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EDITED BY
Susannah Mary Sallu,
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University of Augsburg, Germany
Jonas Cromwell,
University of Leeds, United Kingdom

*CORRESPONDENCE
Sébastien Boillat
✉ sebastien.boillat@unibe.ch

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The division of work in Senegalese conventional and alternative food networks: a contributive justice perspective

Sébastien Boillat[1,2,3]*, Patrick Bottazzi[1,4] and Ibrahima Khalil Sabaly[5,6,7]

[1]Institute of Geography, University of Bern, Bern, Switzerland, [2]School of Agricultural, Forest and Food Sciences HAFL, Bern University of Applied Sciences, Zollikofen, Switzerland, [3]Institute of Biology, University of Neuchâtel, Neuchâtel, Switzerland, [4]Centre for Development and Environment, University of Bern, Bern, Switzerland, [5]Initiative Prospective Agricole et Rurale, Immeuble Kër Jacques Faye, Dakar, Senegal, [6]Ministère de l'Agriculture et de l'Equipement Rural, Sphère Ministérielle Ousmane Tanor Dieng, Diamniadio, Senegal, [7]Institut des Sciences de l'Environnement, Université Cheikh Anta Diop, Cité Universitaire, Dakar, Senegal

Labor conditions and rights are a key justice issue in agri-food systems, particularly in global, capitalized and industrialized food supply chains. While alternative food networks have emerged to produce and distribute food outside these logics, their ability to provide more equitable work conditions remains widely debated. We examine equity issues in the division of labor in food exchange networks in the horticultural sector of Senegal from the perspective of contributive justice. Contributive justice considers more broadly how different qualities of work are distributed and how work is perceived by the workers themselves. We performed 71 interviews of workers participating in three food exchange networks: (1) the conventional horticultural supply chain from the Niayes production area to Dakar, (2) an NGO-supported organic food network also supplying goods from Niayes to Dakar and (3) a community-supported agriculture scheme in a peri-urban coastal area. We investigated how functions and tasks are distributed along gender, ethnicity, place of origin and education characteristics of workers and how they qualify their tasks in terms of satisfaction and tediousness. We found a sharp labor division along gender, education and ethnic characteristics in the conventional network and a less sharp one in the two alternative networks. However, worker participants in alternative networks tend to belong to local elites and rarely include more disadvantaged people; they also tend to be less specialized and perform several functions, but do not necessarily express better work satisfaction. Workers who perform highly tedious tasks in the conventional network show rather surprising high work satisfaction. Based on these findings, we discuss the interplays between external and situated perceptions of work and the organization of food supply chains. This allows to critically examine the transformative potential of alternative food networks in the context of a lower-middle income country such as Senegal.

KEYWORDS

alternative food networks, labor, equity, contributive justice, horticulture, Senegal, agroecology

1. Introduction

The issue of labor conditions and rights is key to assess the performance of agri-food systems in terms of equity and sustainability. While labor issues have been widely studied in global and industrialized food supply chains (Gibbon et al., 2008; Raynolds, 2014; Böhm et al., 2019), the question of labor has only recently been incorporated in the study of alternative food networks in developing countries. Alternative food networks (AFN) are usually meant as a response to the high environmental and social impacts of industrial food supply chains; they encompass a high diversity of initiatives such as local farmer's markets, fair trade cooperatives, community-supported agriculture, all aiming at producing, distributing and consuming food outside of the capitalist and industrial logics (Goodman et al., 2012). AFNs often involve ecological or organic farming and seek to minimize physical distance and establish direct social connection between producers and consumers.

Social and environmental activists and movements, as well as NGOs usually promote AFNs with a stated objective of social empowerment. In their view, AFNs are instruments to implement agri-food system practices that are both more socially just and environmentally sustainable (Bruce and Som Castellano, 2017). However, AFNs can also be elitist and exclusionary, with most of their participants tending to be educated, wealthy and, in the American context, of European descent (Hinrichs, 2003; Goodman et al., 2012). In this context, the "relocalization" of production and consumption does not automatically lead to more socially just outcomes (Hinrichs, 2003; Allen, 2010).

Studies that address labor in AFNs mainly focus on labor issues as drivers of producer and consumer participation (Bruce and Som Castellano, 2017; Podda et al., 2021). These studies have stressed the need to understand better the interplay between labor issues, participation and ecological and social benefits of AFNs. Nevertheless, with the exception of seminal works dealing with gender issues (Som Castellano, 2016), few studies have explicitly addressed inequalities in the distribution and division of work in the process of transporting and distributing food. Furthermore, most studies address the distribution of quantified labor and income as inputs and outputs, but do not take into account different qualities of work and how they are perceived by the people involved. The concept of contributive justice, which looks at the distribution of meaningful and fulfilling work as a social justice issue (Gomberg, 2007; Sayer, 2009; Timmermann, 2018) provides a promising framing to connect the empirical assessment of labor division with the broader notion of social justice. Surprisingly, despite existing studies on contributive justice and agricultural production (Timmermann and Félix, 2015), the concept has not yet been applied to the study of food distribution networks.

This study fills this gap by explicitly focusing on the division of meaningful work along horticultural supply chains in Senegal. We focus on three networks: the conventional food supply chain based on the informal economy, an NGO-supported organic food network and a community-supported agriculture scheme. We inquire about how work is distributed along patterns of gender, ethnicity, geographic origin and education by combining assessments of labor conditions with a more situated perspective on work tediousness and satisfaction. We specifically focus on food distribution networks, including gathering, transport and selling of food products in the peri-urban and urban greater Dakar area. Our study further contributes to the literature on labor and AFNs with the novel inclusion of a lower-middle income country context, in which the dichotomy between industrial/global and small/local food network is less evident.

2. Approach, materials and methods

2.1. Food networks, labor and contributive justice

Food supply chains are increasingly understood as social networks, in which specific relationships of power, cooperation and trust enable the circulation of food (Jarosz, 2000). The high environmental and social impacts of industrial food supply chains have led to the emergence of AFNs as a practical response by which proximity between producers and consumers would minimize these impacts. Nevertheless, this common assumption has been questioned. In the USA, for example, the alternative food movement remains dominated by "white, middle-class individuals, organizations, and institutions and operate within a consumerist, market framework" (Agyeman and McEntee, 2014). Allen (2010) argues that local food systems do not automatically lead to greater social justice. Even AFNs that claim to include specific social groups often exclude other disadvantaged social groups through "selective patronage" processes (Hinrichs and Allen, 2008). Furthermore, AFNs are unevenly distributed in space, potentially concentrating in wealthy urban areas (Brinkley, 2017).

The fact that AFNs often require higher labor intensity than industrialized and standardized food systems is usually considered a barrier for their wider adoption (Jansen, 2000). Nevertheless, it is only more recently that studies on labor in AFNs more explicitly assess the division of labor as a key component of power (Watson, 2019) and as a potential driver of social inclusion and exclusion (Fourat et al., 2020). Even so, most studies focus either on production or on consumption (Böhm et al., 2019). Attempts to bridge this divide through the study of labor at both producer and consumer side (Bruce and Som Castellano, 2017), or a focus on "prosumers," namely consumers who co-produce the food they eat (Podda et al., 2021) have highlighted the importance of the circulation of values and ideals of meaningful work across food networks. Nevertheless, few studies also integrate labor issues in systems of food distribution. While "prosumption" presupposes very short supply chains, AFNs that go beyond strict localization such as rural-to-urban networks still involve specialized work in commercialization, which is little studied under this perspective.

Furthermore, AFN studies have almost exclusively focused on the "Global North" and high income or upper-middle income contexts. For example, the recent special issue on AFNs focusing on prosumption (Podda et al., 2021) includes cases from Europe, Japan and the Americas. In these contexts, AFNs contrast with dominant conventional food networks that are highly industrialized and that are characterized by a sharp division of labor between the different components and functions of the food system. However, in lower-middle and low income countries, especially in Africa and Asia, industrialized food distribution chains usually control much smaller shares of the local food market. Most food commercialization and distribution occurs through the informal economy, giving another meaning to conventional food networks than in industrialized

contexts. Examining AFNs in such contexts therefore questions their "alterity" (Goodman et al., 2012) and requires to re-think their co-existence with dominant food networks that rely on non- or only partly industrialized exchange systems.

