

Governance through fair pricing:

Co-constructing equity as a first step towards a dynamic, inclusive and certified institutional market for school canteens in Niakhar, Senegal



Co-identify the obstacles and levers to the driving role of collective restaurants, such as school canteens, in the development of local agroecological value chains, as well as the conditions for setting up a Participatory Guarantee System (PGS)

Modou Gueye Fall, Cheikh Tidiane Fall, Oumar Lo, Marc Piraux, Astou Diao Camara

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Abstract

This study assesses the potential of the structured school canteen market as a lever for a viable and equitable agroecological transition in the Niakhar municipality of Fatick Region, Senegal. While institutional demand is driving the adoption of sustainable practices, price governance, frozen since 2019, is jeopardizing the profitability of the dairy sector. To overcome this impasse, a five-step participatory methodology was implemented. It combines a quantitative profitability analysis (Benefit/Cost Ratio) with a qualitative co-construction approach with stakeholders. The diagnostic confirmed the market's positive impact on producer resilience, but also the unsustainability of historical prices ($BCR < 1$). A multi-stakeholder workshop enabled the collective definition of criteria for a "fair price," followed by the evaluation of different scenarios. The results identify a fair price mechanism of 650 FCFA/L for the producer and 1200 FCFA/L for the processor. This price pair is the only one to reconcile strong social legitimacy (high perception of fairness), proven economic viability ($BCR > 1$), and support for environmental sustainability. The study concludes that the sustainability of agroecological transitions relies on adaptive governance mechanisms, where prices are not imposed but co-constructed, paving the way for participatory certifications (PGS) and more resilient and equitable markets.

Keywords: Agroecology; School canteens; Fair pricing; Participatory governance; Cost-benefit analysis; Dairy value chain; Niakhar, Fatick, Senegal.

Introduction

The need for a profound transition to sustainable food systems is now widely accepted in the scientific and political spheres. Within this framework, agroecology has emerged as a central conceptual and operational framework, promoting agricultural systems based on ecological processes, agroecosystem resilience, and social equity (FAO, 2018; HLPE, 2019). However, a key debate runs through research and public policy: what are the most effective levers for encouraging the large-scale adoption of agroecological practices by farmers? While regulatory instruments and direct subsidies have yielded mixed results, increasing attention is being paid to the role of markets and economic signals in influencing producers' technical and organizational choices (Dumont et al., 2016).

In this context, public institutional procurement, particularly for school meals, appears as a particularly promising tool. It combines significant purchasing power with strong political legitimacy, enabling the integration of environmental and social criteria into public procurement specifications (Morgan and Sonnino, 2008; Swensson and de Maria, 2020). The theory of the "market as a regulatory space" suggests that stable and demanding institutional pressure can generate *positive normative pressure*, encouraging producers to adopt more sustainable practices in order to maintain their access to a secure and valued market (Dumont et al., 2016; Loconto and Simbua, 2012). Public contracts thus act as framing mechanisms, linking economic incentives, social norms, and environmental objectives.

This hypothesis was recently empirically confirmed by Ba et al. (2024) in the context of family farms in West Africa, particularly in Niakhar, Fatick Region, Senegal, through the Agroecological Initiative (AEI) implemented by the ISRA-CIRAD-CGIAR consortium, in collaboration with the DyTAEL of Fatick. However, despite these advances, the question of economic sustainability remains a central issue. In particular, market governance, and more specifically price formation, constitutes a major challenge for the profitability and sustainability of agroecological activities.

The current context is marked by a succession of structural and cyclical shocks, including the Covid-19 pandemic, geopolitical crises, and the rise of protectionist and tariff policies at the international level. In this context, rigidly fixed prices over long periods often prove counterproductive, undermining the sustainability of markets and agroecological value chains.

The current context is marked by a succession of structural and cyclical shocks, including the Covid-19 pandemic, geopolitical crises, and the rise of protectionist and tariff policies at the international level. In this context, prices that are set rigidly and over long periods often prove counterproductive, undermining the sustainability of agroecological markets and value chains.

