Working Document

Bobo-Dioulasso's dairy value chain: assessing stakeholders' space for initiatives with a view to identifying behaviours conducive to agroecological transition

(Draft version)

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The CGIAR Initiative Transformational Agroecology across Food, Land, and Water Systems develops and scales agroecological innovations with small-scale farmers and other food system actors in seven low- and middle-income countries. It is one of 32 initiatives of CGIAR, a global research partnership for a food-secure future, dedicated to transforming food, land, and water systems in a climate crisis.
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1 Introduction

The 'Agroecological Living Landscape' of Burkina Faso (ALL BF) aims to develop Bobo-Dioulasso's dairy value chain through an agroecological transition involving all industry stakeholders.

The space for initiatives and room for manoeuvre enjoyed by stakeholders in this value chain (dairy farmers, milk collectors, dairy processors, retailers, consumers of dairy products, etc.) lie within a space bounded by a set of opportunities and constraints that affect their behaviour.

While stakeholders in the value chain will see each new opportunity expand their space for initiative and realm of possibilities, each new constraint will tend to restrict it. We therefore postulate that stakeholders operate within a 'space for initiatives' bounded by a set of dimensions (potentialities of their physical environment, knowledge and expertise, access to market, social norms, governing institutions, etc.) which affect their behaviour.

In this study, we suggest a methodology for determining, in a participatory way, stakeholders' space for initiatives in a given value chain and, more specifically, their space for agroecological initiatives. By characterising this space for initiatives, we aim to identify the main areas where action is needed to step up the pace of agroecological transition by influencing stakeholder behaviour.

This paper sets out four specific targets:

1) Introducing the concept of 'space for agroecological initiatives'
2) Providing a methodology for characterising and measuring such space
3) Clarifying the purpose of such characterisation and measurement
4) Illustrating the results of this methodology using Bobo Dioulasso's dairy value chain as a case study

2 Space for agroecological initiatives: just what is it exactly?

Several studies on young farmers in Africa refer to the notion of 'opportunity space'. Sumberg and Okali (2013) define that space as the "spatial and temporal distribution of the universe of more or less viable options that an individual (a young person) may exploit to establish an independent life". According to these authors, an individual's opportunity space is bounded by natural resources, access to market, social norms and interactions. To describe the dimensions that bound such an opportunity space, Rietveld et al (2020) refer to constraints and opportunities within the socio-institutional and agroecological environment that affect the individual's ability to act.

Our study focuses on Bobo Dioulasso's dairy industry stakeholders. In this research framework, 'stakeholders' are defined as a group of individuals engaged in the same business activity (milk and dairy product farmers, collectors, processors, retailers and consumers).

We regard stakeholders in the dairy value chain as being able to take initiatives, i.e. actions aimed at initiating, undertaking or organising something. We will therefore speak of 'space for initiatives' rather than 'opportunity space'. We will also consider that a stakeholder's space for initiatives expands as new opportunities arise and narrows as constraints (challenges, threats) hinder his/her actions (Figure 1).

Figure 1. Effect of opportunities and constraints on a stakeholder's space for initiatives

For stakeholders, these opportunities and constraints can be physical (relating to climate, soil, local natural resources: water, vegetation), cognitive (relating to the acquisition of knowledge and know-how), economic (access to markets and factors of production), social (relating to the integration of social norms and modes of interaction), institutional (relating to farming regulations and policies), and possibly of other kinds (spiritual, etc.). A stakeholder's space for initiatives is therefore bounded by at least five dimensions (Figure 2) if we exclude others (spiritual, ethics…).

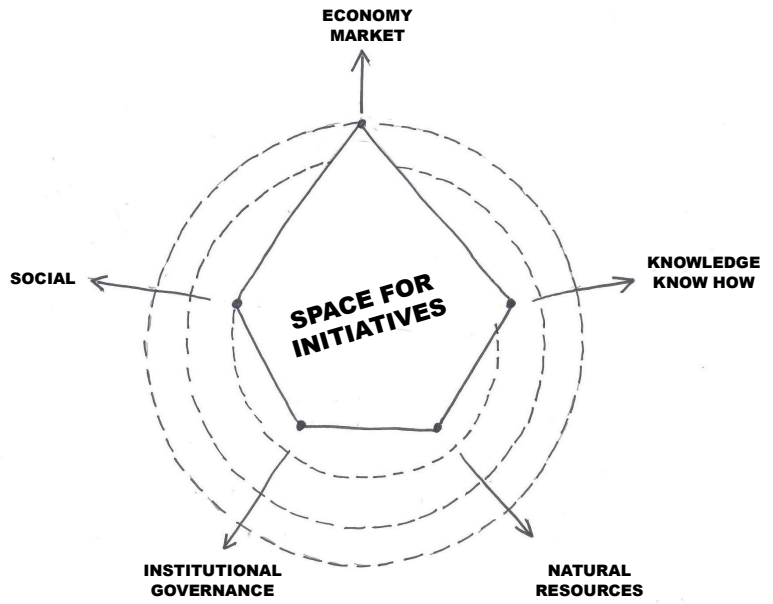


Figure 2. Stakeholders' space for initiatives bounded by the following five dimensions: physical, cognitive, economic, social and institutional

The notion of space for initiatives can easily be applied to agroecology based on the elements and dimensions of agroecology described by Wezel et al. (2020). By substituting the 13 dimensions of agroecology for the 5 dimensions mentioned above and applying the same reasoning, we can define a space for agroecological initiatives bounded by these 13 dimensions (Figure 3).

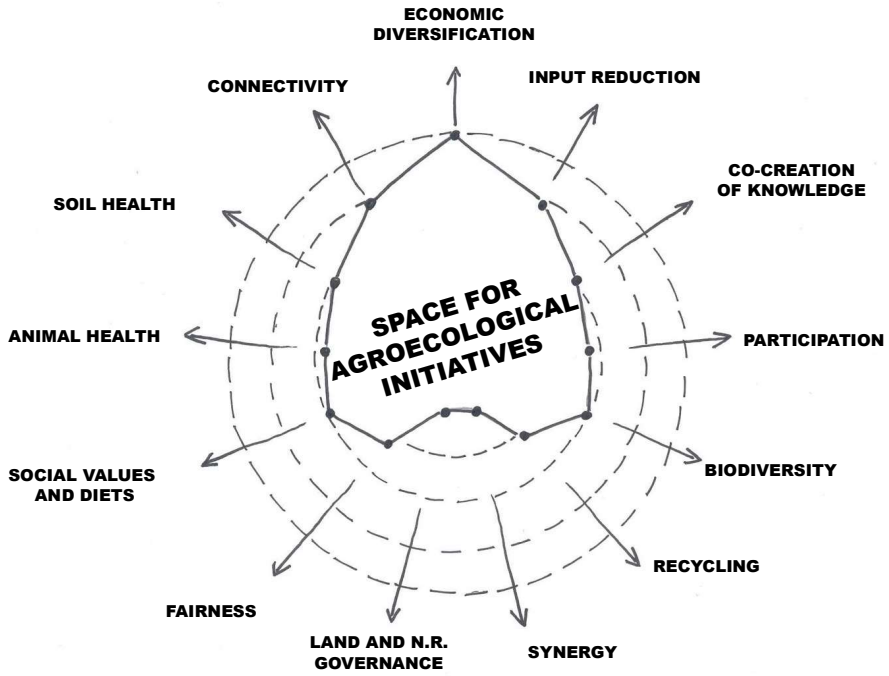


Figure 3. Stakeholders' space for agroecological initiatives bounded by the 13 dimensions (elements) of agroecology (Wezel et al., 2020)

3 Space for Ae initiatives: How do we go about characterising and measuring it?

Our proposed method focuses on Bobo Dioulasso's dairy industry stakeholders.

This method is based on focus groups (FGs) featuring Bobo Dioulasso's dairy value chain stakeholders who share the same business activity and are representative in terms of diversity (e.g. dairy farmers' FG include 3 sub-groups of farmer producers: agro-pastoralists / mini-farms / women dairy farmers). These FGs will be tasked with gathering, in a participatory way, the opportunities and constraints identified by the FGs' stakeholders, enabling them to then design their space for agroecological initiatives.

3.1 Focus group (FG) sampling and set-up

We propose to study the following FGs:

- FG1 - Dairy farmers, comprising 3 sub-groups: dairy agro-pastoralists / mini-dairy farms / women involved into dairy production at farm level
- FG2 - Milk collectors, comprising 2 sub-groups: independent collectors / Milk Collection Centres
- FG3 - Dairy processors, comprising 2 sub-groups: those using mainly local milk / those working 100% with milk powder
- FG4 - Dairy product retailers: one single sub-group

Note: For consumers, the proposed approach is not relevant. For them, we will be conducting a study on consumer preference criteria for dairy products (this study will be covered by a separate protocol).

FG set-up and repetition:

- Each focus group will consist of several sub-groups of representatives from each of the FG's occupational sub-categories (e.g. for milk producers: agro-pastoralists, mini-dairy farmers, women dairy farmers; with 3 to 10 representatives per sub-group).
- To be as thorough as possible when it comes to collecting opportunities and constraints, we propose to repeat Focus Group Discussions (FGDs) so as to take into account a significant proportion of representatives per category, as shown in Table 1.

Table 1. Focus Groups make-up and repetition

Focus groups	Sub-groups	Estimated population	Repetition 1	Repetition 2
Dairy farmers	Agro-pastoralists Mini-farms Women farmers (*)	> 200 ~ 20 > 200	5 4 3	7-5
Milk collectors	Independent Collection centre	> 50 ~10	7 7	- -
Dairy processors	Local milk Milk powder	~10 ~20	8 6	- -
Dairy product retailers	Shops, kiosks, supermarkets	> 100	7	-

(*) These are usually agro-pastoralists' wives, and rarely independent women.

3.2 Proposed provisional schedule

- Presentation of the study and protocol adjustments: August 2023
- Presentation of the study to the ALL BF Board and identification of potential FGD participants with a view to testing the methodology: September 2023
- Protocol adjustments and preparation of study logistics: 19-20 September 2023
- Processor and Farmer FGD testing: 20-21 September 2023
- Completion of the other FGDs and repetitions: 3-4 October 2023
- Study report drafting: October 2023

3.3 FGDs and data collection

Prior to the Focus Group Discussions (FGDs), during which data (opportunities/constraints, conditions/intensity) will be collected, we will ensure that all FG participants agree on the representativeness and characteristics of the occupational category they represent in the FG. A representative from each occupational category will outline the characteristics of their 'type' to the audience:

- For Farmer FGDs: extensive agro-pastoralists / semi-intensive mini-farms / women dairy farmers
- For Collector FGDs: independent collectors / collection centre employees
- For Processor FGDs: local milk users / 100% milk powder users
- For Retailer FGDs: no sub-group

This presentation may be followed by a short Q&A session to confirm the following points: (i) Do you recognize this type? (ii) Should we change, add or remove anything from the description? (iii) Do you agree with the suggested name for this type? Key features of each occupational sub-category may be summarised on posters and displayed in the room.