More generally, the interplay between labor issues such as workers' participation in decision making or workers' satisfaction and ecological and social benefits of AFNs is highly context-dependent and is not yet well understood. In this study, we argue that this understanding is particularly limited through a narrow, quantitative definition of labor as paid employment and production input, which fails to integrate new forms of work that may prevail in AFNs (Jansen, 2000; Podda et al., 2021). There is therefore a need to open up the concept of *labor* beyond a monetarized productive input to include wider benefits of *work*, such as self-satisfaction, gender relations, domestic and public space, reproductive labor and exchange of trust, values and knowledge (Podda et al., 2021). In this perspective, the benefits and burdens of work become particularly sensitive to the social context in which they are embedded. In lower income countries with limited industrialization of food networks, the social-cultural meanings of paid or unpaid labor, service or meaningful work build on different socio-historic trajectories and are likely to differ substantially from those prevailing in Global North contexts (Ingold, 2000b). For this reason, one needs to combine the assessment of how work is distributed with a more situated appreciation of the different characteristics of work in a given context.

Understanding social benefits and burdens of work requires therefore to distinguish meaningful and rewarding work from burdensome and tedious work. An equity and justice perspective further implies to look at how different qualities of work are distributed among the members of a social group, and what the criteria for distribution are. The concept of contributive justice, which focuses on the equitable distribution of meaningful and rewarding work (Gomberg, 2007; Sayer, 2009) and the opportunities for workers to develop skills and make use of them (Timmermann, 2018) provides the adequate framing for this differentiation.

Contributive justice has been defined as "justice with regards to what people are expected and able to contribute in terms of work" (Gomberg, 2007). Contributive justice postulates that work can have an intrinsic value and cannot be equated to mere exchange value. It is rooted in philosophical and psychological approaches to behavioral economics that question the *homo economicus* assumption that monetary gain is the main motivation to work (Frey, 1997). It assumes that we also work because it influences who we are; it gives us social recognition, self-esteem (Sayer, 2009) and the enjoyment of exerting skills (Ingold, 2000a). In this sense, contributive justice also connects with the idea of capabilities as a justice issue already recognized in Rawls' theory of justice (Rawls, 1971) and further developed by Sen (2009).

To understand contributive justice requires to open up the concept of labor as a homogenous input that workers exchange against money and go beyond social justice as a mere issue of distribution of labor burdens vs. economic benefits. To do this, one has to distinguish between different kinds of work such as low status, low-skilled, health deteriorating, dangerous and mentally harmful labor and meaningful and rewarding work that involves skill development, creativity, craftsmanship and decision-making (Sayer, 2009). Social justice issues then arise in the unequal, social division of these different kinds of labor as an explanation of economic and status inequalities (Sayer, 2009).

Following this idea, the redistribution of tedious and meaningful tasks become key drivers of social and political emancipation. Access to meaningful tasks improve capabilities, social recognition and the possibility to less educated classes to become skilled and progress socially and politically. Several social science theories such as labor environmentalism, post-work and contributive justice approaches provide a deeper conceptualization of these heterodox approaches to emancipatory work (Bottazzi, 2019).

Assessing contributive justice and harnessing its potential for emancipatory transformation also requires to overcome the dichotomy between external and situated approaches of work (Hsieh, 2009). Timmermann (2018) proposes to combine both approaches to avoid overlooking local social realities on the one hand or get biased information due to adapted expectations of disadvantaged people on the other.

In his intent to characterize meaningful and tedious work in wider detail, Timmermann (2018) identifies six key elements that can be used to assess contributive justice. First, the *opportunities to participate*, namely contributing more positively and effectively to society while being able to cover basic needs, should be available to people from all backgrounds. Second, workers should have the opportunity to constantly *develop skills*, in order to retain employment but also to build-up self-esteem and satisfaction. Third, contributive justice is also about how the *opportunities to* "*learn to be productive*" and per extenso, how production means are distributed. A fourth key component is the *fair evaluation* of work inputs, which has a strong cultural component. Fifth, people have a duty to *do one's share according to one's capacities*, a duty likely to become less demanding if the other contributive justice demands are fulfilled. Finally, a more equal *distribution of meaningful work and tedious tasks* is a key component of contributive justice, also entailing the reduction of tedious tasks through innovation.

A more situated account of contributive justice implies to inquire on how workers perceive their own work and what tasks they qualify as satisfactory and tedious. Work satisfaction and tediousness entails several components which have been used to qualify working conditions in the food sector (Bodescu et al., 2022). Work satisfaction includes personal satisfaction, in which one considers a task as fulfilling for oneself including competence building, and social and economic satisfaction linked with the social and political status and the income acquired by doing a job (Dumont and Baret, 2017) Tediousness can be related with the physical effort needed to perform a task, the technical difficulty of realizing a task and the perceived social degradation related to a task (moral tediousness); it further includes dangerousness, namely the risks associated with performing a task (Dupré et al., 2017).

In the next section, we detail how we combine the study of work quality differentiation with the observation of the division of work in different food exchange networks.

2.2. Approach and research questions

The division of labor, an enduring concept of the sociology of work, has been reconceptualized to include a wider spectrum of labor such as unpaid, non-profit, household and voluntary labor, as well as integrating whole supply chains from production to consumption as integral components of economic processes (Glucksmann, 2009). In

this sense, the classic understanding of the division of labor centered as the technical division of tasks and their allocation to people according to social class is only one aspect of the whole labor division process.

In this study, we build on this framing to assess the division of labor in the food supply chain, while restricting our scope on people who are actively involved in exchanging and circulating food. This might include some producers and consumers depending on the context, and also include unpaid or voluntary work if relevant. Our contributive justice perspective implies to move away from focusing on income per labor input (about which it is often difficult to get valid data in informal economy contexts), to focus on labor conditions and perceptions and how these are distributed among individuals and social groups. We structure our inquiry around the following research questions:

1. For each food network, how are food supply chains organized and who are the actors, functions and tasks involved at each stage of the supply chain?

This question addresses the instituted economic processes of labor, which determines the distribution and organization of labor across processes of production, exchange, distribution, and consumption (Glucksmann, 2009).

2. How and why are the tasks distributed to whom in terms of gender, skills, social status, class, race and ethnicity?

This question addresses the division of labor in a classic sense, also inquiring about the conventions, formal and informal institutions that shape the division of labor.

3. How can these tasks be qualified in terms of meaningfulness/tediousness from an external and situated perspective?

With this question, we open up the concept of labor to a contributive justice perspective, looking at different qualities of work from an external and situated perspective and connecting them with the distribution question.

2.3. Data collection and analysis

Our approach requires mixed methods with the combination of qualitative and quantitative data collection and analysis processes. Our quantitative part is nevertheless limited since in the study area, AFNs employ too few people to get samples large enough to perform analytical statistics. We collected data in the Dakar and Thiès regions of Senegal. During a preliminary phase ranging from March 2019 to March 2021, we used a qualitative approach to understand how food supply chains are organized and who the key actors are. We interviewed 14 key informants including 5 main responsible persons for AFNs and the NGOs that support them, 4 people from conventional and organic producers' organizations, 4 from authorities (ministry of agriculture and municipalities where vegetables are marketed) and one from a consumer's association. We asked about the history of the food networks, the kind of food exchanged, the actors involved and the main targeted markets, as well as about decision-making processes, investments and asset ownership. A review of existing grey literature also provided useful information. We complied the obtained information into a first sketch of the supply chain structure, the location of food exchange markets and the different functions and tasks involved. We then further refined the sketch with field visits taking place between March 2019 and March 2021.

For the second phase of the study, we collected data at individual level, with qualitative information on tasks performed and perception of work and quantitative data on working time for each task. This allows us to connect working time with the perceptions of the tasks involved and get an overall appreciation of work conditions. We interviewed 73 workers (44 men, 29 women) belonging to the three networks who performed different functions at different supply chain stages (Table 1). For AFNs, the number of interviews remained small ($n = 16$) due to the limited total number of employed people. We did not face this limitation for the conventional networks and tried to have at least 8 interviews per function, however in this case fewer carriers and rickshaws agreed to give interviews than people with other functions. The interviews took place in either Wolof, Serer or French depending on the choice of the interviewee. After performing a protocol orally to establish informed consent, we filled a form including personal data (gender, age, ethnicity, personal situation, place of origin, languages spoken, education level) and data on labor conditions (function, labor status, formal/informal, hiring process, skill development opportunities and approximate income). We then performed a simplified work planning assessment (Dedieu and Servière, 1999), asking respondents to list their tasks and quantify working time in different typical situations (market days, peak vs. lean seasons, etc.). We then asked them to qualify each task in terms of physical, technical and moral tediousness, dangerousness as well as social and personal satisfaction in a 1–5 Likert scale. Finally, we asked the respondent open questions about the most difficult and satisfactory tasks and their main motivation to work.