It is with this in mind that the market component of the Multifunctional Landscape Program (FML) was designed, as a continuation of the Agroecological Initiative (IAE) and under the leadership of the ISRA-CIRAD-CGIAR consortium. As part of a demand-driven approach, this component aims to develop innovative governance mechanisms for agroecological markets in Senegal, based on a fair pricing mechanism co-constructed between the direct actors in the value chains. This co-setting of prices is carried out under the supervision of influential stakeholders, in particular civil society (DyTAEL) and research institutions, in an iterative, adaptive, and inclusive manner. The ultimate goal is to lay the groundwork for the development of a sustainable agroecological market based on participatory certification such as the Participatory Guarantee System (PGS), reconciling economic viability, social equity, and environmental sustainability.

1. The ANPDI school canteen model studied

The school canteen model developed by ANPDI in the Niakhar region since 2019 aims to promote local and sustainable food while supporting the local economy. This system relies on sourcing local products, such as goat's milk, vegetables, and grains, grown and processed by local farmers and processors (Figure 1). Meals, served twice a week (Tuesdays and Thursdays), are primarily based on local products, such as millet porridge and dairy dishes, thus contributing to improved nutrition for students. Conversely, the consumption of one promotes and stimulates the consumption of the other.

ANPDI plays a key role in this model by facilitating procurement, providing training for canteen managers, and supporting municipalities with financing and monitoring. However, the involvement of the local community is essential for sustainability. Parents actively contribute in kind, providing products such as millet or peanuts, and participate in canteen management through School Management Committees (SMCs). Their contribution strengthens community ownership of the canteens, fosters cohesion, and ensures a regular supply of local products.

In parallel, awareness workshops organized by ANPDI encourage parents to support the model and understand the importance of local food for children's health. Thanks to this participatory and inclusive approach, school canteens become a central element of community life, contributing both to students' food security and local economic development.

A limitation of the model is that the investment equipment exceeds the production capacity of beneficiaries or production and processing units. This could undermine sustainability.

