Funded by Danone Ecosystem, it was led by CIRAD with the important collaboration of the Animal Production Research Institute and Cairo University.
5. Typologies of the farms and dairy enterprises have been produced (Daburon 2017)

6. Distance (Princen 1997) encompasses geographical, cultural, and power asymmetries and the number of intermediaries in a production chain.

Acknowledgements

We wish to thank all the researchers of the Animal Production Research Institute and of Cairo University who have participated in this study, as well as all the producers and intermediaries of the sector who have given us their time. In loving memory of Ahmed Ali and Mona Osman; dedicated researchers and great friends. We will miss you.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes on contributors

Annabelle Daburon with a veterinarian background, joined the research and international development community in CIRAD (the French agricultural research and international cooperation organization working for the sustainable development of tropical and Mediterranean regions). Her work focused mainly on the Egyptian dairy sector, especially the urban farming and the development of dairy inclusive businesses using livelihood approaches. In 2018, she joined Wageningen University & Research in the Wageningen Centre for Development Innovation (WCDI) as a livestock value chain advisor.

Véronique Alary is a senior scientist at the International Center of Agricultural Research for Development (CIRAD) in the research unit SELMET on livestock systems in the Mediterranean and tropical areas. She currently works in the International Center of Agricultural Research for Dry Areas (ICARDA) at Rabat (Morocco). Her research interests include household viability, risk management, and adaptive capacity of rural families to changes.

Ahmed Ali was researcher and director of the Technical office at the Animal Production Research Institute (APRI), Agriculture Research Center (ARC), in Cairo, Egypt. He passed away in 2020.

Mona Abdelzaher Osman was a senior scientist and Head of Sheep and Goat Research Department at the Animal Production Research Institute (APRI), Agricultural Research Center (ARC), Ministry of Agriculture and Land Reclamation, Cairo, Egypt. Her research interests included breeding and genetics of sheep and goats and lately she interested in farming systems, integration of livestock with crop production, risk management, and adaptive capacity of rural families to changes. She passed away in 2021.

Taha Hosni Abdelsabour is researcher at the Animal Production Research Institute (APRI), Agriculture Research Center (ARC), in Cairo, Egypt.

Jean François Tourrand is General Inspector of Veterinary Public Health (IGSPV) of the French Ministry of Agriculture (MAAF), seconded to the Center of International Cooperation in Agriculture Research for Development (CIRAD), Doctor of Veterinary Medicine (1981) with MSc in Tropical Animal Disease and Animal Production (1983) and PhD in Animal Science (1993). During his 40-year career, JF. Tourrand has been a lecturer and researcher at various universities and research centers in Africa (Senegal, Egypt), Asia (China and Indonesia), North America (United States and Canada), South America (Brazil, Argentina, Uruguay, Ecuador, Peru and Colombia). His research interest includes techniques, performance and the adaptation of livestock societies to global change.

ORCID

Annabelle Daburon http://orcid.org/0000-0002-1865-6417
Véronique Alary http://orcid.org/0000-0003-4844-5423

References

Alary, V., C. Corniaux, A. Aboulnaga, and G. Salah. 2017. *The Traditional Milk Sector around Greater Cairo in Egypt*. Montpellier: CIRAD, ARC, ICARDA, Cairo University, Ain Shams University, AIRD. https://umr-selmet.cirad.fr/FichiersComplementaires/Atlas_finale_BR1_end.pdf.

Arato, M., S. Speelman, J. Dessein, and G. van Huylenbroeck. 2017. "Assessment of Socio-Economic Configuration of Value Chains: A Proposed Analysis Framework to Facilitate Integration of Small Rural Producers with Global Agribusiness." *International Food and Agribusiness Management Review* 20 (1): 25–43. doi:10.22434/IFAMR2015.0060.

Bijman, J., and V. Bitzer2016. *Quality and Innovation in Food Chains: Lessons and Insights from Africa*. The Netherlands: Wageningen Academic Publishers. doi:10.3920/978-90-8686-825-4.

Bitzer, V., and P. Glasbergen. 2015. "Business–NGO Partnerships in Global Value Chains: Part of the Solution or Part of the Problem of Sustainable Change?" *Current Opinion in Environmental Sustainability* 12 (February): 35–40. doi:10.1016/j.cosust.2014.08.012.