To analyse the data, we first compiled the different tasks and functions performed along the food supply chain and assessed the personal characteristics of the people involved in terms of gender, education level, place of origin and ethnicity. We compiled these data into Sankey flow diagrams for the two main food exchange locations in the conventional network (gathering markets in the Niayes production region and Thiaroye market in Dakar) and for the alternative food networks. Because each AFN had too few people involved to show the diagram without making personal data visible, we merged the two AFNs into a single diagram. Second, we assessed overall work tediousness and satisfaction by each function. For this, we calculated average dimensions of tediousness and satisfaction on the 1–5 Likert scale by weighting each task with the time involved. We then complied descriptive statistics for all people performing each function (mean and standard deviation) using R. Finally, we complied and compared qualitative reasons for work satisfaction for AFN members and conventional food network members.

3. Results

3.1. Area of study: the horticultural domestic supply chain in Senegal

Located in West Africa, Senegal has a vibrant horticultural sector including agribusinesses oriented at export and small to large producers fulfilling the growing domestic demand. Vegetable production including onions, tomatoes, potatoes and cabbage has doubled between 2012 and 2018 and is growing steadily (République du Sénégal, 2019). The sub-sector is considered key for the country's economic development, rural employment and food security; it

TABLE 1 Characteristics of the main functions assessed.

Functions	Description	*n* (m/f)	Main tasks	Contract type	Continuous education
Conventional food networks					
Beater (coxeur)	First intermediary between producers and the distribution network. In charge of prospecting, buying, gathering and reselling products to wholesale market	11/1	Install and clean shop, prospect, order, weight, store, sell, pay, take loans	Independent	None (12), Business (1)
Small wholesaler ("bana bana")	Second intermediary, buys to beaters, organizes hired transport (pays per bag) to Dakar and sells	7/2	Buy, sort, weight, store, register, sell, pay, take loans	Independent	None (all)
Large wholesaler ("bana bana")	Intermediary, buys large quantities in production areas and transports to Dakar, has own transportation facilities	8/0	Buy, sort, weight, store, register, sell, pay	Independent	None (6), Marketing (2)
Detail seller	Buys vegetables from small or large wholesalers and sells to consumers on open markets	3/5	Install and clean shop, buy, unpack, repack, sell	Independent	None (7), Product transformation (1)
Washer	Wash the vegetables before packing at beater's shops	0/10	Unpack, sort, cut, fetch water, wash, repack	Independent	None (all)
Carrier	Carries bags from beater's shop to washing spots and back, to truck, unload trucks and carry to rickshaws or wholesale shop	6/0	Unload, carry, load	Independent	None (all)
Rickshaw	Carries bags from trucks to wholesale shops over larger distances at open markets	5/0	Unload, transport, store, load	Independent	None (all)
Alternative food networks					
Producer-seller	Farmers who directly bring their production to local markets (using hired horse-driven carts) and sell to consumers	1/6	Sow, transplant, water, harvest, sort, pack, load, transport, unload, sell	Salaried (5); Independent (2)	None (2), Basic marketing (5)
Commercial/ marketing manager	Organize and supervise gathering at production sites, transport to Dakar and detail sale at Dakar markets	1/3	Prospect, order, collect, pay, weight, register, store, install and clean shop, make baskets, sell	Salaried (4) of them 2 informal (indemnity)	Marketing, food processing (3)
Driver	Drives transport from production areas to Dakar, loads and unloads goods	2/0	Load, transport, unload, unpack, install shop, vehicle maintenance	Salaried (2)	None (all)
Detail seller	Detail sale at Dakar markets	0/2	Install and clean shop, buy, unpack, repack, sell	Independent	None (all)

receives substantial international support and investments (FAO, 2021) and has benefited from temporary bans on potato and onion imports during domestic harvest seasons from July to August. Nevertheless, the recent growth of large agribusiness companies endangers small-scale local producers by flooding the markets with cheap products. The growing water scarcity due to climate change and extractive policies benefitting mostly to urban consumption and agribusiness also threatens the sector (Boillat and Bottazzi, 2020).

The main horticulture production region in Senegal is the Niayes coastal region to the North of Dakar, where the combination of shallow groundwater, clay alluvial soils and a fresh microclimate thanks to oceanic influence favors production (Rejiba et al., 2012; Camara et al., 2019; Boillat and Bottazzi, 2020). In pre-colonial times, the area has been occupied by Fulani pastoralists in the dry season, Lebou fishermen and then by Serer and Wolof sedentary cultivators who planted cassava, melon and sesame; horticulture was promoted after 1920 by the French colonial authorities, who introduced non-African vegetables such as potatoes, peppers, cabbage and eggplants and also brought workforce from the groundnut basin area (Fare et al., 2017).

Senegal is also a pioneer in West Africa for the development of alternative agricultural production approaches. The country has a very dynamic agroecological community mainly based on NGOs, farmer organizations and researchers. These actors recently formed an advocacy coalition, the "Dynamic for an agroecological transition in Senegal (DyTAES)," created 2019 (Bottazzi and Boillat, 2021). International organizations also support this movement, with the country designated a pilot country for the agroecological transition by FAO (2016) and a proliferation of development cooperation aiming at promoting agroecological practices (Boillat et al., 2021).

Initiatives for the agroecological transition also include the implementation of AFNs, involving innovations in commercialization and consumption, such as farmer markets, organic food cooperatives, and community-supported agriculture. AFNs are part of the strategy to promote agroecological products including the development of "short supply chains" connecting producers and consumers and involving territorial collectivities (DyTAES, 2020). The development of AFNs in Senegal is thus strongly tied to the organic farming and agroecological movement and their related practices. Agroecological initiatives usually place a strong emphasis on improving farmers'

well-being. This includes better prices for products but also safer work conditions thanks to the substitution of pesticides, better natural resource management, improved education and farmer unionization.

Nevertheless, organic and agroecological farming can also increase pressure on farmers. Dependence on foreign funding, enforcement of uncoordinated organic standards, and asymmetric cultural and symbolic power between farmers and NGO staff can enable top-down channels of labor control (Bottazzi et al., 2020). These mechanisms are similar as those observed in conventional large estate and contract farming in the country, showing a convergence of labor control regimes constituted at global, national and local scale (Baglioni, 2017). While these studies exclusively focus on labor at production level, the question of how involved values "travel along value chains" (Ponte, 2016) and how AFNs are inserted into existing social structures, remains open.

Examining the division of labor and its underlying mechanisms in food commercialization networks is thus particularly relevant to critically examine the emancipatory potential of AFNs in the Senegalese context. In particular, the organization of labor and its division along gendered, ethnic and geographic social groups may connect with deeply entrenched socio-historical categories of master–slave and gender conditions that persist in the country (Fall, 2011; Thioub, 2012). This configuration strongly advocates for a combination of situated and external approaches of work as stated in our framework, and for a comparative study addressing both conventional and alternative food exchange networks.

Our study focuses on three food exchange networks in which the whole supply chain from production to consumption is located in the Senegalese provinces of Thiès and Dakar (Figure 1). First, the dominant "conventional" network (Figure 1A) supplies vegetables from the Niayes production region, with gathering markets in Keur Abdou Ndoye (KAN) and Notto Gouye Diama (NGD) to the city of Dakar, with wholesales markets in Thiaroye and Castor and detailed sellers within the city. The distance from Notto to Thiaroye market is about 60 km and a 2-h drive under usual traffic conditions. The first alternative network studied (hereafter NGO-coop) is an NGO-supported organic food network organized in a cooperative (Figure 1B), who supplies organic vegetables also from the Niayes region (gathering in KAN, Bayakh and "Km. 50" along the Thiès-Dakar road) to weekly markets in high-income neighborhoods of Dakar. Distance from KAN to these markets is also about 60 km and 2-h drive. The third network, a community supported agriculture (hereafter CSA) (Figure 1C) is located in the village of Toubab Dialao on the Petite-Côte ("Small Coast"), a tourist area in the outskirts of Dakar. There, vegetables are produced on a community-supported organic school-farm of about 2 hectares and sold at the weekly market in the village, about 2 km away.