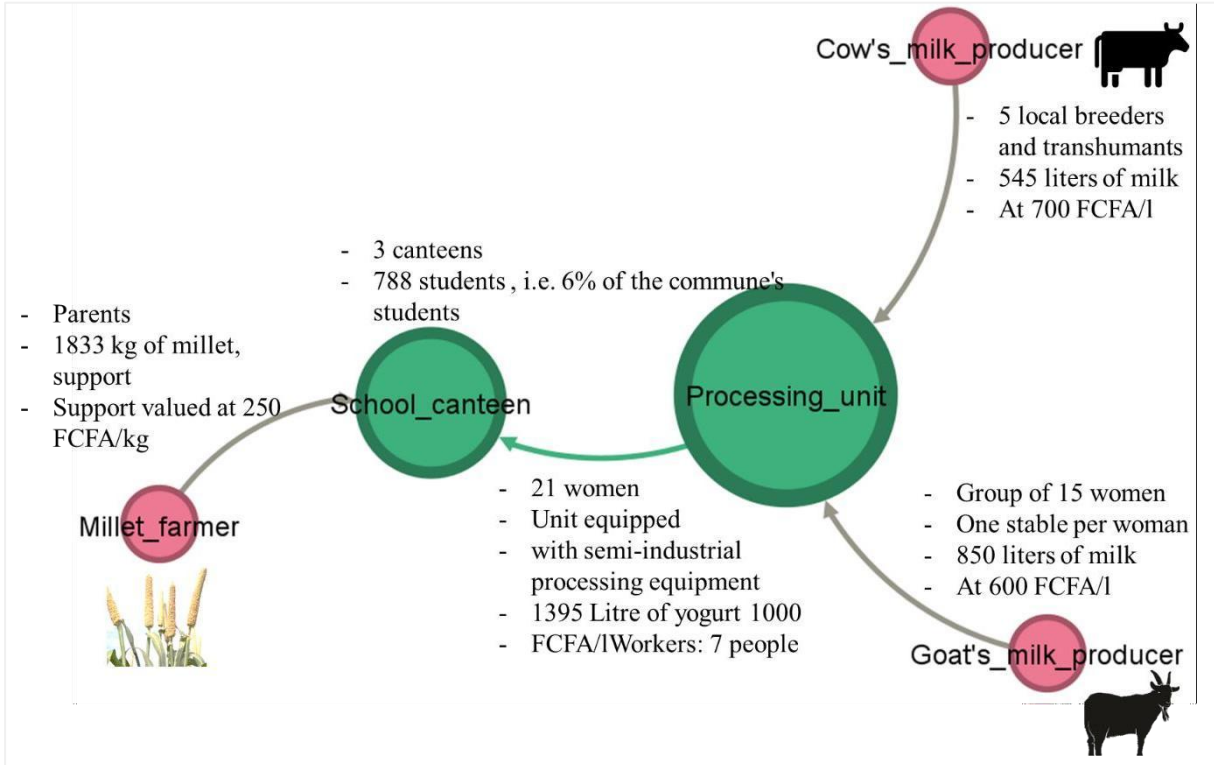
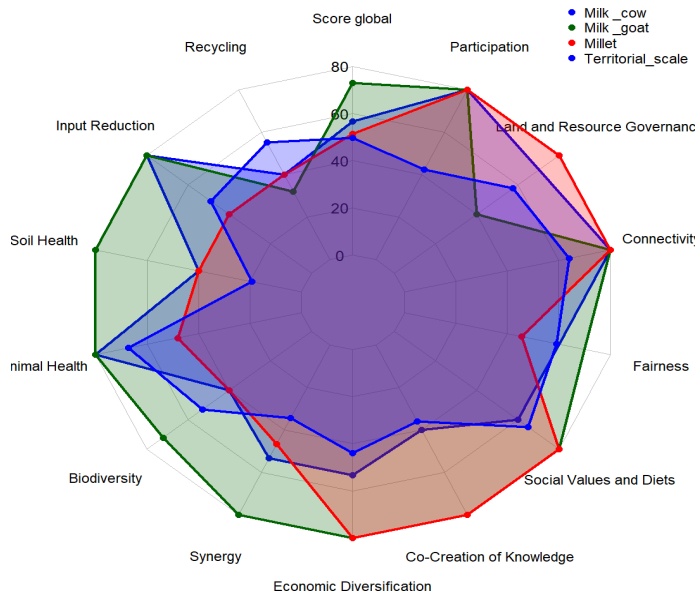


Figure 1: Market situation for canteens school in 2024

Source: (Fall et al., 2024)

2. The driving role of canteens in the use of agroecological practices



Analysis of the level of agroecological transition in value chains shows that it is closely dependent on their commercial relationship with school canteens (Fall et al., 2024; Ba et al., 2024). Indeed, comparison between different value chains, based on the 13 principles of HLPE, reveals contrasting levels of transition depending on the type of link with canteens.

Thus, the goat's milk value chain, which has a direct commercial relationship with school canteens, exhibits a more advanced level of agroecological transition. It is followed by the millet value chain, which is supplied to canteens as a subsidy by parents. In contrast, the cow's milk value chain, primarily marketed outside the school canteen system in a less structured market, shows a much lower level of transition.

These results highlight an important finding: the demand from school canteen for healthy products strongly encourages actors in the goat's milk value chain to adopt agroecological practices in order to maintain their market share. Conversely, when commercial pressure and incentives are weak, the level of transition tends to decrease, as illustrated by the overall situation in the region and that of the cow's milk supply chain.

3. The challenge related to the sustainability of the school canteen market

The assessment of the impact of the canteens in Fatick on the production and processing of goat's milk, carried out through the ITS (Interrupted Time Series) model, shows very significant effects, with a multiplication of production by a factor greater than 5.

Analysis of control variables, including climatic factors and the Covid-19 pandemic over a period of 15 years, reveals that production is resilient to climate shocks, but remains very vulnerable to cyclical shocks related to Covid-19, whose inhibitory effect has strongly impacted the functioning of school canteens.