Once this preliminary work has been completed, the task of listing opportunities and constraints may begin. FG participants are split into sub-groups with two facilitators per sub-group. One facilitator moderates proceedings, and one assistant is tasked with gathering the participants' votes on the intensity of opportunities and constraints.

We suggest starting the inventory with opportunities (because participants are used to being asked about constraints and we think it is important to start with positive issues, which are more difficult to extract from group discussions before fatigue sets in). The inventory is carried out under the supervision of the focus group moderator, as follows:

1. Participants are given a few minutes to think about the opportunities that come to mind;
2. The moderator asks a participant to share an initial opportunity with the sub-group. To facilitate the discussion, the moderator is provided with a list of prompts (see suggestions in the appendix). The moderator asks if other participants have identified the same opportunity. Participants reach agreement on the wording of this opportunity and the moderator writes it down on a post-it note (opport.i);
3. The sub-group is then asked to assign an intensity rating to the opportunity (opport.i) (ranging from 1 to 3: "3 cowries" for very high intensity, "2 cowries" for medium intensity, "1 cowrie" for low intensity). Intensity rating refers to the importance attached by participants to the opportunity for their activity;
4. The assistant collects the cowries and, knowing the number of participants in the group, assigns a score from 1 to 3 to opport.i: 1 if $0 <$ opport.i *rating* < 1.49; 2 if $1.5 <$ opport.i *rating* < 2.49; 3 if $2.5 <$ opport.i *rating* < 3.0;
5. Participants are then invited by the moderator to return to step 2 and provide another opportunity not previously suggested. Steps 2, 3 and 4 are repeated until all participants' suggestions have been exhausted.

Once the inventory of opportunities has been completed, the same procedure is used to carry out the inventory of constraints.

The final result is a table of FG opportunities and constraints listed by FG occupational sub-groups and intensity level.

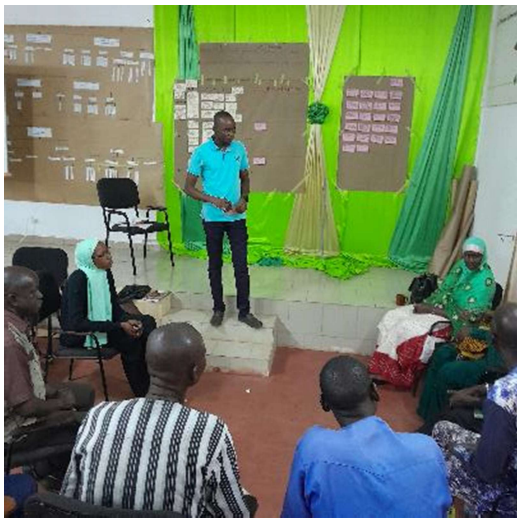


Figure 4. Focus Group Discussions

3.4 Opportunities and constraints mapping

To prepare for data analysis, opportunities and constraints first need to be grouped together in predefined lists of criteria.

We suggested using two lists.

- The first one is made up of the following 5 dimensions: Natural Resources, Knowledge and Know-How, Economy and Market, Social Norms and Interactions, Institutions and Policies
- The second one is based on the 13 elements of agroecology (Wezel et al., 2020)

We suggested that mapping be carried out by the researchers in charge of the study, as participants were not necessarily very familiar with the proposed categories.

Ultimately, the data analysis provides a table of FG opportunities and constraints listed by FG occupational sub-groups and intensity level, based on the 5 categories in the first list and the 13 categories in the second list (Table 2).

Table 2. Simplified version of the table showing data to be analysed (the real version includes 1 line per opportunity or constraint per focus group and sub-focus group; 5 columns for list 1; 13 columns for list 2).

Stakeholders	Sub-group	Opportunity/ constraint description	No. of participants	No. of cowries	No. of cowries/ participants	Intensity	List 1 (5 criteria)	List 2 (13 dimensions of agroecology)
						+++ (3)		
						++ (2)		
						+ (1)		

3.5 Data Analysis

Data analysis from Table 2 is carried out in the same way for both lists of criteria. In the following sections of this protocol, the calculation method will be shown in relation to the list of 13 agroecological criteria, but the process is the same for the first list of 6 criteria.

When considering the 13 dimensions of agroecology, a stakeholder's (or a sub-group of stakeholders') space for agroecological initiatives forms an irregular polygon with 13 sides (with one vertex per dimension; shown in green in Figure 5). The height of each vertex will depend on the intensity of opportunities and constraints. Figure 5 depicts the case of Agro-pastoral dairy farmers. It illustrates the method for calculating and characterising the space for agroecological (Ae) initiatives.

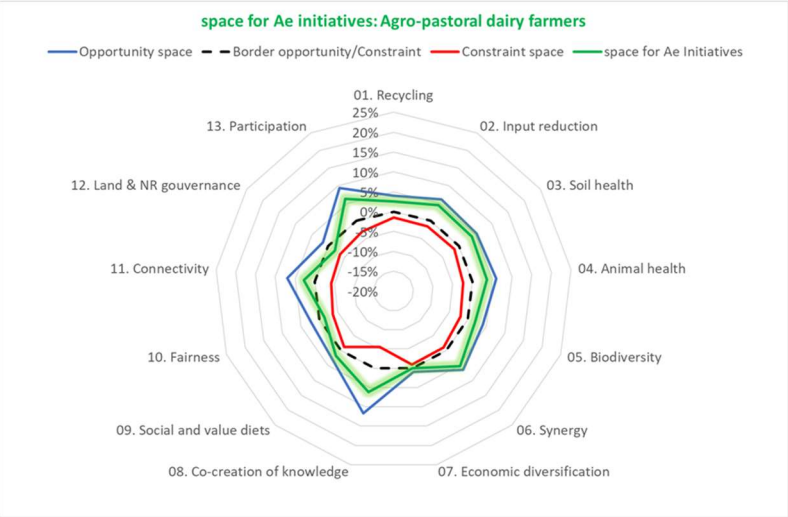


Figure 5. Space for Ae initiatives of a stakeholder (green line), opportunity space (blue line), constraint space (red line) and neutral boundary between opportunities and constraints (black dotted line) - illustrated with the case of agro-pastoral dairy farmers

To determine this stakeholder's space for Ae initiatives, we must first identify his/her opportunity space and constraint space.

In order to determine the opportunity space, an opportunity score is first calculated for each dimension (Di; i=1 to i=13). This score is calculated as follows.

Each opportunity associated with a given dimension (Di; i=1 to i=13) is assigned a value ranging from 1 to 3 depending on its intensity level (+; ++; +++):

- Low (+): $\begin{pmatrix} opport. \\ + \\ Di \end{pmatrix}$ rating; value: 1 point per opportunity
- Medium (++): $\begin{pmatrix} opport. \\ ++ \\ Di \end{pmatrix}$ rating; value: 2 points per opportunity
- High (+++): $\begin{pmatrix} opport. \\ +++ \\ Di \end{pmatrix}$ rating; value: 3 points per opportunity

The formula used to calculate the opportunity score for the Di dimension is therefore as follows:

$$\begin{pmatrix} Score \\ opport. \\ Di \end{pmatrix} = 3 \times Nb_{\substack{Opport. \\ +++ \\ Di}} + 2 \times Nb_{\substack{opport. \\ ++ \\ Di}} + 1 \times Nb_{\substack{opport. \\ + \\ Di}}$$

The same approach is used to determine the constraint space. A constraint score must first be calculated for each dimension (Di; i=1 to i=13). This score is calculated as follows.

Each constraint associated with a given dimension (Di; i=1 to i=13) is assigned a value ranging from 1 to 3 depending on its intensity level (-; --; ---):

- Low (-): $\begin{pmatrix} constr. \\ - \\ Di \end{pmatrix}$ rating; value: 1 point per constraint
- Medium (--): $\begin{pmatrix} constr. \\ -- \\ Di \end{pmatrix}$ rating; value: 2 points per constraint
- High (---): $\begin{pmatrix} constr. \\ --- \\ Di \end{pmatrix}$ rating; value: 3 points per constraint

The formula used to calculate the constraint score for the Di dimension is therefore as follows:

$$\begin{pmatrix} Score \\ constr. \\ Di \end{pmatrix} = 3 \times Nb_{\substack{constr. \\ \overline{Di}}} + 2 \times Nb_{\substack{constr. \\ \overline{Di}}} + 1 \times Nb_{\substack{const. \\ \overline{Di}}}$$

Now that the opportunity and constraint scores are known for each Di dimension (i=1 to i=13), the next step is to build the space for agroecological initiatives.

First, the opportunity and constraint scores for each Di dimension (i=1 to i=13) are converted into a percentage of the overall opportunity and constraint score.

Opportunity scores are then assigned a + sign to take on a value between 0 and 1 and constraint scores are assigned a - sign to take on a value between 0 and -1.

The 13 opportunity scores associated with each dimension thus provide the vertices of the opportunity space, and this space can be outlined (blue polygon in Figure 3). Similarly, the 13 constraint scores associated with each dimension provide the vertices of the constraint space, and this space can also be outlined (red polygon in Figure 3).

For a given Di dimension (i=1 to i=13), the algebraic sum of the opportunity and constraint scores gives an Ae initiative score as follows:

$$\begin{pmatrix} Score \\ initaitive \\ Di \end{pmatrix} = \begin{pmatrix} Score \\ opport. \\ Di \end{pmatrix} + \begin{pmatrix} Score \\ constr. \\ Di \end{pmatrix}$$

The 13 Ae initiative scores associated with each Ae dimension thus provide the vertices of the space for Ae initiatives, and this space can be outlined (green polygon in Figure 3). When a vertex sits above the black dotted line (Figure 5), this means that opportunities outweigh constraints (the realm of possibilities is therefore wider) and vice versa (the realm of possibilities is narrower).