3.2. Food networks and the division of work

3.2.1. The conventional food network

In the Niayes areas, large agribusinesses, family businesses and smallholder farmers co-exist in the horticultural production sector (Fare et al., 2017). Producers are often connected through labor exchange networks, with smallholders often serving as wage workers in larger farms, and the widespread practice of sharecropping (Fare et al., 2017; Boillat and Bottazzi, 2020; Van Hoyweghen et al., 2020). Many farmers are organized in cooperatives, formerly state-supported and now mainly supported by NGO and international cooperation initiatives with a strong focus on production and access to inputs (Reed and Hickey, 2016). In this context, market development actions have focused mainly on exports (Maertens and Verhofstadt, 2013). In contrast, domestic marketing, conservation and transformation of vegetables has experienced little changes (Dugué et al., 2017).

Commercialization of horticultural products start on-field ("bord-champ") or at the gathering markets of KAN and NGD (Figure 1). Vegetables produced include onions, carrots, potatoes, turnips, cabbage, green beans, tomatoes, eggplant, African eggplant (*Solanum aethiopicum*), peppers and cucumbers. At KAN and NGD gathering markets, producers supply packed and sorted vegetables to beaters called *coxeurs* who own or rent shops there (Figure 2A). Prices but also exchange conditions vary with supply: when supply is high (January to July) producers bring their products to beaters, assuming transportation costs. When supply is low, beaters need to search for producers in the fields and take products at their own cost, sometimes even assuming packaging and sorting. Payment to producers can be immediate or differed after the beater has sold the product. Beaters often have lists of producers and establish informal contracts with them; some of them are also producers or work for family-owned agribusinesses.

Beaters control the quality of products, weight and register them. They then sell the products again to wholesalers called *bana bana* who are in charge of transporting them to wholesale markets of Thiaroye and Castor in Dakar. Food distribution at the gathering markets requires several services, which producers, *coxeurs* or *bana bana* hire on informal, task-based contacts. This includes the washers, who unpack, cut, wash and repack vegetables that need this process such as carrots. It also includes the carriers called *dockeurs* who carry the vegetables bags from beater shops to trucks and to washing places. In KAN, carriers are paid 50 XOF (0.075 USD) per transported bag. To transport products to Dakar, *bana bana* hire truck drivers who are paid according to the number of transported bags. Once in Dakar, *bana bana* wholesalers sell their products again to beaters who own or rent shops there. Retailers then come to the shops and buy their products to sell them at smaller detail markets throughout the city. Some larger *bana bana* also own shops or deposits in Thiaroye and Castor markets. There, services including washing, carrying and small-distance transportation via rickshaw are used. These services are also hired through task-based informal contracts (Figure 2A).

Figure 3 shows the division of work according to gender, education level, origin and ethnicity of people interviewed at gathering (KAN-NGD, Figure 3A) and wholesaler (Thiaroye, Figure 3B) markets. In gathering markets, washing is exclusively operated by women and carrying by men. Beater and wholesaler functions are dominated by men but not exclusively. Most women interviewed at the market have no education level at all. Most men have koranic education, beaters and wholesalers use Arabic writing to register their sales. Nearly all respondents were born in the village or the region and spoke wolof and/or pulaar, with the exception of carriers who are Serer migrants from the groundnut basin region, and a *bana bana* from Guinea. Besides writing and reading skills, a key asset to perform beater function is access to a shop location, which is issued by the village chief in KAN and by the municipality in NGD. Some beaters (all of them men) had free access due to family land ownership, but

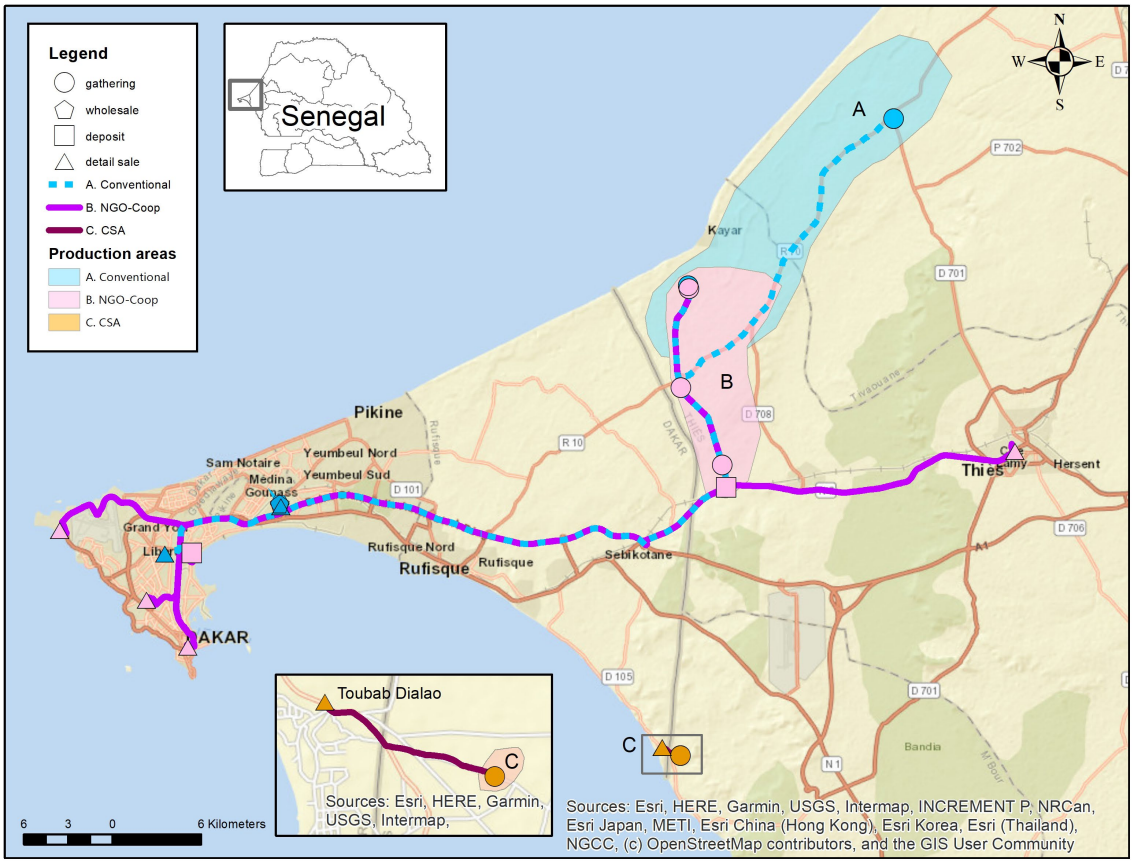

FIGURE 1
Area of study and location of food supply networks, including production areas for **(A)** the conventional food network, **(B)** the NGO-Coop and **(C)** the CSA.

others had to pay a rent to a landlord in form of a tax per bag handled. In Thiaroye market, the division of work is sharper, with auxiliary service tasks (washer, carrier, rickshaw) exclusively performed by Guinean migrants. All of them have no education level. As in gathering markets, beaters and wholesalers have koranic education; most of them are native to Dakar or other province capitals of Senegal and pay a rent to the municipality for shop location. Detail selling is exclusively performed by women from the Dakar area; women do not perform beater or wholesaler functions. Finally, a few wholesalers have secondary and tertiary education levels.

According to our respondents, there is relatively little permeability between functions, everyone having quite clear tasks to perform. Tedious tasks tend to be shared rather within than between groups, with carriers, rickshaws and washers often collaborating to perform the tasks or fetch water. Carriers and rickshaws who are mainly migrants often share food and accommodation too.