However, the profit margin is significantly less than one ($BCR < 1$), with current production and processing prices at 600 and 1000 FCFA respectively (Ba et al., 2024). These prices were set in 2019, before the COVID-19 pandemic.

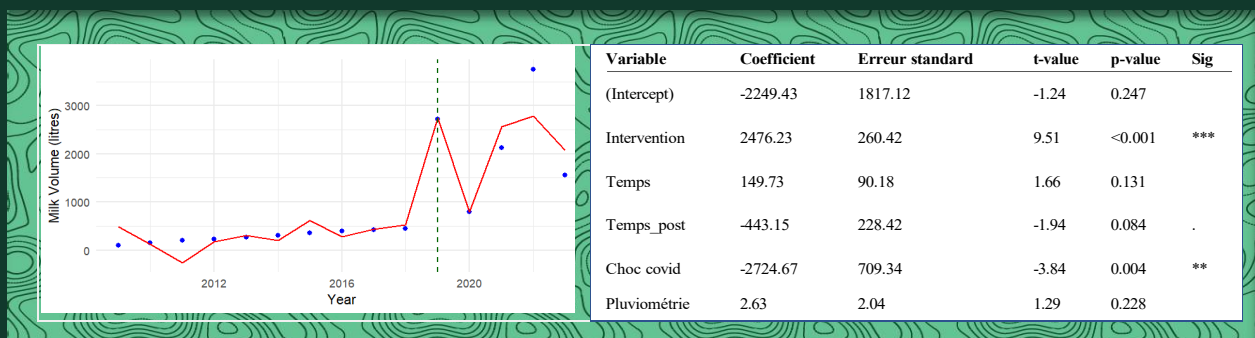


Figure 2: Effect of school canteen on the production and processing of goat's milk

4. Methodology

The methodological approach used relies on a holistic, both vertical and horizontal, analysis to foster interactive discussions among the diverse stakeholders in the agroecological market of school canteens. This includes business models at the production and processing levels, as well as demand, particularly from schools, supported by technical and financial partners (TFPs), with ANPDI serving as the lead organization. The methodology is based on five successive and complementary steps: from evaluating the evidence on market significance to identifying fair prices, through defining profitable pricing scenarios, debating market importance and sustainability, and establishing a shared understanding of fair prices (Figure 3), employing a mixed-methods approach combining qualitative and quantitative analysis.

The first two steps constitute a diagnostic phase, the third and fourth constitute an awareness-raising and skills-training phase, and the final phase is the co-design of the fair price itself. The diagnostic phase was conducted through individual surveys, while the other phases were carried out through a multi-stakeholder workshop that brought together the market in all its diversity and representativeness.

4.1. Assessing the impact of the school canteen market

The impact assessment was conducted at the production level through socioeconomic surveys of milk-producing households. The central hub of the market, the processing unit, served as the entry point for identifying milk producers affiliated with the market. Primarily located in two villages, to isolate the market's effect, three surrounding villages were randomly selected from among the five villages surrounding these milk producers. In total, 84 producers were surveyed, including all 39 milk suppliers. To determine the effects, matching was performed, resulting in a calculation base of 27 pairs after matching.

The impact assessment was based on three indicators: wealth creation, level of economic distress, and resilience. Income, the ratio of goats sold per year to the total, and capital (productive capital) were used to calculate these indicators. The median of the differences between pairs was used to calculate the indicators.

4.2. Profitable pricing scenarios

Profitable price scenarios serve as a basis for identifying fair prices. Through socioeconomic surveys of milk producers and the processing unit, panel data over a 6-year period from 2019

to 2025 on the costs and benefits of price pairs (production and processing) were used with the cost-benefit ratio (CBR) approach to identify profitable prices, i.e., those with a $CBR \geq 1$.

4.3. Debate on the importance of the market

The diagnostic results, particularly the market's impact on value chains for both production and processing business models, were presented and discussed among the various market participants. A historical overview, especially of production before and after the market's creation, allowed participants to better understand the market's significance on the socioeconomic conditions of value chain actors, as well as on the development of this value chain.