In order to calculate values for initiative, opportunity and constraint areas, Ae initiative scores must first be converted as follows:

$$\begin{pmatrix} Score \\ initiative \\ Di \end{pmatrix} = 1 + \begin{pmatrix} Score \\ initiative \\ Di \end{pmatrix}$$

$$\begin{pmatrix} Score \\ opport. \\ Di \end{pmatrix} = 1 + \begin{pmatrix} Score \\ opport. \\ Di \end{pmatrix}$$

$$\begin{pmatrix} Score \\ constr. \\ Di \end{pmatrix} = 1 + \begin{pmatrix} Score \\ constr. \\ Di \end{pmatrix}$$

Formulas for calculating initiative, opportunity and constraint areas are as follows:

$$\frac{1}{2} \times \sin\left(\frac{360}{13}\right) \times \sum_{i=1}^{i=13} \begin{pmatrix} Score \\ initiative \\ Di \end{pmatrix} \times \begin{pmatrix} Score \\ initiative \\ Di+1 \end{pmatrix}$$

$$\frac{1}{2} \times \sin\left(\frac{360}{13}\right) \times \sum_{i=1}^{i=13} \begin{pmatrix} Score \\ opport. \\ Di \end{pmatrix} \times \begin{pmatrix} Score \\ opport. \\ Di+1 \end{pmatrix}$$

$$\frac{1}{2} \times \sin\left(\frac{360}{13}\right) \times \sum_{i=1}^{i=13} \begin{pmatrix} Score \\ constr. \\ Di \end{pmatrix} \times \begin{pmatrix} Score \\ constr. \\ Di+1 \end{pmatrix}$$

This area has no dimension as it is calculated from scores expressed as a percentage (in the example shown, agro-pastoral dairy farms values are: 3.19 for the initiative area ; 3.34 for the opportunity area and 3.17 for the constraint area). This value is of little interest per se. However, as part of a comparative approach between sub-FGs, this data will be useful. It will allow us to compare the initiative area of two sub-FGs and thus determine which FG has the largest space for initiatives, which is interesting as part of a comparative approach.

The same reasoning can be applied to list 1 (of the 5 dimensions) in order to determine a stakeholder's space for initiatives with reference to these 5 dimensions (Figure 6).

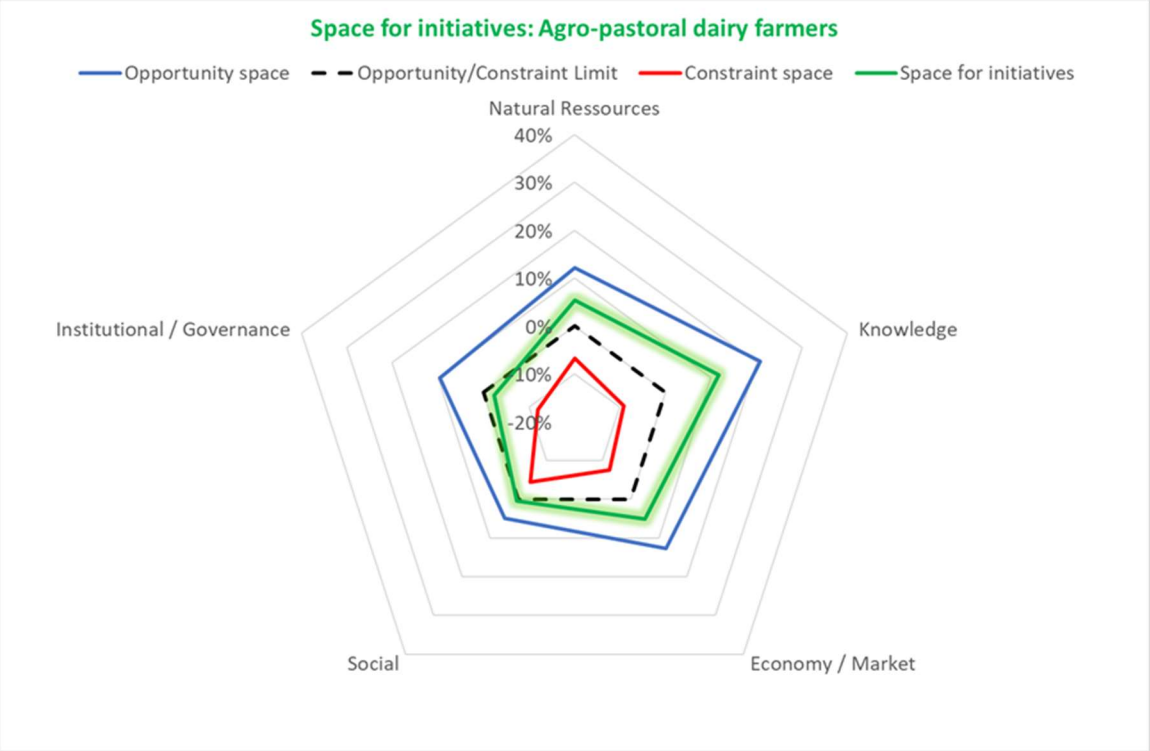


Figure 6. Space for initiatives of a stakeholder (green line), opportunity space (blue line), constraint space (red line) and neutral boundary between opportunities and constraints (black dotted line) - illustrated with the case of agro-pastoral dairy farmers

4 Characterising and measuring space for Ae initiatives: for what purpose?

4.1 For industry stakeholders

Characterising a stakeholder's space for initiatives can be useful in shedding light on that stakeholder's situation and identifying key actions to be taken in order to widen that space and change his/her behaviour.

Specifically, characterising a stakeholder's space for initiatives should help to:

- Better define that stakeholder's room for manoeuvre and options for expanding his/her space for initiatives;
- Better identify the critical dimensions where constraints restrict the stakeholder's room for manoeuvre;
- Compare spaces for initiatives available to stakeholders engaged in the same business activity but using different methods (e.g. agro-pastoral dairy farmers vs. mini-dairy farmers vs. women

dairy farmers, independent milk collectors vs. Milk Collection Centres, dairy processors using fresh milk vs. processors using 100% milk powder).

4.2 For researchers

Publishing an article on measuring stakeholders' space for Ae initiatives within a value chain, as applied to Bobo Dioulasso's dairy industry;

Suggesting the approach to WP5 facilitators for possible application in other fields;

5 Application to Bobo Dioulasso's dairy value chain

5.1 Inventory of opportunities and constraints by socio-economic group

5.1.1 Women dairy farmers

The following tables list the opportunities (30) and constraints (27) identified by women dairy farmers according to their intensity level (3 being the highest and 1 the lowest).

Table 3. Inventory of opportunities for women dairy farmers

Opportunity description	Intensity
Cutting of rangeland grass to feed livestock	3.0
Support for the installation of boreholes to ensure water availability in the dry season	3.0
Animal habitat improvement	3.0
Understanding between the various industry players to ensure fair dealings	2.9
Access to reduced-price oil cakes through Milk Collection Centres (MCCs)	2.9
Forage crop growing in the dry season	2.8
Presence of veterinary services in communities	2.8
Improvement of local breeds (selection, cross-breeding) to increase milk production	2.8
Access to livestock sales yards	2.8
Access to training	2.8
Access to MCC premises for milk sales	2.8
Use of manure to improve soil quality	2.8
Use of manure for pesticide development	2.8
Agreement signed with consumers of dairy products	2.8
Access to public facilities (town hall, PS) for milk promotion	2.8
Milk processing (soap, cream, etc.) and sales	2.6
Development of cattle tracks by government	2.6
Existence of alliances	2.6
Knowledge sharing between dairy industry stakeholders	2.6
Existence of a legal framework	2.6
Availability of family and hired labour	2.6
Acquisition of equipment for milk marketing through projects	2.6
Increasing political interest in dairy farmers	2.6
Regular training courses in milk production, animal feed and milk processing	2.6
Product trading between industry players (milk, oil cakes, etc.)	2.4
Access to trade fairs (SNC)	2.4
Access to government training schemes and microcredit	2.4
Reduction in cattle numbers so as to retain a manageable number of animals	2.3
Availability of water resources (dams)	2.1
Traceability of trades with consumers	2.0

Table 4. Inventory of constraints for women dairy farmers

Constraint description	Intensity
Funding difficulties (banks unwilling to consider animals as collateral)	3.0
Growing insecurity (terrorism, robbery, etc.)	3.0
Lack of grazing areas, especially in the rainy season because of fields	2.8
Lack of knowledge of the laws governing dairy farming (rules and regulations)	2.8
High cost of veterinary products	2.6
Presence of insect pests on pastures	2.5
Obstruction of cattle tracks by fields	2.5
Limited period during which forage resources can be exploited (shortage)	2.4
Water pollution by pesticides during the rainy season	2.4
Lack of resources (finance, initiatives, machinery, etc.)	2.3
Conflicts between crop and livestock farmers	2.3
Conflicts with neighbours over animals (damage, etc.)	2.1
Lack of local milk	2.1
Lack of equipment for manure recycling (especially for insecticide production)	2.1
Lack of expertise in building modern barns	2.1
Lack of training	2.0
Lengthy procedure for improving rules on access and use of natural resources	2.0
Lack of communication between industry stakeholders and within cooperatives	1.8
Poor allocation of training courses in relation to dairy farmers' locations	1.8
Unsuitable training (language, duration, timing)	1.6
Arduousness of manure recycling work	1.6
Lack of expertise in feed formulation	1.6
Lack of expertise in quality organic manure production (manure pit)	1.6
Lack of expertise in product diversification	1.6
High cattle population	1.6
Lack of expertise in the use of natural products to improve animal health	1.5
Lack of labour for herding animals out to pasture	1.5

5.1.2 Milk-producing agro-pastoralists

The following tables list the opportunities (45) and constraints (31) identified by agro-pastoralists according to their intensity level (3 being the highest and 1 the lowest).

Table 5. Inventory of opportunities for agro-pastoralists

Opportunity description	Intensity
The Dairy Innovation Platform helps to strengthen connections between the various components of the value chain	3.00
Availability of training courses in milking, feeding, FF	3.00
Organic manure (OM) production helps to reduce the need for mineral fertilisers	2.92
Training: milking, transport, hygiene	2.92
OM exchanges with neighbouring farmers	2.92
Field corralling of livestock improves soil health	2.92
Good relationships help to secure land and various forms of aid	2.92
Legume crops help to improve soil health	2.86
Livestock farmers' sedentary lifestyle (reduced mobility)	2.83
OM improves soil fertility	2.83
Forage crops help to reduce livestock feed purchases	2.83
Forage production aimed at increasing milk production	2.83
Milk supply, OM disposal, corralling contracts, crop residue (CR) trades => wealth	2.75
Supply of draught cattle	2.75
Working with other stakeholders to bring about change	2.75
Declassification of classified forests	2.75
Audio-visual communication around the local dairy value chain	2.75
Improved rules on access to land for livestock farmers as a means of securing their business	2.75
Corralling and soil rotation help to reduce the use of fertilisers	2.71
Training courses on water source maintenance (natural springs, wells and boreholes)	2.71
Regular promotional days, trade fairs	2.67
Government sets up projects to fund training and consultancy activities	2.67
Regular consultations on daily issues affecting the local dairy value chain	2.67
Providing quality milk to consumers	2.67
Presence of a livestock market	2.67
Good cooperation with veterinary staff benefits everyone	2.67
Establishment of a number of fully equipped MCCs at local level	2.58
Mutual agreement on prices and observance of each party's obligations	2.58
To improve animal health, we focus on quality feed and sound disease prevention	2.58
Training courses in cow housing and animal health	2.58
Reforestation and protection of specific tree species help to improve soil health	2.57
Government subsidies on well and borehole construction	2.57
Agreement on delivery times	2.50
Agreement on regular milk deliveries	2.50
Farm insurance for livestock farmers	2.50
Proper monitoring of herds by vet services helps to reduce healthcare costs	2.42
Crop residues for animals	2.42
Training helps to diversify activities	2.42
Training courses in artificial insemination	2.33
Availability of local milk for the value chain	2.33
Improving water quality through treatment to safeguard animal health	2.29
Knowledge of grazing areas	2.25
Presence of funding structures (microfinance, projects)	2.25
Use of bark to produce decoctions for livestock	2.17
Pasture and water availability	2.17