3.2.2. The alternative food networks

3.2.2.1. Organic food cooperative

Founded 2013, the NGO-coop is an important provider of vegetables to the organic food markets in Dakar. The cooperative has been supported since its foundation by a national NGO, who also support organic producers in the Niayes and in other regions of Senegal. They have developed organic production due to high concern over increased and uncontrolled use of pesticides in the Niayes horticulture sector (Diop et al., 2016; Hardin, 2019). NGO-coop's providers include rice producers in Podor, fruits and vegetables from Fatick, fonio and cotton from Tambacounda and fruits and vegetables from the Niayes area. The vegetables sold are the same species as the conventional ones, plus also cassava, lettuce and squash, and fruits including lemon, pomelo, papayas, mango, strawberry, passion fruit, oranges and tangerines.

The NGO-coop producers are organized into two associations who are affiliated to the Federation of Senegalese Organic Agriculture (FENAB). Thanks to the technical and organization support of the NGO, they operate a participatory guarantee system and certify producers with a internally recognized label. NGO-coop employs three marketing managers and two drivers and occasionally hires helpers for selling, transport and delivery (Figure 2B). The cooperative's drivers pick up the products on farm early in the morning and bring them to a temporary storage facility located along the Thiès-Dakar road, where a marketing manager controls and register the products. Producers sell about 30% of their products to the cooperative and are paid a premium of about 1500 XOF per 50 kg bag (2.3 USD) for being certified organic.

Drivers then bring the vegetables and fruits to Dakar and Thiès, where another marketing manager directly sells them. Selling places move every day to three different neighborhoods in Dakar. Customers are mainly wealthy residents including expats, who often send their employees to buy the organics. Unsold products are taken to a refrigerated storage facility in Dakar-Hann and re-sold in the

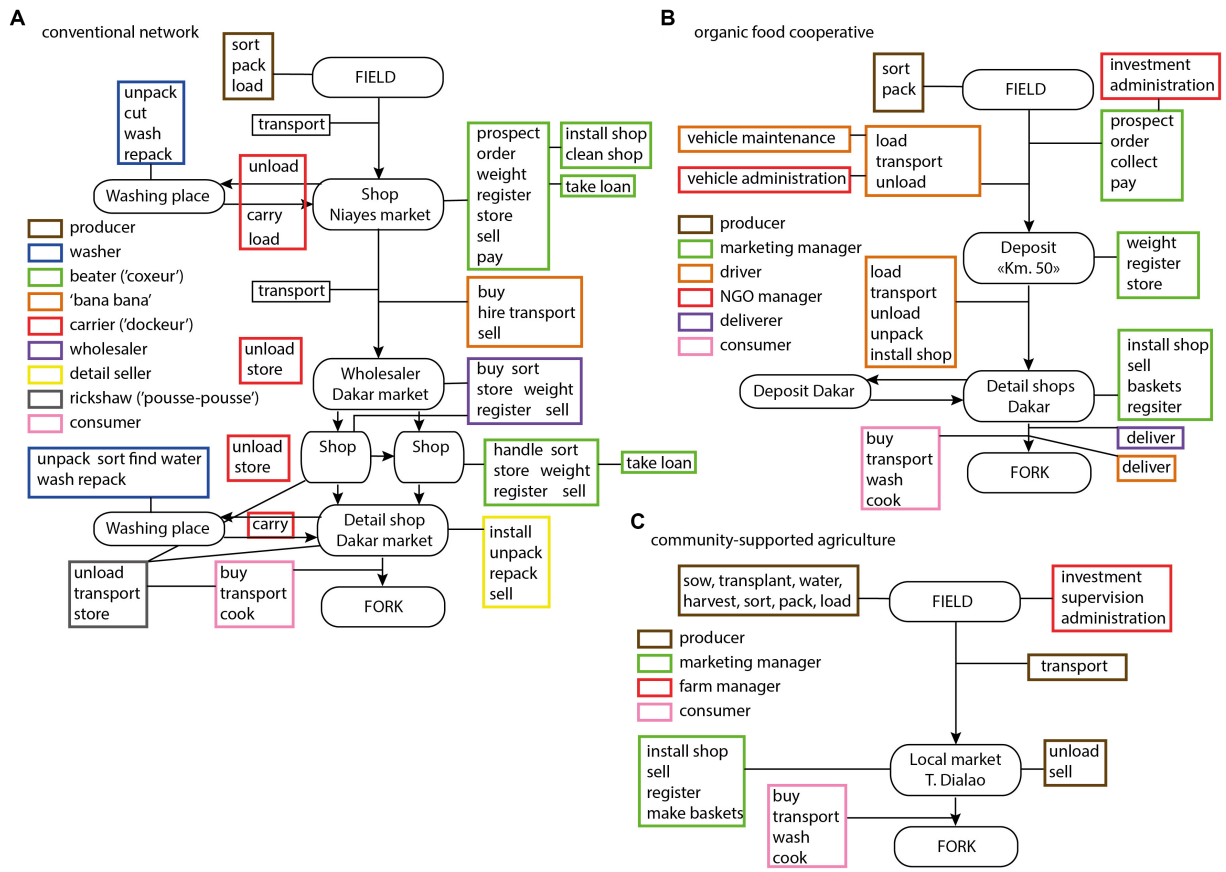

FIGURE 2
Workflow and functions along horticultural supply chains in the three networks. **(A)** Conventional network. **(B)** Organic food cooperative. **(C)** Community-supported agriculture.

following days. Expired products are fed to the animals in Dakar's Zoo. The cooperative performs marketing, accounting and registering. The supporting NGO still assumes tasks via a paid manager, including investments, vehicle administration, prospecting and market studies and pays fees to access selling places.

3.2.2.2. Community-supported agriculture

Located in Toubab Dialaw, a touristic village on the coast, the CSA network is built around a community-supported school-farm which started its activities in 2017 on a 2-ha intensive irrigated plot. A group of consumers, particularly two French women working in the advertisement industry and residing in Dakar, has been supporting the setting up of the farm to demonstrate the potential of agroecology, investing in land and a well with a solar pump. Currently the CSA supports 200 women producers, organizes a monthly market, trains farmers, and employs young professionals. A manager with a large experience in agroecology at another experimental farm leads the farm and also trains students in organic practices (Figure 2C). The association grants small plots within the farm to a group of women from the village and provides them with inputs. These "producers-sellers" supply their own families and sell the surplus at a monthly market organized by the CSA network. Among the women's group, one person is responsible for setting up the shop, register the products and make the baskets to be distributed. The farm also supplies local restaurants and hotels along the coast, as well as consumers from Dakar who come to visit the farm buy products and from time to time participate at production activities on a voluntary basis. More recently the monthly market has evolved into a larger event published on social media, attracting organic producers from the region and tourists from Dakar and abroad who specifically come to buy organic food.

Figure 3C shows the division of work for the two assessed alternative food networks. In these networks, most positions are held by women, except for the drivers and one commercial manager. Only a minority of producers-sellers have no education level, and all commercials or marketing managers have at least secondary education level. Involved producers-sellers are all from Dakar region and all network members are Senegalese. In terms of ethnicity, most network members speak wolof or serer, which are the main languages spoken along the Petite Côte.

3.3. Work characteristics, perceived tediousness and satisfaction

Table 1 shows the main tasks involved in the different functions assessed, as well as the main working conditions, including contract type and possibilities of continuous education. All workers in conventional networks are independent and do not receive any monthly and formal salary. Most of them have no access at all to continuous education, with the exception of two large wholesalers and