This awareness of the importance of the market and current challenges has opened up the discussion on the concept of fair pricing.

4.4. Common understanding of the concept of fair pricing

Before addressing the concept of fair pricing, discussions first focused on the notion of price itself, revisiting two fundamental principles: the composition of production costs (inputs, labor, depreciation, etc.) and that of benefits (reproduction, well-being, increased production capacity, etc.). These discussions on the traditional view of price allowed for an introduction to the concept of fair pricing, highlighting its added value: just profit, vertical solidarity, sustainability, and so on.

This upgrade made it possible to begin the actual work of identifying fair prices.

4.5. Identifying fair prices

The identification of fair prices was carried out in four stages. First, the actors involved, both in production and processing, defined their criteria: each link in the chain identified its own criteria for a fair price. According to the scale shown in Figure 3, each criterion was scored from 1 to 4 on a scale ranging from "negotiable" to "essential," with "less important" and "important" in between. Next, price pair scenarios were scored according to the criteria, also using the same scale. These scores allowed for the calculation of weighted scores for each price pair, which were then analyzed to select the pair that best met the producers' interests using two filters. First, the pair was compared to a reference score, which was the score obtained on the "important" scale. Then, price pairs with a score higher than the reference were differentiated by comparing their relative cost basis (RCB).

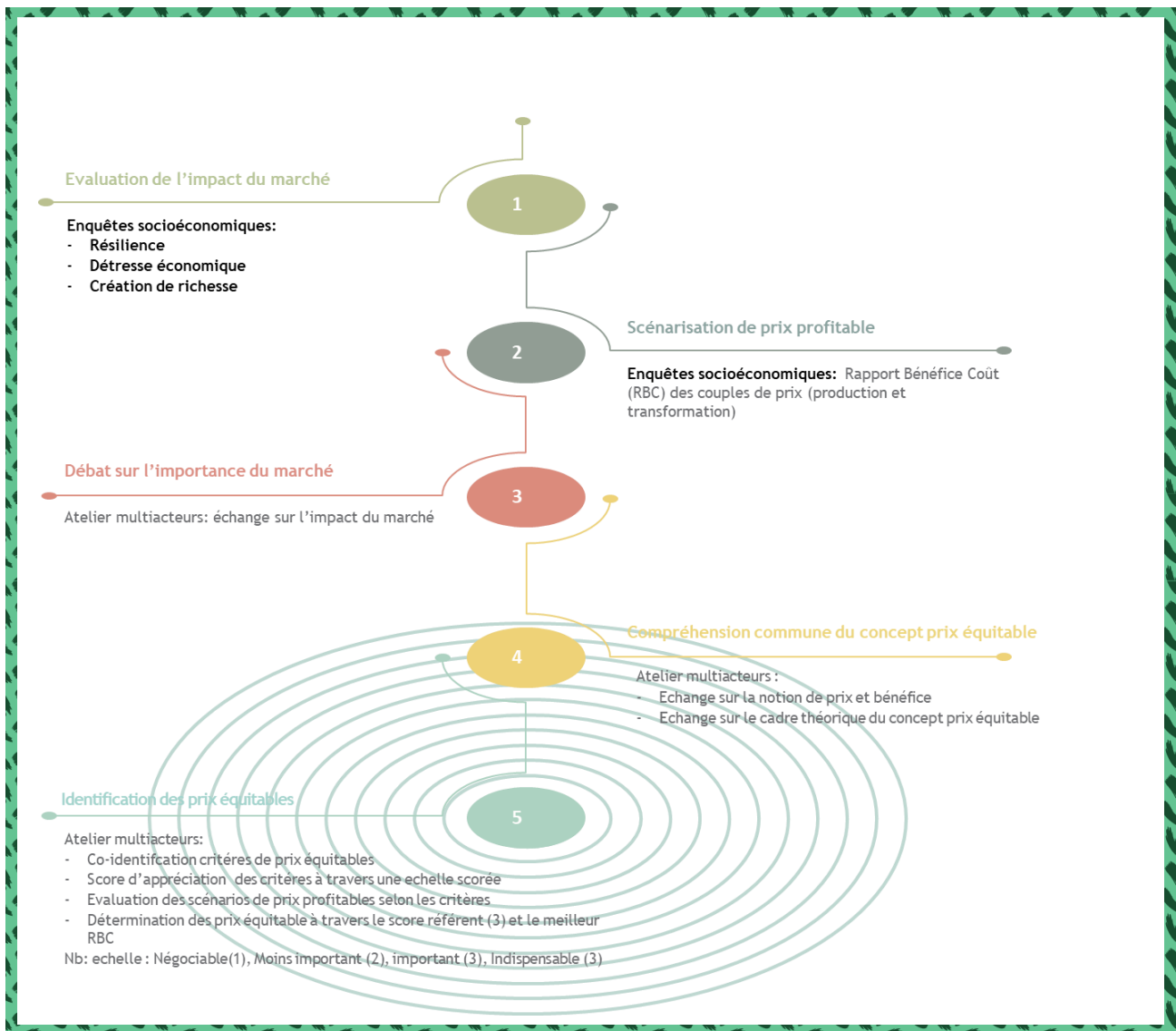


Figure 3: Approach Methodology for identifying fair prices




5. Key results

5.1. Impact of the school canteen market