Table 6. Inventory of constraints for agro-pastoralists

Constraint description	Intensity
Low productivity of local cattle	3.00
Lack of funding for training courses	3.00
Farmers' insecurity causes milk production to fall	3.00
Lack of milking facilities	2.92
Recurrent bushfires	2.92
Milk prices set at the expense of farmers	2.92
Population growth limiting access to land (urban development)	2.92
Lack of equipment for milk transport and storage	2.92
Poor allocation of state aid	2.92
No certification for local milk quality	2.83
Lack of infrastructure and equipment for OM transport and CR storage	2.83
Insufficient information on government schemes for farmers	2.83
Obstruction of grazing tracks	2.83
Proliferation of gold panning sites attracting young people	2.75
Cultivation of lowlands and water points	2.75
Competition over natural resource management	2.67
Lack of finance outlets for livestock farmers	2.67
Poor milk quality at certain times owing to cow feed	2.67
Red tape when applying for state aid	2.67
Lack of resources to organise the local dairy value chain	2.58
Difficulty in producing large quantities of OM	2.58
Lack of traceability for vet products, herbicides, etc.	2.50
Poor state of roads preventing timely delivery of milk in some areas	2.42
Loss of traditional skills in plant-based animal care	2.42
Unavailability and shortage of veterinary staff	2.42
Lack of a local livestock market	2.33
Shortage of labour due to low wages	2.33
Inadequate training opportunities for farmers	2.25
Failure to meet commitments among stakeholders	2.25
Use of organic manure generates significant weed growth in fields	1.75
Unfair distribution of family property	1.08

5.1.3 Mini-dairy farms

The following tables list the opportunities (22) and constraints (27) identified by mini-dairy farms according to their intensity level (3 being the highest and 1 the lowest).

Table 7. Inventory of opportunities for mini-farms

Opportunity description	Intensity
Farmers' capacity building for processing and preserving raw milk	3.00
Local milk promotion through events (SNC fairs), training centres, army barracks, etc.	3.00
Capacity building on forage production techniques	3.00
Stronger ties between stakeholders through the Dairy Innovation Platform (DIP)	3.00
High demand for livestock by-products (manure)	3.00
Distribution / Provision of forage seeds	3.00
Training (livestock management, feed, health monitoring) leading to increased milk production	3.00
Stronger ties between stakeholders through the establishment of cooperatives	2.25
Interpersonal relationships foster access to information	2.25
Credit condition adjustments following the introduction of the DIP	2.25
Consultation frameworks in place to facilitate problem-solving between stakeholders	2.25
Contracting arrangements for input and product trades (feed for milk, milk for money, etc.)	2.25
Improved hygiene conditions for milking operations, transport and packaging of local milk in order to build trust and proximity with consumers	2.25
Improving access to land in order to ramp up forage production	2.25
Use of natural products in livestock feed (more Moringa, etc.)	2.25
Support for farmers (subsidies for vaccination campaigns, equipment, etc.) from government departments	2.25
Easy access to markets for product sales	1.50
Use of organic manure instead of mineral fertilisers	1.50
Involvement of technical departments to help strengthen ties between stakeholders	1.50
Consultation frameworks in place to facilitate information sharing and improve practices	1.50
Advisory support to facilitate access to finance via government departments	1.50
Access to information through the DIP	1.50

Table 8. Inventory of constraints for mini-farms

Constraint description	Intensity
Lack of skilled local HR to provide training on improved livestock management	3.00
Training topics not tailored to dairy farming	2.25
Competition for sales between raw milk and milk powder	2.25
Low sale price for local milk in the rainy season	2.25
Cultural inertia not conducive to changing practices	2.25
High cost of livestock inputs	2.25
High cost of attending trade fairs for local milk promotion	2.25
Poor access to suitable inputs for improved breeds	2.25
Lack of communication about local milk	2.00
Risk of conflict of interest in business diversification	1.50
Little use made of endogenous knowledge in livestock feed development and health monitoring	1.50
Restrictive credit conditions	1.50
Conflict of interest between stakeholders (funders, input suppliers)	1.50
Cumbersome procedures for applying for livestock farming machinery and equipment (grinders, etc.) from government	1.50
Lengthy OM mineralisation process for soil heath improvement	1.50
Prejudice about local milk quality	1.50
Perceived lack of hygiene in local milk storage and transport equipment	1.50
High cost of training	1.50
Inadequate equipment made available to farmers by technical departments	1.50
High land acquisition/rental costs for production	1.50
No kiosks dedicated to local milk sales	1.50
Difficulty in finding full-time staff	1.00
Increased workload in the chemical input reduction process	1.00
Withholding information from consumer bodies makes it harder to build proximity and trust	1.00
Poor access to information on training courses	0,75
Unsuitable conditions for access to funding	0,75
Lead times for invitations to events or attendance at meetings are not conducive to participation	0,50

5.1.4 Independent milk collectors

The following tables list the opportunities (18) and constraints (22) identified by independent milk collectors according to their intensity level (3 being the highest and 1 the lowest).

Table 9. Inventory of opportunities for independent collectors

Opportunity description	Intensity
Harmonisation of prices per litre of milk charged by collectors	3.00
Information exchange meetings held between all dairy industry stakeholders	3.00
Reaching out to MCCs for skills development	2.86
Labelling milk and milk derivatives (product type, origin, date...)	2.86
Good cohesion with those around us	2.86
Honesty in our dealings with local dairy industry stakeholders	2.71
Availability of local milk draws customers	2.71
Good quality of local milk	2.71
Honouring contracts with customers (timings, milk quantities)	2.57
Trust in people we work with	2.57
Radio announcements made by local dairy industry stakeholders	2.43
Advertising campaigns for local milk and milk derivatives run by dairy industry stakeholders	2.43
Use of social networks to promote local milk and milk derivatives	2.43
Production of tee-shirts advertising local milk and milk derivatives	2.14
Cooperation between collectors and farmers to repair damaged rural tracks	1.57
Fair profit-sharing with our employees	1.57
Feed and water trough production from used cans	1.29
Sale of used cans	1.14

Table 10. Inventory of constraints for independent collectors

Constraint description	Intensity
Illiteracy of some individual collectors	3.00
No access to funding as we are not an association	3.00
Unsuitable training courses for our business (milk collection)	3.00
Disputes between individual collectors	2.86
Lack of interest shown by some stakeholders at networking events	2.86
Poor quality of milk collected	2.86
Addition of water to milk to meet orders	2.71
No leniency from the police when we commit traffic offences while handling fresh milk	2.71
Difficulty in bringing together all the industry players	2.71
Lack of a structure uniting individual collectors	2.57
Low purchasing power for factors of production (collection and storage equipment)	2.57
Failure to apply knowledge acquired during training courses	2.57
Poor quality motorbike parts (environmental pollution)	2.43
Lack of marketing skills	2.43
Difficulty in agreeing on a single point during meetings	2.43
Lack of professional and family integrity among our employees	2.43
High cost of renting or buying premises to set up collection points	2.43
Difficulty in preserving fresh milk	2.14
Difficulty in setting a universal price per litre of milk	2.14
High cost of advertising	2.14
Failure to meet commitments (order deadlines)	2.00
Difficulty in bringing consumers together for advertising	1.71

5.1.5 Milk Collection Centres

The following tables list the opportunities (31) and constraints (20) identified by Milk Collection Centres according to their intensity level (3 being the highest and 1 the lowest).

Table 11. Inventory of opportunities for collection centres

Opportunity description	Intensity
Collaboration with other processing cooperatives (NEEMA)	3.00
Introduction of formal contracts with dairies (PRECAM)	3.00
Introduction of government-issued documents to facilitate product transport and reduce red tape on the road	3.00
Government subsidies for preservation equipment and machinery, as well as for milk transport vehicles	3.00
Government subsidy and monitoring of MCCs	3.00
Advice or training on milk collection and milk price regulation by government	3.00
Trust between stakeholders	3.00
Option to offer your neighbour's products for sale (win-win partnership)	2.86
Training courses that can help to improve milk collection strategies	2.86
Large quantities of milk available	2.86
Gatherings (platform meetings, cooperatives) help to strengthen ties between stakeholders	2.86
Access to land for MCC building projects	2.86
Improved collection management	2.86
Dialogue between dairy industry stakeholders	2.71
MCCs enable milk to be sold as quickly as possible	2.71
Training on selecting more productive cows within herds	2.71
Training on hygiene, milking and milk transport	2.71
Presence of cooperatives offering training opportunities	2.71
Fulfilment of each stakeholder's commitments	2.71
PADEL-B/PASPA projects to procure tricycles (government)	2.57
Information, seed and experience sharing with neighbours	2.57
MCCs bring greater proximity to milk	2.57
Fair sharing of some donations	2.57
Interactions with technical veterinary services to be improved	2.57
Training courses and meetings often contribute to problem solving	2.43
Promotional days and trade fairs help us to promote our activities	2.43
We receive project grants for the purchase of vehicles and collection equipment	2.43
Support from neighbours in milk collection and other activities	2.29
Communication around local milk and MCCs	2.29
MCCs ease the workload of collectors, especially women	2.14
Collaboration with processors provides training opportunities	2.00

Table 12. Inventory of constraints for collection centres

Constraint description	Intensity
Low milk price in MCCs	3.00
Socio-political instability and security crisis	3.00
Insecurity prevents improvements to the rules governing access and use of tracks	3.00
Poor track conditions	2.86
Low level of government involvement in dairy value chain activities	2.86
High land prices	2.86
Lack of collection equipment	2.71
Too much red tape involved when applying for aid	2.71
State aid often fails to arrive on time and is often misappropriated	2.57
Lack of residue recycling training courses	2.57
Lack of residue recycling equipment	2.43
Use of milk powder in processing	2.43
Lack of funding for training projects	2.43
Lack of funding and credit for business diversification	2.29
Mistrust and dishonesty among stakeholders	2.14
Failure to meet obligations, and hypocrisy of some people	2.14
Low processing capacity of Dairy Processing Units (DPUs) (in the rainy season)	2.14
Insufficient number of training courses aimed at milk collectors	2.14
Disputes or conflicts among stakeholders	1.71
Pandemic diseases such as COVID-19	1.71

5.1.6 Processors using mainly local milk

The following tables list the opportunities (31) and constraints (24) identified by processors using mainly local milk according to their intensity level (3 being the highest and 1 the lowest).