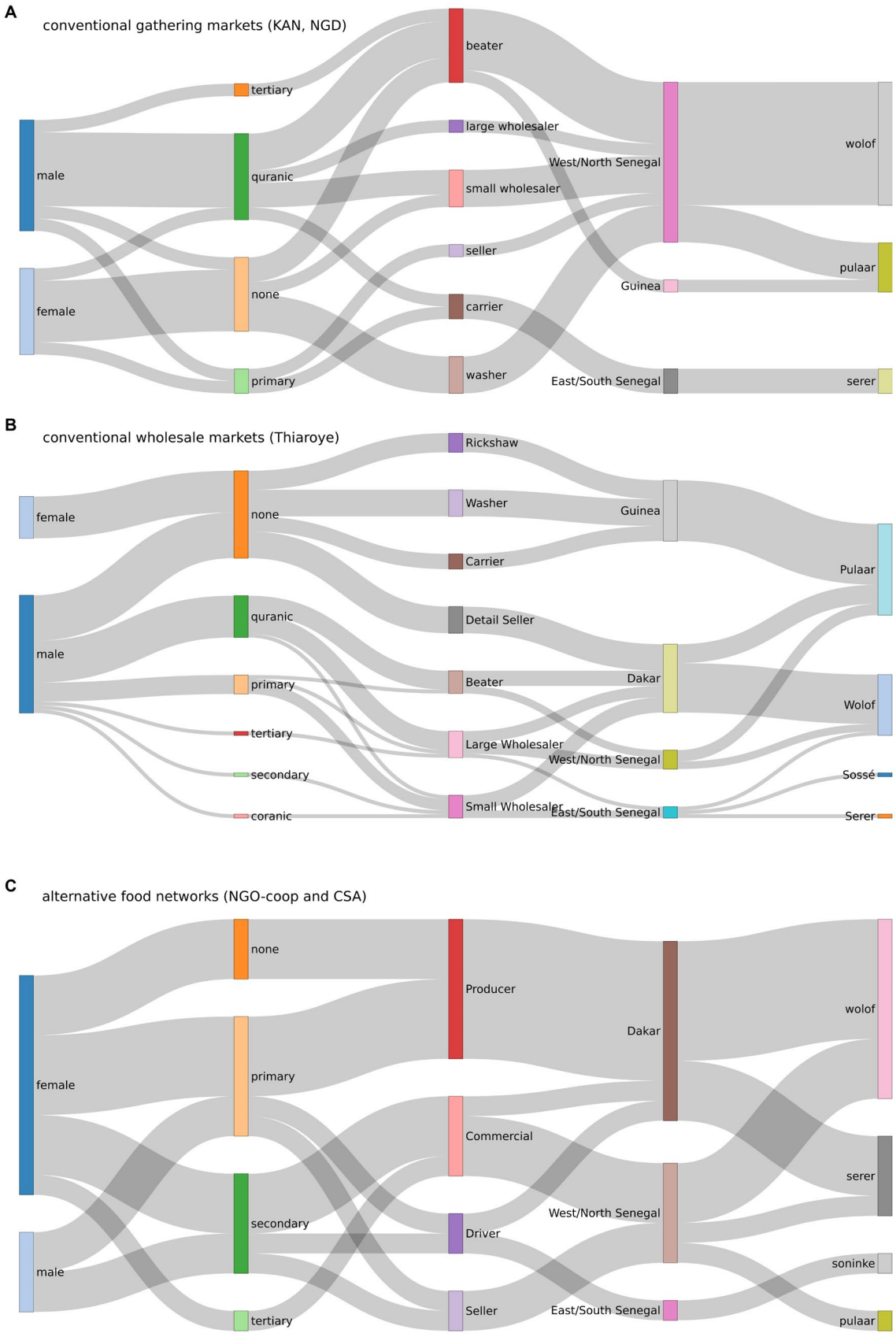

FIGURE 3
Division of work according to personal characteristics in the three networks. **(A)** Conventional gathering markets (KAN, NGD). **(B)** Conventional wholesale markets (Thiaroye). **(C)** alternative food networks (NGO-coop and CSA).

a beater who attended self-funded courses. One retailer was trained in food transformation by a farmer association. Conditions are different in alternative networks, with a majority of marketing managers paid monthly by their respective cooperatives and even producers-sellers who are employed by the farm in the CSA network. Most receive their salaries as indemnity and not as formal contracts. Furthermore, most producers-sellers and managers in AFNs have access to several capacity building courses paid by the cooperatives and NGOs.

Regarding tediousness, the functions of carrier, rickshaw and washer were unsurprisingly the most physically tedious (Figure 4). AFN activity tend to be less physically tedious than in conventional networks, with the exception of retailers. Producers-sellers in AFNs and also beaters and small and large wholesalers perceived the moral tediousness of their tasks as low, contrary to carriers and rickshaws. However, commercials in AFNs showed high variability in perceived moral tediousness. Most respondents judged their tasks as technically easy, especially detail selling and, surprisingly, commercials, which is likely due to their high education level and capacitation access. Carriers are the ones who consider their tasks as most technically tedious due to the difficulty of carrying bags across the traffic-saturated markets. Correspondingly, carrying and rickshaw driving were also perceived as being the most dangerous tasks. Regarding dangerousness, large and small wholesalers also mentioned the risks of being robbed or hijacked.

Very surprisingly, carriers show the highest socioeconomic and personal satisfaction, with the argument that by doing this job they are able, though barely, to feed themselves and sometimes even their families. Retailers, who are also from modest background see their work as less physically tedious than their peers who wash or carry. Inversely, more wealthy workers such as large wholesalers were little satisfied by their job in socio-economic terms, many of them associating their activity with failure in studying or in getting a formal employment despite their qualifications. More generally, AFN participants did not perceive a higher socioeconomic or personal satisfaction than those involved in conventional networks.

A more qualitative appreciation of work satisfaction (Figure 5) shows the strong importance of learning, direct relationship with clients and social and environmental engagement for AFNs participants. For conventional food network participants, those involved in sales and the service providers had different views. Salesmen privileged money as the main reason for work satisfaction. Many of them found their job uninteresting but did it "for the money." The ability to support their families with the earned money was also a strong argument. Surprisingly, about 60% of service providers, who have the most modest backgrounds and hardest work conditions expressed the duty to "do well their work" (such as "cleanliness" for washers) as an important motivation. Nevertheless, some carriers argue that their task was "not a job" and did not find any satisfaction in it at all.

4. Discussion

4.1. Understanding the organization, division and characteristics of work in food networks

We found important organizational differences and similarities between conventional and alternative food networks in the area of study. Conventional networks link self-employed agents through market relations, but lack overarching organization or regulation. The conventional networks' characteristics are typical of the "informal economy," which makes about 80% of non-agricultural employment in West Africa, namely easiness of entry and exit for lower status workers, unregulated and competitive markets, labor-intensive activities and general rights deficit (International Labour Organization, 2002; Charmes, 2016). We also observed a high degree of specialization in these networks, with very little permeability between roles and functions. Supply and demand of labor as well as access to assets control power relations: those able to control highly demanded services and related assets such as transportation, large storage facility and investment capital can bargain labor conditions to their favor, such as differing payments and forcing producers to assume transportation costs. Inversely, the high and growing supply of unqualified labor, characteristic of sub-Saharan Africa, makes food workers very vulnerable and favors informal, labor-intensive activities and extremely low incomes (Giordano et al., 2019; Girard et al., 2022). In this context, even an increase in labor demand due to the growth of export sector is likely to rely on informal networks and have little impact on poverty reduction (De Blasis, 2020).

Alternative food networks also have little formalization levels, often with only the main company (cooperative, NGO) registered and employees paid with "indemnities" instead of formal salaries. AFNs participants perform more varied tasks than in conventional networks and show a lower specialization degree in functions. Specialization is lowest at shorter supply chains (CSA), where producers act as sellers, and medium in larger alternative supply chains (NGO-coop). Thus, enlarging supply chains is likely to require more specialization. A particularity of the AFNs is their control by overarching organizations, such as NGOs or the cooperative boards (Bottazzi et al., 2020). This form of control allows the enforcement of specific rules, such as participatory guarantee schemes, bonuses paid to organic producers and better working conditions such as monthly wage and access to continued education. These benefits do not nevertheless stem from a more balanced power distribution between the different agents of the network, but rather from principles voluntarily embraced by the supporting organizations. This dynamic appears to be similar to fair trade networks, in which specific values circulate but remain disconnected to local institutions and collective actions for labor rights, thus limiting their emancipation power (Raynolds, 2014).

The easiness or difficulty of entry to fill a specific function is key to understand the current division of work in the three observed networks. In informal economies, working poor positions have very low entry requirements but higher positions often have very restrictive entry requirements (Charmes, 2016). In our observed networks, three factors appear to enable or disable people to enter a position: place of origin, gender and education. In conventional networks, the assets that each self-employed agent can provide determines the ability to enter a specific position. This includes starting capital especially for wholesalers and transporters. In AFNs, however, starting capital is provided by supporting NGOs and external donors, enabling people who do not count with this asset to work as commercials and managers. Despite this, conventional domestic food networks are likely to be influenced by capital flows and corresponding labor control networks that exist in the export sector of Senegalese horticulture (Baglioni, 2017). These connections would merit further research.