The socioeconomic indicators assessed in Table 1 show that, even though incomes are negative due to low prices in particular, dairy-producing households are less economically distressed and have a greater capacity to avoid extreme measures, such as selling their livestock (productive capital), to meet their consumption needs. Indeed, the difference between the annual livestock sale rates of dairy producers and those of non-producers is -10.4%, indicating a significantly reduced reliance on this practice in times of need.

This difference translates concretely into increased resilience for these households. On average, their annual productive capital is more than 110,000 FCFA higher than that of non-producing households.

Table 1: Market impact on milk- producing households

Indicator	Producer	Non-producer	Gap
Income (in FCFA)			 + 110,000
Economic distress (annual sales rate)			 - 110,000
Resilience (capital in FCFA)	270,000	160,000	 + 110,000

5.2. Profitable pricing scenarios

Beyond the initial price per liter (production-processing) pair of 600-1000 FCFA, which is not profitable, the analysis identified other possible combinations. Figure 4 presents the cost-benefit ratios (CBRs) calculated for processing, considering a tolerance threshold of 0.95 around the profitability threshold of one. This approach identified seven price pairs with CBRs ranging from 0.97 to 1.04.

The results show that the break-even point (BEP) is not positively correlated with the absolute price level. The price pair 625-1200 FCFA proves to be the most profitable with a BEP of 1.04. It is followed by the pairs 650-1200 FCFA and 625-1175 FCFA, which also reach the break-even point with a BEP of 1.00.

It is interesting to note that the couple with the highest prices (700-1200 FCFA) obtains an BCR of only 0.97, while the couple with the lowest prices (600-1150 FCFA) achieves an BCR of 0.98. This underlines that profitability depends on the specific balance between the price paid to the producer and the selling price of the processor, rather than their individual levels.