Table 13. Inventory of opportunities for processors using mainly local milk

Opportunity description	Intensity
Local milk itself is an opportunity (highly nutritious, source of income, diversification into by-products, lower imports, contribution to GDP, job creation for women and young people)	3.00
Product quality helps to strengthen proximity and consumer confidence	2.63
World Milk Day, school canteens, information exchange meetings, coffee breaks	2.63
Quality of welcome at DPUs	2.63
Creation of a framework for regular engagement with authorities, civil servants and politicians	2.25
An internal DIP committee helps with problem-solving	2.25
Combination of natural (often organic) products with local milk	2.25
Existence of a venue/office space for external meetings	1.88
Trust strengthened by processor's openness about inputs used	1.88
Use of appropriate techniques helps to reduce inputs (DPU experience)	1.88
Hygiene in and around DPUs / awareness-raising on social hygiene	1.88
Cooperatives and exchange platforms foster collaboration	1.88
Use of natural products to improve quality (néré, monkey bread, banana, honey, grapes, etc.)	1.88
Documents on price harmonisation between farmers, collectors and processors	1.88
Use of appropriate equipment (delays milk fermentation)	1.88
Label and packaging design to promote local milk	1.88
Customer proximity	1.50
Consumer preferences driving product diversification	1.50
Consultation frameworks in place to improve innovations (change of practices)	1.50
Training courses (hygiene, preservation, processing into various products)	1.50
Existence of collection, delivery and/or product purchase programmes (DIP calendar)	1.50
Building a climate of trust between stakeholders	1.50
Monthly problem-solving meetings	1.50
Market availability (fair, SNC), albeit insufficient	1.25
Interpersonal communication facilitating business development (experience sharing)	1.25
Support from technical departments helps to strengthen fair dealings between stakeholders	1.25
Stronger partnership between the DIP and other external stakeholders	1.25
Contribution from government departments in terms of subsidies, advice, red tape cutting, etc.	1.00
Drawing up contracts to strengthen ties with other stakeholders (commodity prices)	1.00
Exchange trips and visits to other DPUs enable product diversification	1.00
By-product recycling (whey for pigs)	0.63

Table 14. Inventory of constraints for processors using mainly local milk

Constraint description	Intensity
Local milk supply (production) far below demand	3.00
Very high interest rates on loans (9-15%)	2.63
No support with equipment after training courses	2.63
High cost of attending trade fairs	2.25
High price of local milk compared to milk powder	2.25
Unfair competition between products made from local milk and those made from milk powder	2.25
Lack of institutional contracts	2.25
No kiosks dedicated to the sale of dairy products made from local milk	2.25
Lack of adequate processing equipment and machinery	2.25
Low awareness of the intrinsic quality of local milk	1.88
Weak support for local milk promotion from government departments	1.88
Insufficient technical expertise in local milk processing	1.75
Few research trips	1.50
Insufficient training on diversifying products made from local milk	1.50
Lack of suitable packaging for marketing	1.50
Unavailability of quality control equipment for milk and milk by-products	1.50
Difficulty in preserving local milk and milk derivatives	1.25
Labels providing little information on the composition of dairy products (difficulty in distinguishing local milk from other products)	1.00
Extensive red tape (for loan applications)	1.00
Difficulties in accessing credit	1.00
Lack of billboards for local milk promotion	1.00
Delays in raw milk deliveries	1.00
Failure to honour contractual commitments	1.00
Difficulty in finding staff	0.63

5.1.7 Processors using mainly milk powder

The following tables list the opportunities (33) and constraints (17) identified by processors using mainly milk powder according to their intensity level (3 being the highest and 1 the lowest).

Table 15. Inventory of opportunities for processors using mainly milk powder

Opportunity description	Intensity
Presence of funding structures	2.83
Presence of preservation equipment (fridge)	2.83
Source of jobs, income and solidarity	2.83
Availability of local milk in both quantity and quality	2.67
On-site availability of processing equipment and machinery	2.67
Presence of market segments (grocery stores, shops, kiosks, restaurants)	2.67
Activity recognised by government	2.67
Installation of boreholes	2.67
Consultation framework with dairy industry players (Coop, DIP)	2.67
Training in product diversification	2.50
Presence of automated packaging equipment	2.50
Consumer incentives (consumer loyalty schemes offering bonuses)	2.50
Harmonisation of prices, quantities and quality	2.50
Business management training courses	2.17
Training courses in marketing	2.17
Presence of electric milk blending equipment	2.17
Availability of labour	2.00
Fulfilment of mutual commitments on standards and quality	2.00
Training courses in processing techniques	1.83
Promotion of dairy products by neighbours	1.83
Training courses in processing hygiene	1.50
Presence of a local market	1.50
Use of mint as a substitute in gapal and degué flavouring	1.00

Table 16. Inventory of constraints for processors using mainly milk powder

Constraint description	Intensity
High cost and unavailability of local milk	2.83
Low investment capacity	2.83
Lack of training courses in milk powder processing	2.67
Lack of support from government	2.67
Low quality of processing equipment and machinery	2.50
Difficulty in processing local milk	2.50
Lack of delivery equipment	2.33
Increase in the purchase price of dairy products	2.33
Recurring water cuts	2.33
Local milk is highly perishable	2.33
Difficulty in bringing together all the stakeholders (particularly consumers)	2.33
High input costs for milk powder processing	2.33
Varying quality of milk powder	2.33
Unwillingness to harmonise product selling prices	2.00
Reduced quality of dairy products (when input prices rise)	2.00
Erratic supply of white sugar	1.83
Lack of electricity for processing operations	1.83

5.1.8 Dairy product retailers

The following tables list the opportunities (17) and constraints (17) identified by dairy product retailers according to their intensity level (3 being the highest and 1 the lowest).

Table 17. Inventory of opportunities for retailers

Opportunity description	Intensity
Stronger ties and trust built with customers/consumers through quality of dairy products distributed/sold	3.00
Retailers themselves act as promoters of the nutritional benefits associated with dairy products made from local milk	3.00
Attending trade fairs, national culture weeks, etc. helps to improve dairy product packaging design	3.00
Easy access to rural tracks facilitates dairy product distribution and new partnership opportunities	2.57
Increasing customer base through dairy product diversification, especially those with added natural/local plants	2.57
Possibility of setting up a retailers' association/cooperative through the DIP	2.57
Openness and good communication foster trust with consumers	2.14
Consumer preferences drive dairy product diversification	2.14
Family and professional relationships facilitate dairy product distribution	2.14
Existence of verbal contracts for dairy product deliveries	2.14
Availability of kiosks, mini-markets, shops and private individuals for dairy product sales	2.14
Attending problem-solving sessions at DPU level	2.14
Interpersonal relationships help to broaden the customer base for dairy products sales in rural areas	2.14
Securing new customers/consumers through sound marketing strategy	1.71
Building customer loyalty by providing free dairy products for testing before purchase	1.71
Home delivery, especially for weddings and christenings, helps to build closer relationships with customers	1.14
Existence of verbal contracts specifying the number and type of dairy products to be delivered over set periods (week, month)	1.14

Table 18. Inventory of constraints for retailers

Constraint description	Intensity
Lack of technical support from government departments	3.00
Breaks in the cold chain for dairy products in kiosks and shops, requiring retailers to replace them	3.00
Reduced quality of dairy products due to storage in fridges alongside other products such as bissap	3.00
Lack of a retailers' association precludes any application for loans or funding	3.00
No retailers' cooperatives/associations	2.57
Lack of association limits access to training opportunities	2.57
Reduced market share owing to ever-increasing number of retailers	2.57
Lack of structuring/formalisation of the retail business	2.57
Lack of sufficient quantities of local raw milk throughout the year prevents closer ties from being forged with other stakeholders	2.57
Business development held back by imported dairy products flooding the market	2.57
Lack of funding to help retailers become self-employed	2.57
Ransoming of law enforcement officers demanding money or documents evidencing dairy product retail activities	2.14
Dairy product damage resulting from police confiscation of vehicles transporting such products in the event of traffic light violations	2.14
Key messages on tricycles are not focused enough on promoting local milk and milk derivatives	2.14
Lack of storage centres available to retailers means they cannot operate independently from DPUs	1.71
Reduced profit margins due to inflated bonuses sometimes demanded by customers	1.71
Stronger ties between stakeholders hindered by growing individual interests	1.14

5.1.9 Inventory of opportunities and constraints: quantitative review

Among the dairy value chain's socio-economic groups, FGDs helped to identify an average of 28 opportunities and 23 constraints per group (Table 19). Agro-pastoralists (45) identified the largest number of opportunities. Agro-pastoralists, Women and Independent milk collectors identified the largest number of constraints (31 and 27). Overall, however, the number of constraints and opportunities identified in each socio-economic group is fairly balanced (with the exception of agro-pastoralists and processors using mainly milk powder, who identified far more opportunities than constraints). On the whole, the number of opportunities and constraints identified for each socio-economic group is large enough to characterise spaces for initiatives as described by the method outlined above.

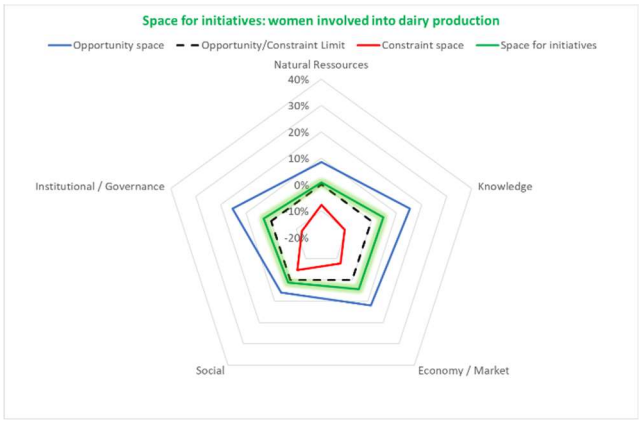
Table 19. Number of opportunities and constraints by socio-economic group

	Opportunities	Constraints
Women	30	27
Agro-pastoralists	45	31
Mini-farms	22	27
Independent collectors	18	22
Milk Collection Centres	31	20
Processors using local milk	31	24
Processors using milk powder	33	17
Retailers	17	17
Average	28	23

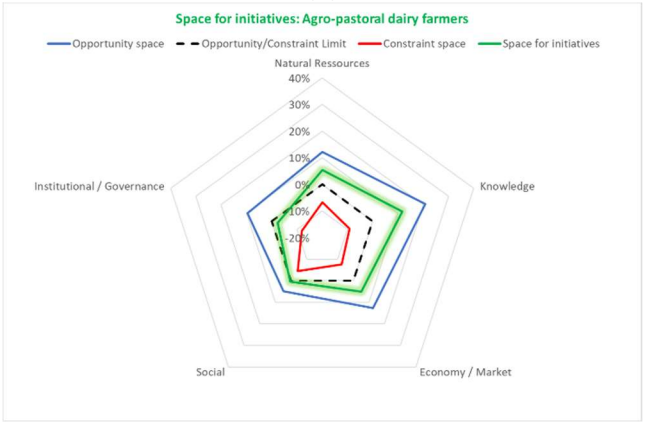
5.2 Spaces for initiatives among dairy industry stakeholders

5.2.1 Spaces for initiatives among dairy farmers

Figure 7 outlines the spaces for initiatives available to men and women dairy farmers in the following 5 dimensions: Access to Natural Resources, Knowledge, Economic Factors, Social Levers and Political Levers.