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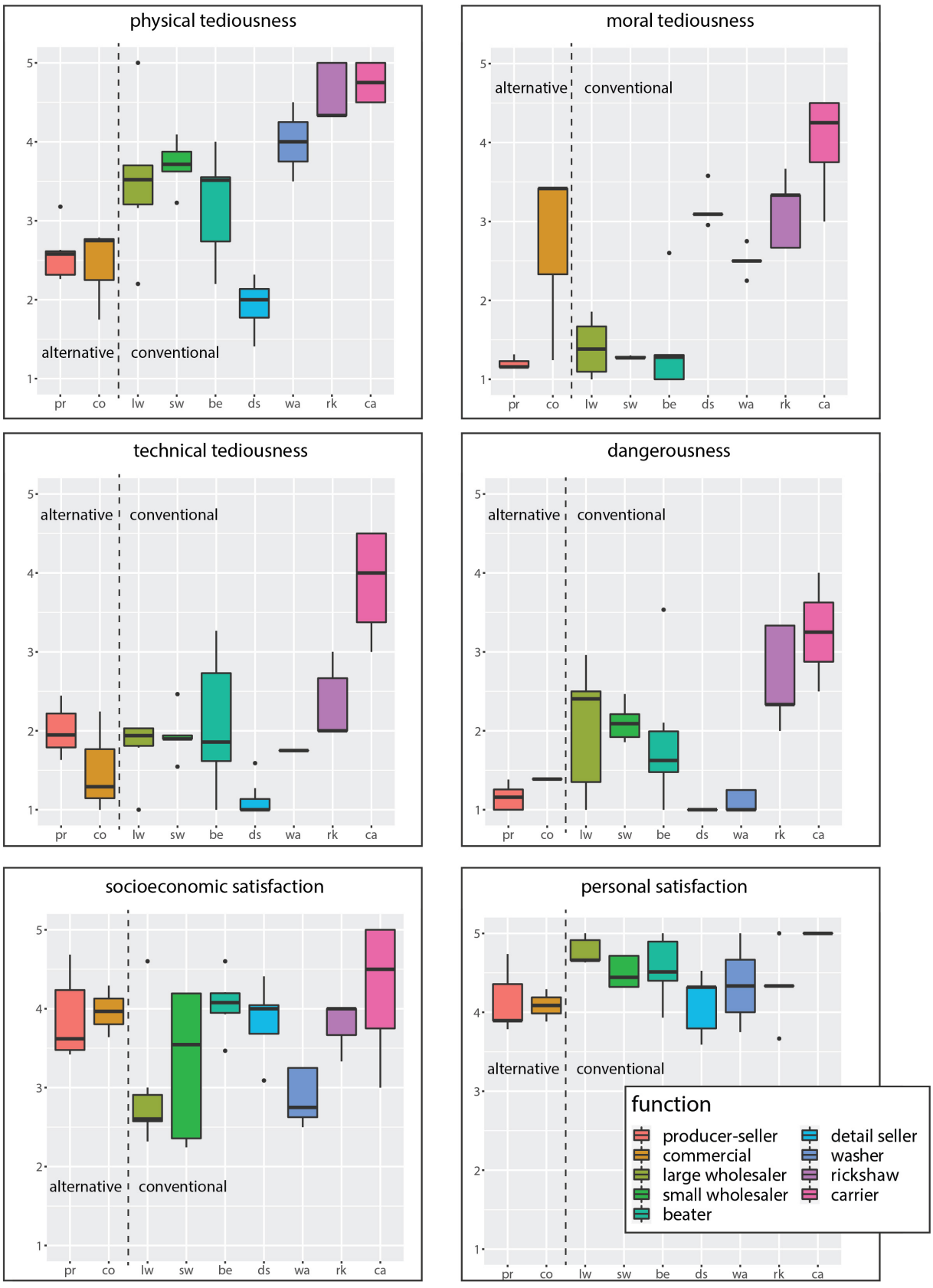

FIGURE 4
Perceived tediousness and work satisfaction according to different functions.

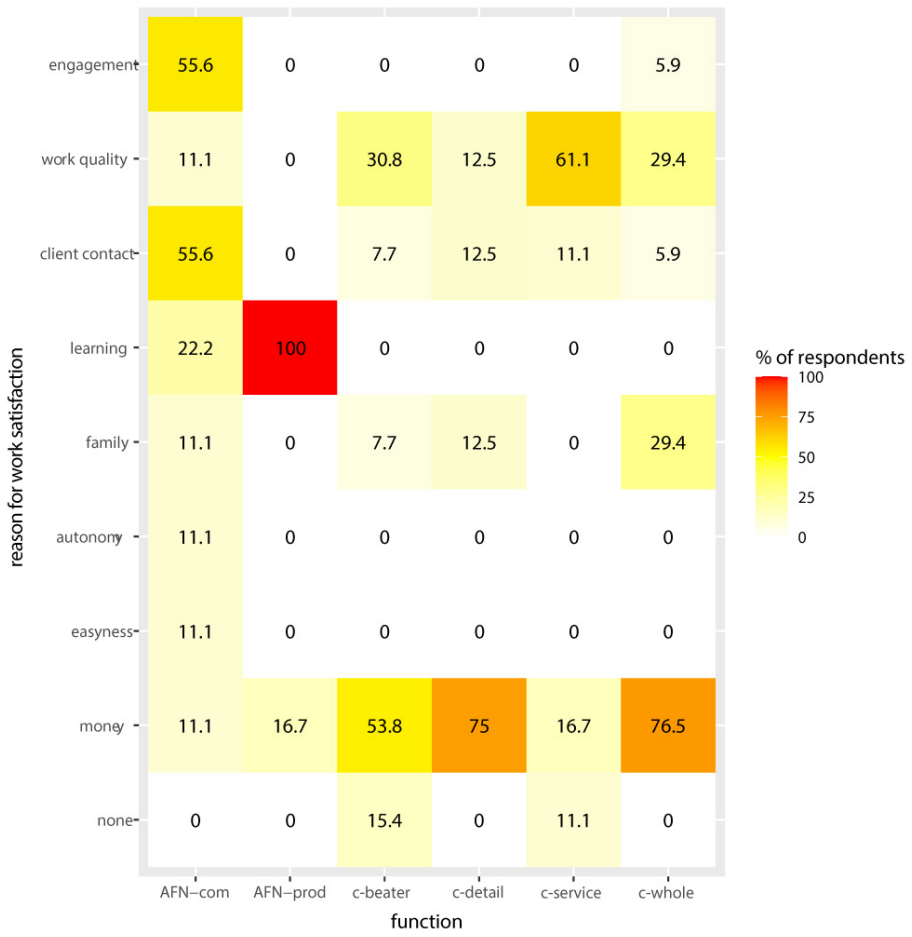

FIGURE 5
Main reasons for work satisfaction among different categories of functions: AFN-com=commercials at AFNs, AFN-prod=producers at AFNs, c-beater=beaters in conventional networks, c-detail=detail sellers in conventional networks, c-service=service providers in conventional networks, c-whole=wholesalers in conventional networks.

Place of origin plays a role in all networks, particularly in conventional ones, where beaters and smaller wholesalers are usually males of local origin who can access selling space in markets at reasonable price. Inversely, carrier and rickshaw positions are held by male migrants. In AFNs, most women working in the networks come from the production areas, relatively privileged peri-urban spaces compared with the rest of the country, especially the Petite Côte. Thus the ability of women to adhere to AFNs even without education level is strongly tied to their locality. The gender divide is particularity strong in conventional networks, with higher-level positions exclusively held by men, and local women working as washers or small detail sellers. In this case, local origin only concedes privileges to men. The gender divide also exists in AFNs but appear to be set at a higher level: most positions are held by women, with the exception of the highest manager positions that remain in hands of men.

Education is a crucial factor in the division of work but operates at different thresholds in conventional and alternative networks. Though Senegal has a primary completion rate of 61% (2020), education progress is very recent and limited geographically, with a rate of 39% in 2000 and a current rate below 40% for rural areas such as Kaffrine and Djourbel (République du Sénégal, 2022; UNESCO, 2022). The primary education gender gap has been filled after 2010, but many working age women as well as men from rural areas still remain uneducated. In conventional networks education levels of participants are very low. Koranic education, reserved to males, enables them to calculate and read and write in Arabic script which is key to access beater and seller positions. In AFNs, primary education completion is a clear threshold level to enter the networks, with the exception of some producers. This observation combined with the fact that current AFNs remain extremely small leaves AFN participation out of reach for a very large population cohort in the country. Continuous education and social mobility options are very low in conventional networks, thus workers are very likely to remain trapped in lower-status jobs. Inversely, AFNs offers much more options through capacity building and the creation of commercial positions strongly tied to the support of NGOs and CSA donors.