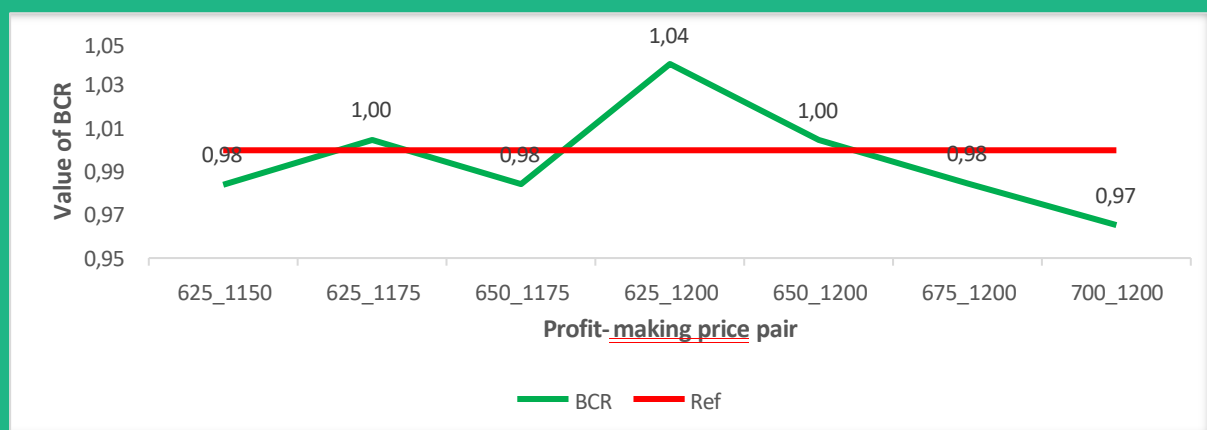


Figure 4: Profitable pricing scenarios

5.3. Identifying fair prices

5.3.1. Identification of fair pricing criteria

The stakeholders defined their own criteria for characterizing a fair price. Dairy producers identified six criteria: cost, profit, reproduction (of the herd), increased production capacity, solidarity, and sustainability.

The actors involved in the transformation, for their part, identified similar criteria, with the exception of those specifically related to production. They added a criterion concerning impact (social or environmental).

Assessing the relative importance of these criteria (on a scale of 1 "Negotiable" to 4 "Essential") reveals distinct priorities:

- ✓ For producers: the criteria of profit, increased production capacity and sustainability are considered "important to essential". The reproduction criterion is considered "important". The solidarity criterion is between "less important" and "important", while the cost is perceived as "negotiable to less important";
- ✓ For the transformation: the impact and sustainability criteria are considered "important to essential". The benefit criterion is considered "less important", and the cost is perceived as "negotiable to less important".

This hierarchy highlights a difference in perspective: producers highly value criteria related to investment and the development of their activity (profit, capacity), while processors give high priority to more systemic dimensions (impact, sustainability).



Figure 5: Identification of fair pricing criteria

5.3.2. Evaluation of profitable pricing scenarios based on criteria

Analysis of the ratings given by the actors reveals distinct perceptions depending on the links in the chain.

Regarding costs, the prices paid to producers are considered to range from "negotiable" (625 FCFA) to "less important to important" (for the higher prices in couples at 1200 FCFA). On the processing side, only the selling prices of 1200 FCFA reach a level considered satisfactory ("less important to important" to "important"), while the lower prices (1150-1175 FCFA) are perceived as "negotiable to less important".

Regarding profits, in the production chain, perception improves significantly with price increases: from "negotiable to less important" at 625 FCFA, it rises to "important" at 650 FCFA, and reaches "important to essential" for couples priced at 1200 FCFA. For processors, profits

are generally perceived as ranging from "less important to important" to "important to essential."

The criteria for reproduction and capacity enhancement receive positive evaluations ("important" to "important to indispensable") for couples at 1200 FCFA, and average scores ("less important to important" to "important") for the other scenarios.

Solidarity and sustainability are consistently rated highly. For solidarity, scores range from "less important to important" to "important to essential." Sustainability even reaches the "essential" level for the 1200-700 pair from the producers' perspective, and is perceived as "important" to "important to essential" by processors across all scenarios.

In terms of impact, the selling price of 1200 FCFA is perceived as having an impact between "important" and "important to essential".

These assessments thus confirm that the scenarios combining a producer price of at least 650 FCFA and a processor selling price of 1200 FCFA are perceived as the fairest on all criteria, laying the groundwork for the final multi-criteria analysis.



Figure 6: Scores of profitable price scenarios in based on the criteria

5.3.3. Identifying fair prices through weighted price-criteria scores

The final identification of the fair price is based on the analysis of weighted scores, which aggregates the rating of each price scenario with the hierarchical weight of the fairness criteria. A reference score, established on the basis of the "important" scale (score 3), is set at 8.24 for production and 7.20 for processing.