(a)



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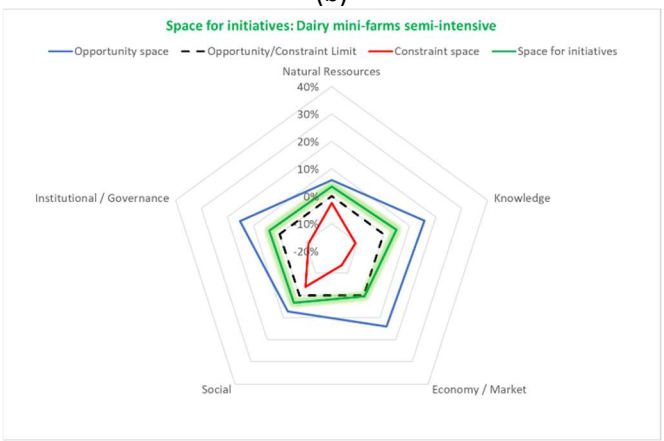


(c)

Figure 7. Spaces for initiatives among women dairy farmers (a), dairy agro-pastoralists (b) and mini-dairy farms (c)

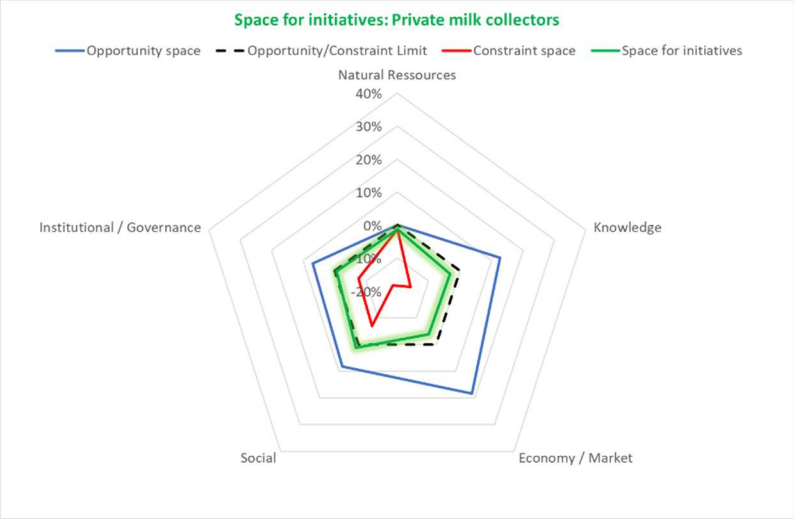
This figure shows that, overall, women have fewer opportunities (particularly in terms of access to knowledge and market) and more constraints (particularly in terms of access to natural resources, knowledge, social levers and economic levers) than men (agro-pastoralists or mini-farms), thereby limiting their space for initiatives.

Among men, dairy agro-pastoralists appear to enjoy the greatest number of opportunities (particularly in terms of access to natural resources and knowledge), and slightly fewer constraints (except in terms of access to institutional levers), and therefore the greatest space for initiatives. Mini-farms face constraints in terms of access to natural resources (which is understandable since they are often located close to towns) and, more surprisingly, in terms of access to market (probably because these farms are more geared towards selling milk and therefore more sensitive to market opportunities than agro-pastoralists, for whom dairy farming is often a sideline).

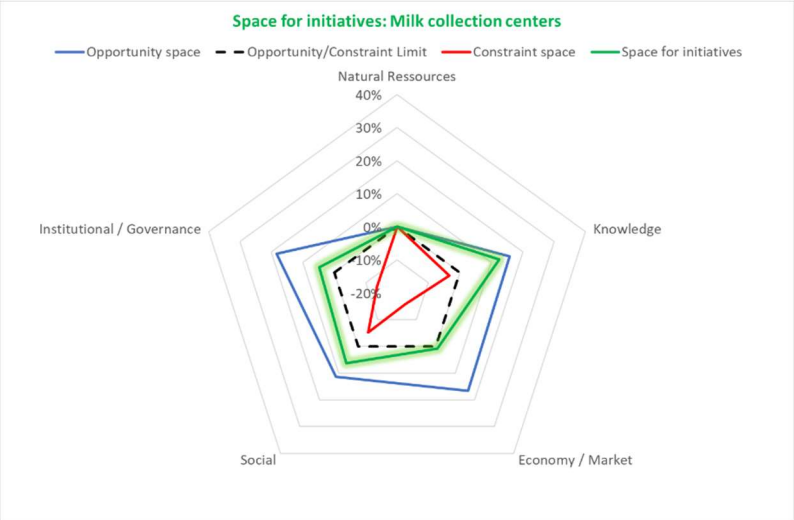
5.2.2 Spaces for initiatives among milk collectors

Figure 8 outlines the spaces for initiatives available to milk collectors (independent collectors and collection centres) in the following 5 dimensions: Access to Natural Resources, Knowledge, Economic Factors, Social Levers and Political Levers.

This figure shows that Milk Collection Centres have fewer constraints (in all five dimensions) and more opportunities overall (except for Access to Market) than independent collectors. Ultimately, Milk Collection Centres' space for initiatives is greater than that of independent collectors.



(a)

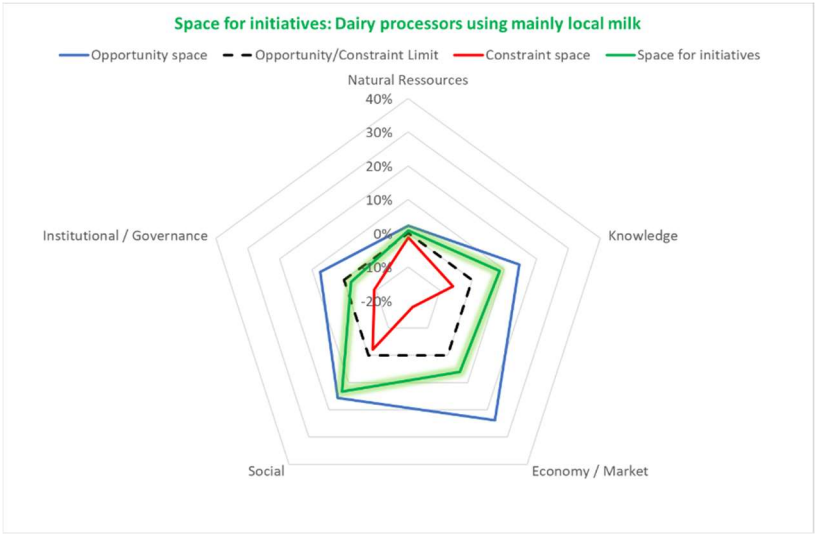


(b)

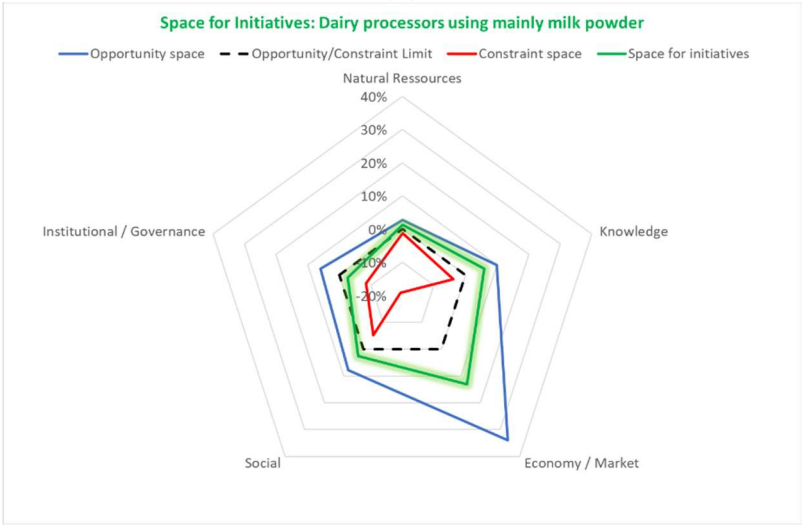
Figure 8. Spaces for initiatives among independent milk collectors (a) and Milk Collection Centres (b)

5.2.3 Spaces for initiatives among dairy processors

Figure 9 outlines the spaces for initiatives available to Dairy Processing Units (using mainly local milk ('LM DPUs') and using mainly milk powder ('MP DPUs')) in the following 5 dimensions: Access to Natural Resources, Knowledge, Economic Factors, Social Levers and Political Levers.



(a)



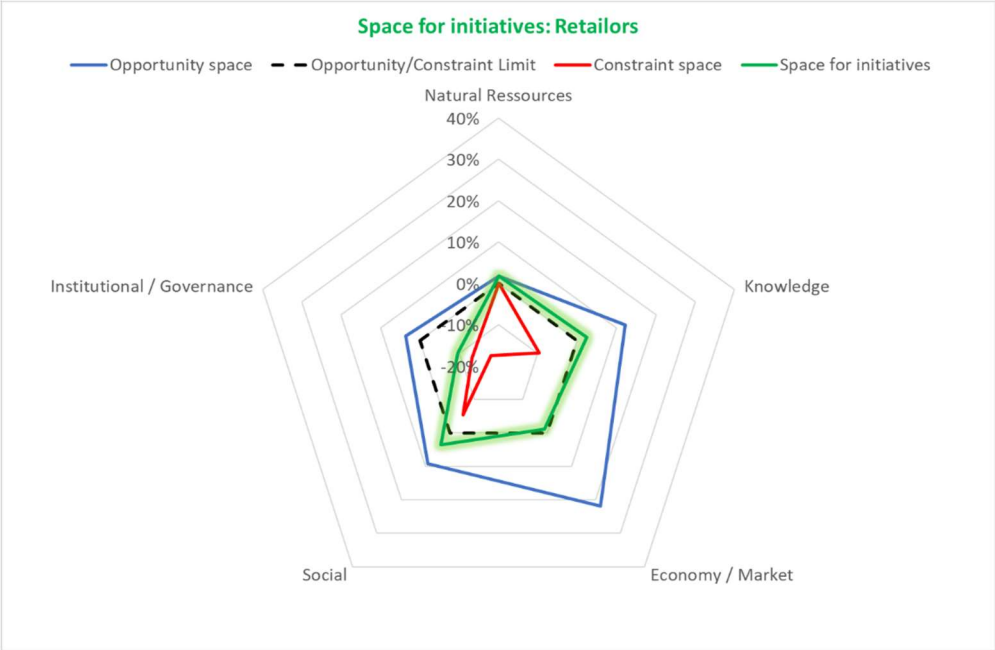
(b)

Figure 9. Spaces for initiatives among processors using mainly local milk (a) and processors using mainly milk powder (b)

This figure shows that LM DPUs enjoy more opportunities in the Access to Knowledge, Social Levers and Political Levers dimensions than MP DPUs, which have more opportunities mainly in the Access to Market dimension. LM DPUs have slightly more constraints in the Access to Political and Institutional Levers and Access to Knowledge dimensions. For MP DPUs, constraints are greater in the Access to Social Levers and Access to Market dimensions. Ultimately, LM DPUs' space for initiatives is greater than that of MP DPUs in the Access to Knowledge, Social Levers and Political Levers dimensions. MP DPUs' space for initiatives is greater in the Access to Market dimension.