In conventional networks, high physical, moral tediousness as well as dangerousness is clearly related with low, easy-to-entry positions such as washers, carriers and rickshaws. The high variability in perceived tediousness for beaters and wholesalers likely reflects the high diversity of socio-economic conditions, work experience (e.g., victims of theft or not) education level and expectations for these positions. The mixed picture found in perceived tediousness for AFNs also reflects the high diversity of expectations. Lower physical

tediousness in AFNs might be related with the diversity of tasks, support Timmermann and Félix (2015)'s hypothesis that more diversified tasks in agroecological production leads to more fulfilling work. Personal expectations and aspirations nevertheless appear to play a key role in shaping perceived work satisfaction, as the surprisingly high socio-economic satisfaction of carriers shows. This can be interpreted as a form of "resigned satisfaction," in which people who experience discrepancy between one's personal aspirations and the characteristics of one's actual work situation; this leads them to decrease their level of aspiration to adapt to their difficult work situation and achieve a positive state of satisfaction (Giauque et al., 2012). More generally, it also relates with the problem of "adaptive preferences" in which unfavorable circumstances tends to distort self-evaluation in terms of satisfaction or happiness (Teschl and Comin, 2005). Inversely, AFN participants with higher and increasing education level thanks to capacity building tend to raise their aspirations, thus reducing their satisfaction level, especially at the personal level.

This observation shows the limits of situated perspectives to appraise work tediousness and satisfaction among food system workers. It gives a strong argument to integrate and deepen more objective capability-based approaches, which were partly developed to overcome the adaptive preference problem (Teschl and Comin, 2005). We nevertheless still argue in favor of a mixed approach that combines self-evaluation with external and more specifically distributive perspectives. A stronger emphasis on capabilities highlights the crucial role of capacity building and continuous education opportunities but also the distribution of these opportunities among the workers. Another argument in favor of maintaining situated perspectives is considering qualitative motivations to work that sheds light on the circulation of values along food networks. In our study, AFNs participants clearly refer to a different set of motivations that conventional ones, with emphasis on learning, client contacts and social and ecological engagement. Among conventional workers, we speculate that the divide observed between the sellers who "do it for the money" and the service providers that focus on well-done work is linked to the ability of accumulating money. This option leads the former to adopt money as a value, while the latter remain focusing on satisfying basic needs.

To sum up, our case study's findings show that AFNs do have a positive effect on contributive justice in food networks beyond food production, with key aspects being the diversity of tasks, provision of entry capital for diverse positions and the continuous education opportunities. Yet their reach remains strongly limited due to the minimal education threshold needed, the restriction of AFNs to privileged localities and their small size in general. In the next section, we discuss the implications of our findings for equity issues in the transformation of food systems in developing countries and globally.

4.2. Implications for equitable food system transformation

Our comparative focus addressing conventional and alternative food networks also highlights the extreme vulnerability of food systems in Senegal and in West Africa. The current situation of Dakar and its peri-urban production areas such as the Niayes results from a historic process of European colonization and more recent dominance of commercial lobbies in national politics (Duruflé, 1995) leading to exogenous consumption patterns, high dependence on international markets, poorly regulated national markets and unfavorable structuring of food networks. Consequently, there is a lack of coherence between the logic of imports, support for marketing and the lack of storage infrastructure for local products that leads to very high food waste rates in small and medium-sized farms (Fall and Touré Fall, 2001). The agri-food sector remains extremely precarious by employing 70% of the active population but representing only 17.5% of the country's GDP; the precarity of this workforce further hinders innovation. These structural weaknesses affect both conventional and alternative networks, which have been unable to develop outside a small urban elite until now.

In this context, transformative narratives sustained by farmer organizations and agroecological networks has developed a systemic approach that seeks to simultaneously address production, commercialization, consumption and political, social and ecological levers that could enable transformation (Boillat and Bottazzi, 2020; DyTAES, 2020). Despite this clear vision, up-scaling and out-scaling food system transformation in Senegal remains a great challenge due to the rigidity of the agri-food sector, relative weakness of civil society organizations and the high dependency of transformation actors on external support (Boillat et al., 2021).

A particularly critical aspect is the concentration of both food system research and transformative initiatives in peri-urban contexts and westernized centers of consumption such as the greater Dakar area. Further studies are needed to understand more deeply the complexity of Senegalese food systems. We particularly think about hybrid food systems closer to the most vulnerable populations outside the dominant market channels that are supported by the vitality of the informal sector and a culture of "bricolage" to survive (Fall, 2007). In rural areas, for example, women play a key role in the provision of food and combine many functions such as production, processing and distribution of products (Freguin-Gresh et al., 2022). Their roles both in the domestic and public sphere and their attachment to personal care and reproductive activities make them pivotal actors in alternative and hybrid food networks (Jarosz, 2011). Cultural parameters also need to be taken into consideration, such as the power of religious brotherhoods and its broader logics of reciprocity, solidarity networks and redistribution which are overflowing with innovation and therefore a potential of resilience (O'Brien et al., 2022).

These considerations highlight the potential trade-offs in currently existing AFNs initiatives in the country. While these networks appear to do internally well in terms of equity aspects, it is their limited out-scaling as well as their limited coverage in geographic and social terms that lead to inequitable outcomes, namely the restriction of participation and consumption to elite groups. To overcome this, one need to re-think food system transformation from a spatial perspective. This connects with the recent prospects of re-territorialization of food systems, a process of redefining the relationship between societies, space and the power structures that bind them (Wezel et al., 2016). In this context, multiple forms of reterritorialization are required to strengthen the resilience of food systems in sub-Saharan Africa. Establishing AFNs that are less dependent on urban markets and more rooted in the territories where people live and produce is crucial. To achieve this requires the implementation and development of inclusive governance mechanisms that allow the most vulnerable but also the most active

groups, such as producers and other more precarious intermediaries, to make decisions and influence strategies on a smaller and, therefore, more controlled scale. Senegal is among the pioneers of territorial innovation thanks to the activism of the Dytaes, a platform of more than 50 civil society organizations active in pushing agroecological transition, that is trying to support territories in agroecological transition throughout the country (Bottazzi and Boillat, 2021). Strengthening territorial governance is therefore a key strategy to make food systems more just and sustainable.

Based on these findings, we argue that both the distribution of work, assessed in this study, and the spatial distribution of transformation initiatives and their ties with territorial decision-making processes matter to achieve more equitable and just food systems. This connects the notion of agricultural justice (Timmermann, 2020) with those of contributive justice (Sayer, 2009), but also particularly spatial justice (Soja, 2009; Harvey, 2010) that deals with the impact of territorial governance on social justice issues. As food systems are social-ecological systems deeply shaped by power relations and collective decision-making processes, their equitable or inequitable aspects clearly connect ecological, social and spatial processes. Addressing multiple dimensions, namely labor, supply chains organization, decision-making and space appear to be complementary in monitoring and evaluating just transformations in agri-food systems.

Data availability statement

The datasets presented in this article are not readily available because participants are too easy to identify in the raw data. For this reason, we prefer to waive access to original datasets. Requests to access the datasets should be directed to sebastien.boillat@unibe.ch.

Ethics statement

All participants in this study confirmed their previous informed consent. Oral informed consent was preferred over written consent due to the low written literacy of some participants. To ensure oral informed consent, we followed a protocol including: (1) presentation of the purpose of the interview and the nature of the information that will be collected; (2) inform that participation is voluntary; (3) explaining the confidentiality and anonymity of the information collected; (4) obtention of the verbal consent from participants to gather personal data and take photographs if needed, before starting the interview; (5) opportunity to ask questions. The protocol was explained in the participants' preferred languages, namely Wolof, Serer or French.

Author contributions

SB designed the study, processed the data, and wrote the paper. IS collected the data in the field. PB funding, conceptualization, co-writing, and supervision. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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