Two scenarios stand out by exceeding this reference threshold for both links: the 650-1200 pair (production score: 8.80; transformation score: 7.44) and the 700-1200 pair (production score:

8.75; transformation score: 7.48). These two combinations thus receive the highest overall ratings in terms of perceived fairness.

To differentiate between them, the criterion of economic viability, measured by the Benefit/Cost Ratio (BCR) in Figure 4, is decisive. The 650-1200 pair shows the best profitability with a BCR of 1.04 (BCR > 1), while the 700-1200 pair has the lowest BCR of the set, at 0.97 (BCR < 1).

Therefore, following this participatory and multi-criteria process, the scenario chosen as a fair price is the 650-1200 range, corresponding to a producer price of 650 FCFA and a processor selling price of 1200 FCFA. This optimal choice reconciles strong social legitimacy (high perception of fairness) and proven economic robustness (guaranteed profitability).



Table 2.: Identification of fair prices through weighted price- criteria score

Discussion

This study demonstrates that the structured market for school canteens acts as a powerful lever for the agroecological transition, while also revealing the critical importance of price governance for its economic sustainability. The results confirm and expand upon existing work on the role of public procurement in the transformation of food systems (Morgan and Sonnino , 2008; Swensson and de Maria, 2020).

✓ A market that structures and protects

The significant impact of the market on reducing economic hardship and increasing producer resilience (Table 1) validates the hypothesis of “positive normative pressure” (Dumont et al., 2016). By offering a stable and demanding outlet, the school cafeteria market not only encourages the adoption of agroecological practices (Box 2) but also protects producers from the most vulnerable adjustment strategies, such as selling their productive capital. This dual role, both incentive and protection, is essential in contexts of economic fragility.

✓ Equity, a social and economic construct

The co-construction process highlighted the fundamentally multifaceted nature of the concept of "fair price." The divergence in priority criteria between producers (profit, capacity) and processors (impact, sustainability) illustrates that fairness is not a technical standard, but rather a negotiation between different rationales and expectations (Fraser, 2008). The study's participatory approach made these expectations explicit and integrated into a common evaluation framework, thus responding to calls for more inclusive governance of food value chains (Loconto and Simbua , 2012).

✓ **Beyond cost: viability as a prerequisite for equity**

The most striking result is that the scenario perceived as the fairest by both parties (700-1200) was rejected in favor of the 650-1200 scenario due to its lack of economic viability ($BCR < 1$). This pragmatic choice underscores a fundamental principle: a price can only be socially equitable if it is first economically viable for the entire supply chain. It validates the methodological approach that systematically combined perceptions of fairness with profitability analysis, thus avoiding the pitfall of a consensus detached from economic realities.

✓ **An adaptive mechanism for resilient markets**

The fixed, rigid price implemented since 2019, which became unprofitable after economic shocks, illustrates the limitations of static models. The iterative and participatory mechanism proposed here (650-1200 FCFA) represents a governance innovation. It allows for periodic reassessments of costs and prices, incorporating the possibility of adjustments in response to inflation or other shocks. This institutional adaptability is a key condition for the resilience of agroecological markets in the face of an uncertain environment (Tendall et al., 2015).

Conclusion

This action research has made it possible to overcome the impasse created by a historically fixed and unprofitable price in the value chain of goat's milk supplying school canteens in Niakhar. It demonstrates that it is possible, through a participatory and mixed methodology, to co-construct a fair pricing mechanism that reconciles three fundamental objectives: a legitimate perception of fairness by stakeholders, proven economic viability ($BCR > 1$), and environmental sustainability through the maintenance of agroecological practices.

The identified price, 650 FCFA/L for the producer and 1200 FCFA/L for the processor, is not an end in itself. It represents the first tangible result of an adaptive governance mechanism, designed to be reviewed and adjusted. This outcome lays the foundation for a more resilient and fairer agroecological market. It paves the way for participatory and dynamic governance, in line with the principles of a Participatory Guarantee System (PGS) certification, where market rules, including prices, are defined, monitored, and adapted collectively by the market participants themselves

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