5.2.4 Spaces for initiatives among dairy retailers

Figure 10 outlines the spaces for initiatives available to dairy retailers in the following 5 dimensions: Access to Natural Resources, Knowledge, Economic Factors, Social Levers and Political Levers.



(a)

Figure 10. Spaces for initiatives among dairy retailers

This figure shows that retailers have both the largest number of opportunities and the largest number of constraints in terms of Access to Market.

5.2.5 Comparing constraint spaces, opportunity spaces and spaces for initiatives among dairy industry stakeholders

Table 20 outlines the constraint spaces, opportunity spaces and spaces for initiatives identified for dairy industry stakeholders, as well as the corresponding areas. Cells in the table are colour-coded according to each value's intensity level:

1) For constraints: from green (lowest constraints) to red (highest)
2) For opportunities and space for initiatives: from red (lowest values) to green (highest)

Table 20. Constraint spaces, opportunity spaces and spaces for initiatives identified for dairy industry stakeholders in all 5 dimensions (Access to Knowledge, Natural Resources, Economic Factors, Social Levers, and Political Levers)

	Natural Resources	Knowledge	Economy / Market	Social	Institutional / Governance	Area
Constraint Space						
Women dairy farmers	1.08	1.11	1.08	1.05	1.12	2.80
Agro-pastoralists	1.07	1.09	1.07	1.04	1.12	2.77
Mini-farms	1.02	1.11	1.14	1.04	1.11	2.79
Independent collectors	1.01	1.16	1.22	1.07	1.08	2.92
Milk Collection Centres	1.00	0.97	0.84	0.95	0.86	2.03
Processors using local milk	1.01	1.06	1.18	1.02	1.09	2.73
Processors using milk powder	1.01	1.04	1.21	1.05	1.08	2.77
Retailers	1.00	1.10	1.23	1.05	1.13	2.89
Opportunity space						
Women dairy farmers	1.09	1.15	1.12	1.06	1.15	2.95
Agro-pastoralists	1.12	1.21	1.13	1.05	1.10	2.99
Mini-farms	1.06	1.16	1.14	1.07	1.15	2.96
Independent collectors	1.00	1.13	1.18	1.08	1.07	2.84
Milk Collection Centres	1.00	1.16	1.17	1.11	1.18	3.00
Processors using local milk	1.02	1.15	1.24	1.16	1.07	3.02
Processors using milk powder	1.03	1.10	1.34	1.08	1.06	2.98
Retailers	1.02	1.12	1.22	1.09	1.04	2.86
Space for initiatives						
Women dairy farmers	1.01	1.05	1.04	1.01	1.03	2.51
Agro-pastoralists	1.05	1.12	1.05	1.00	0.98	2.58
Mini-farms	1.03	1.05	1.00	1.03	1.04	2.53
Independent collectors	0.99	0.97	0.96	1.01	0.99	2.31
Milk Collection Centres	1.00	1.13	1.01	1.06	1.05	2.61
Processors using local milk	1.01	1.09	1.06	1.13	0.98	2.64
Processors using milk powder	1.01	1.06	1.13	1.03	0.97	2.58
Retailers	1.02	1.02	0.99	1.04	0.90	2.35

In terms of constraints, we note that the economic constraint of market access is the one most felt by all stakeholders, with the exception of Milk Collection Centres. Next are constraints on access to economic and institutional levers, here again with the exception of collection centres (which makes sense since they were established at the behest of government). Lastly, the constraint related to access to knowledge and know-how is more prevalent among independent collectors (most often young people) and farmers (particularly women farmers).

Regarding opportunities, the most significant ones relate to market access, particularly for actors downstream of production (collectors, processors and retailers). Next comes access to knowledge and know-how (except for processors using mainly local milk). Opportunities for access to economic and institutional levers mainly arise for Milk Collection Centres, followed by agro-pastoralists and women dairy farmers. Social levers are not widely seen as opportunities, particularly among women farmers, agro-pastoralists and independent collectors. Lastly, access to natural resources, which mainly affects men and women farmers, appears to be more of a constraint than an opportunity, particularly for mini-farms and women farmers.

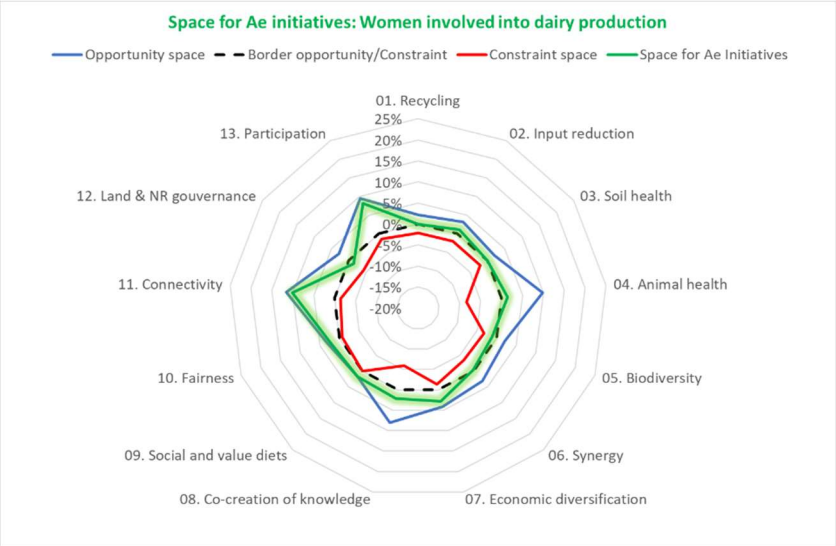
Overall, the space for initiatives resulting from the combination of opportunities and constraints shows that: 1) opportunities are limited in terms of access to natural resources (with the exception of agro-pastoralists); 2) access to knowledge is the dimension in which stakeholders enjoy maximum space for initiatives (with the exception of independent collectors); 3) in the 'access to market' dimension, the picture is mixed, with opportunities predominantly strong for processors (LM and MP) and farmers (women farmers and agro-pastoralists), but rather low for independent collectors, mini-farms, retailers and collection centres; 4) the social dimension appears to be a rather strong opportunity for downstream players in the value chain (collection centres, processors and retailers), unlike farmers and independent collectors; 5) the 'access to political and institutional levers' dimension appears to be the one where, overall, stakeholders have the smallest space for initiatives.

In terms of area calculations, the stakeholders showing the largest constraint spaces, the smallest opportunity spaces and the most limited spaces for initiatives are independent collectors and retailers. At production level, women farmers have the smallest space for initiatives and the largest amount of constraints.

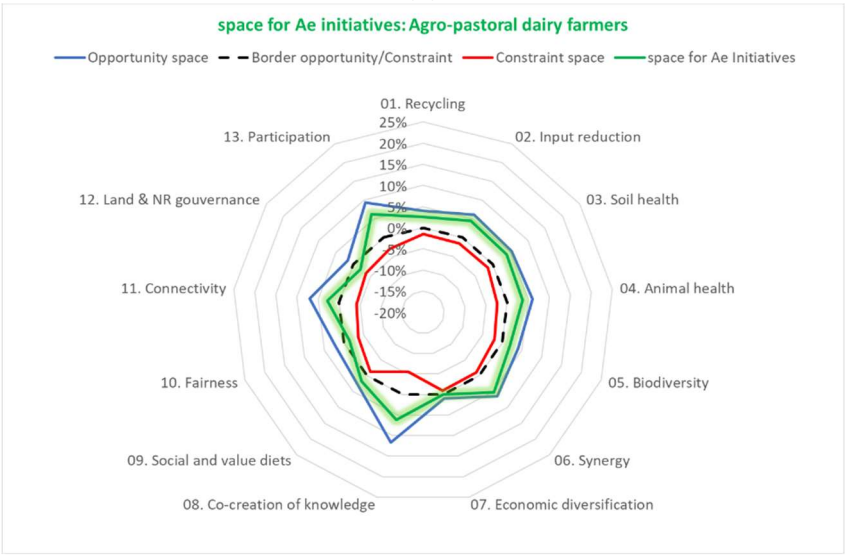
5.3 Spaces for agroecological initiatives among dairy industry stakeholders

5.3.1 Spaces for agroecological initiatives among dairy farmers

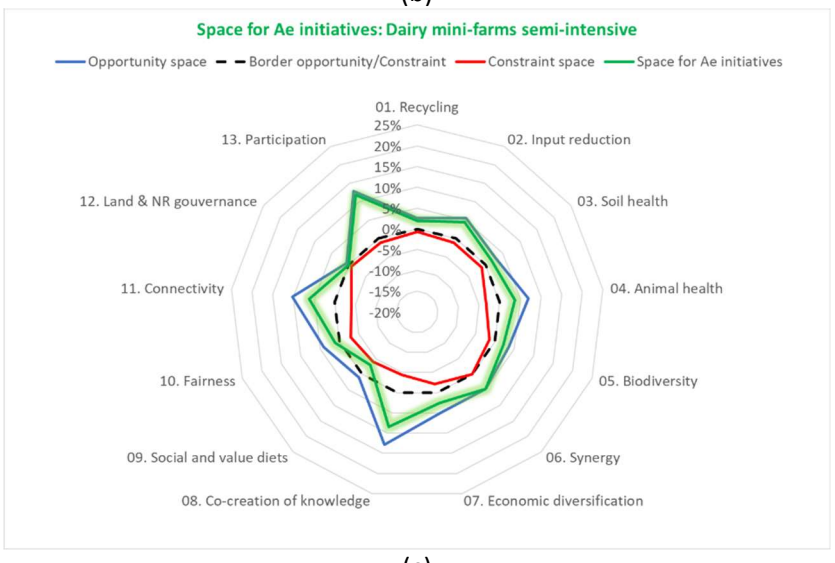
Figure 11 outlines the spaces for Ae initiatives available to men and women dairy farmers in the 13 dimensions of agroecology (Wezel et al., 2020).