Cerdan, C., F. Boucher, D. Sautier, and S. Fournier. 2017. "Chapitre 21—Les Systèmes Agroalimentaires Localisés." In *Des Territoires Vivants Pour Transformer le Monde*, edited by Valette Caron, Coppens d'Eeckenbrugge Wassenaar, and Vatché Papazian, 136–140. Versailles: Quae.

Chamberlain, W., and W. Anseeuw. 2017. *Inclusive Business in Agriculture*. South Africa: Sun Press. http://www.africansunmedia.co.za/Portals/0/files/pdf/9781928355090.pdf.

Chiffoleau, Y., and J.-M. Touzard. 2014. "Understanding Local Agri-Food Systems Through Advice Network Analysis." *Agriculture and Human Values* 31 (1): 19–32. doi:10.1007/s10460-013-9446-6.

Daburon, A. 2017. Propositions de Construction Territorialisée de Business Inclusifs Laitiers à l'aide de La Gestion de La Qualité Du Lait. Approche Multi-Scalaire à Partir d'un Cas d'étude Égyptien. Thèse de Doctorat. Paris, France: Institut Agronomique Vétérinaire et Forestier de France-AgroParisTech de doctorat—Developpement agricole. http://publications.cirad.fr/une_notice.php?dk=585939.

Daburon, A., M. Radwan, V. Alary, A. Ali, S. Abdelghany, and K. Fouad. 2016. "Evolution of a Milkshed and Role of Alternative Milk Collection Centres in Egypt." *Cahiers Agricultures* 25 (6): 1–8. doi:10.1051/cagri/2016049.

Devaux, A., M. T. Cullen, J. Donovan, and D. Horton, eds. 2016. *Innovation for Inclusive Value-Chain Development: Successes and Challenges*. Washington, DC: International Food Policy Research Institute. http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/130788/filename/130999.pdf.

Duteurtre, G., D. Sautier, M. Pannier, and M. H. Nguyen. 2016. "4. Développement Durable Des Territoires Au Vietnam et Alliances Entre Les Acteurs." In *Développement Durable et Filières Tropicales*, edited by E. Biénabe, A. Rival, and D. Loeillet, 65–77. Versailles: Éditions Quæ.

ISO. 2015. *ISO 9000:2015 Systèmes de Management de La Qualité—Principes Essentiels et Vocabulaire*. 4th ed. Genève: ISO. https://www.iso.org/obp/ui/#iso:std:iso:9000:ed-4:v2:fr.

Lançon, F., L. Temple, and E. Biénabe. 2016. "1. La Notion de Filière: Un Cadre D'analyse Pour Les Politiques et Les Stratégies de Développement." In *Développement Durable et Filières Tropicales*, edited by E. Biénabe, A. Rival, and D. Loeillet, 29–40. Versailles: Éditions Quæ.

Muchnik, J., J. S. Cañada, and G. T. Salcido. 2008. "Systèmes Agroalimentaires Localisés : état des Recherches et Perspectives." *Cahiers Agricultures* 17 (6): 513–519 (1). doi:10.1684/agr.2008.0251.

Pant, R. R., G. Prakash, A. Farooquie, and J. A. 2015. "A Framework for Traceability and Transparency in the Dairy Supply Chain Networks." *Procedia—Social and Behavioral Sciences* 189: 385–394. doi:10.1016/j.sbspro.2015.03.235.

Petersen, B., M. Nüssel, and M. Hamer, eds. 2014. *Quality and Risk Management in Agri-Food Chains*. The Netherlands: Wageningen Academic Publishers. http://www.wageningenacademic.com/doi/book/10.3920/978-90-8686-789-9.

Porter, M., and M. Kramer. 2011. Creating Shared Value. *Harvard Business Review*. (No. 89). pp. 62–77.

Prahalad, C. K. 2012. "Bottom of the Pyramid as a Source of Breakthrough Innovations." *Journal of Product Innovation Management* 29 (1): 6–12. doi:10.1111/j.1540-5885.2011.00874.x.

Princen, T. 1997. "The Shading and Distancing of Commerce: When Internalization Is Not Enough." *Ecological Economics* 20 (3): 235–253. doi:10.1016/S0921-8009(96)00085-7.

UNDP. 2008. *Creating Value for All: Strategies for Doing Business with the Poor*. New York: United Nations Development Programme. http://www.rw.undp.org/content/dam/rwanda/docs/povred/RW_rp_Creating_Value_for_All_Doing_Business_with_the_Poor.pdf.