Space for Ae initiatives: Women involved into dairy production
Opportunity space
Border opportunity/Constraint
Constraint space
Space for Ae Initiatives
01. Recycling
02. Input reduction
03. Soil health
04. Animal health
05. Biodiversity
06. Synergy
07. Economic diversification
08. Co-creation of knowledge
09. Social and value diets
10. Fairness
11. Connectivity
12. Land & NR gouvernance
13. Participation
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
-20%

(a)


space for Ae initiatives: Agro-pastoral dairy farmers
Opportunity space
Border opportunity/Constraint
Constraint space
space for Ae Initiatives
01. Recycling
02. Input reduction
03. Soil health
04. Animal health
05. Biodiversity
06. Synergy
07. Economic diversification
08. Co-creation of knowledge
09. Social and value diets
10. Fairness
11. Connectivity
12. Land & NR gouvernance
13. Participation
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
-20%

(b)


Space for Ae initiatives: Dairy mini-farms semi-intensive
Opportunity space
Border opportunity/Constraint
Constraint space
Space for Ae initiatives
01. Recycling
02. Input reduction
03. Soil health
04. Animal health
05. Biodiversity
06. Synergy
07. Economic diversification
08. Co-creation of knowledge
09. Social and value diets
10. Fairness
11. Connectivity
12. Land & NR gouvernance
13. Participation
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
-20%

(c)

Figure 11. Spaces for agroecological initiatives among women dairy farmers (a), dairy agro-pastoralists (b) and mini-dairy farms (c)

Data shows that women farmers face more constraints, enjoy fewer opportunities and consequently have limited space for Ae initiatives, compared with male socio-economic groups (agro-pastoralists and mini-farms).

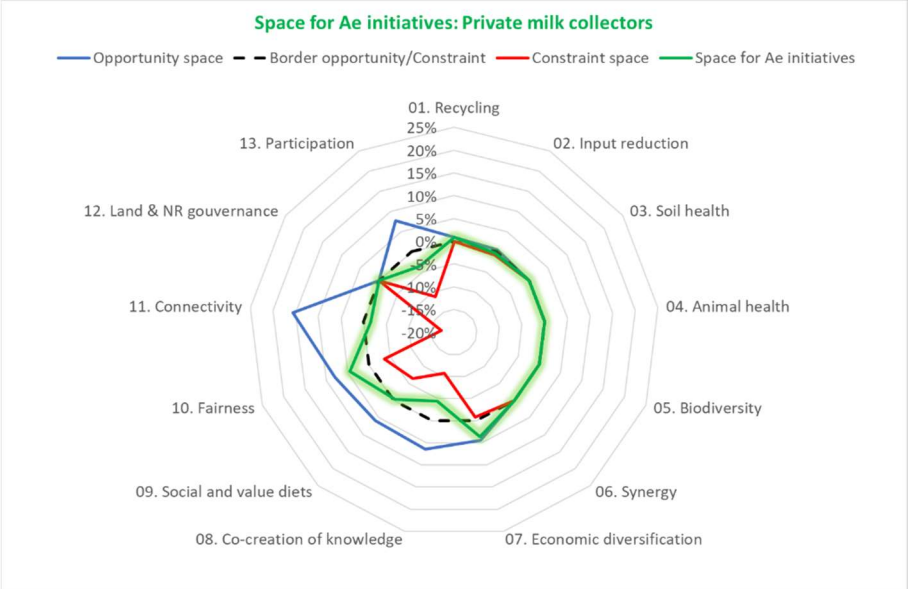
Women farmers show a higher constraint score for 7 out of 13 elements of agroecology, versus 1/13 and 0/13 for agro-pastoralists and mini-farms respectively (in particular for all the elements relating to the farm: Recycling, Input Reduction, Soil Health, Animal Health, Biodiversity and Synergy).

Women farmers have a higher opportunity score for 3 out of 13 elements of agroecology, versus 6/13 and 5/13 for agro-pastoralists and mini-farms respectively. Their score is higher for the following elements: Connectivity, Land Governance and Animal Health.

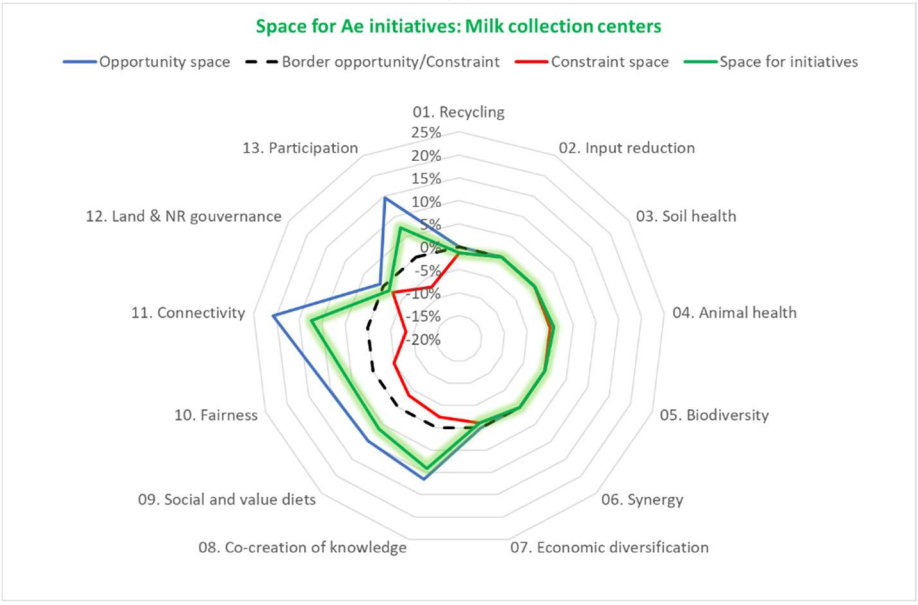
Women farmers have a higher initiative score for 4 out of 13 elements of agroecology, versus 8/13 for agro-pastoralists and mini-farms. Their score is higher for the following elements: Economic Diversification, Connectivity, Social Values and Diets, and Fairness.

5.3.2 Spaces for agroecological initiatives among milk collectors

Figure 12 outlines the spaces for Ae initiatives available to milk collectors (independent collectors and collection centres) in the 13 dimensions of agroecology (Wezel et al., 2020).



(a)



(b)

Figure 12. Spaces for agroecological initiatives among independent milk collectors (a) and Milk Collection Centres (b)

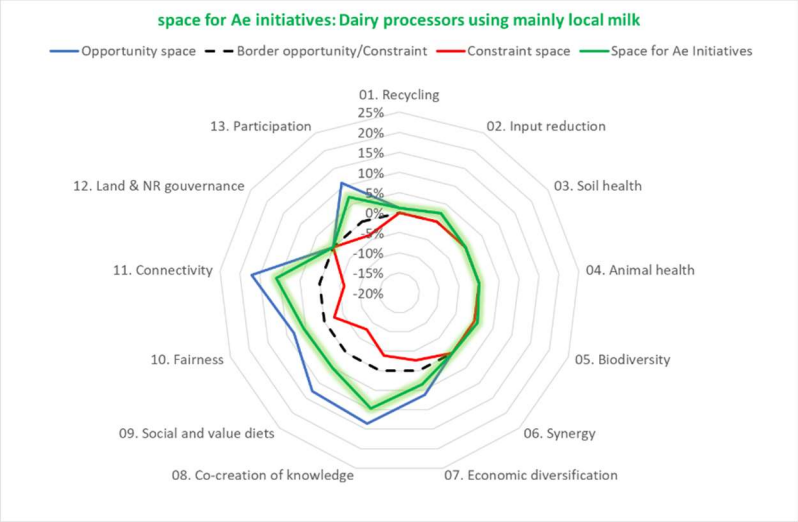
Data shows that independent milk collectors face far more agroecological constraints than Milk Collection Centres. Independent collectors' constraint scores are higher for 8 out of 13 elements of agroecology, versus 0/13 for collection centres.

Independent collectors have fewer agroecological opportunities than Milk Collection Centres. Their opportunity score is higher than that of MCCs for 2 out of 13 elements of agroecology, versus 6/13 for collection centres.

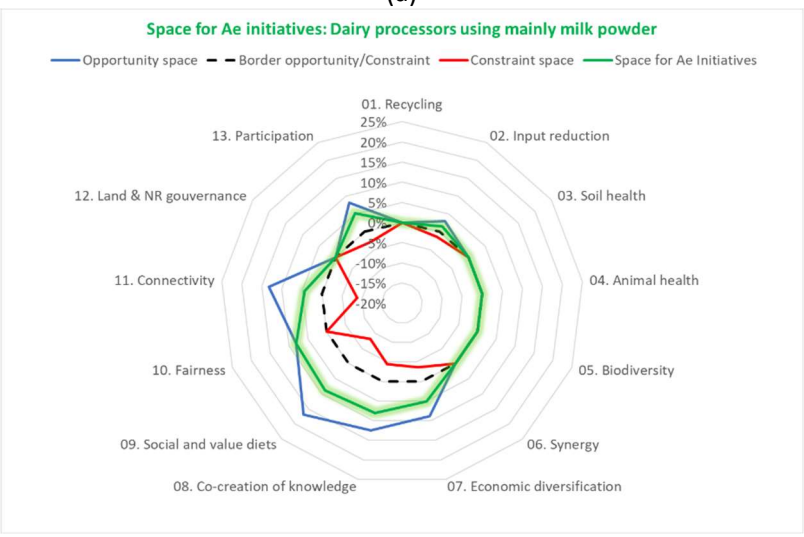
As a result, independent collectors' space for initiatives is greater than that of the MCCs for just three elements of agroecology: “Economic diversification”, “Recycling”, and “Land governance”.

5.3.3 Spaces for agroecological initiatives among dairy processors

Figure 13 outlines the spaces for Ae initiatives available to Dairy Processing Units (using mainly local milk ('LM DPUs') and using mainly milk powder ('MP DPUs')) in the 13 dimensions of agroecology (Wezel et al., 2020).



(a)



(b)

Figure 13. Spaces for agroecological initiatives among processors using mainly local milk (a) and processors using mainly milk powder (b)

LM DPUs exhibit fewer Ae constraints than MP DPUs. LM DPUs' constraint score is higher for the following elements of agroecology: Fairness and Participation. MP DPUs' constraint score is higher for the following elements of agroecology: Economic Diversification and Connectivity.

LM DPUs enjoy more opportunities than MP DPUs. LM DPUs' opportunity score is higher for the following elements of agroecology: Connectivity, Co-creation of Knowledge, Participation, Recycling and Biodiversity. MP DPUs boast a higher opportunity score for the following elements of agroecology: Social Values and Diets, Economic Diversification, Input Reduction.

5.3.4 Spaces for agroecological initiatives among dairy retailers

Figure 14 outlines the spaces for Ae initiatives available to dairy retailers in the 13 dimensions of agroecology (Wezel et al., 2020).

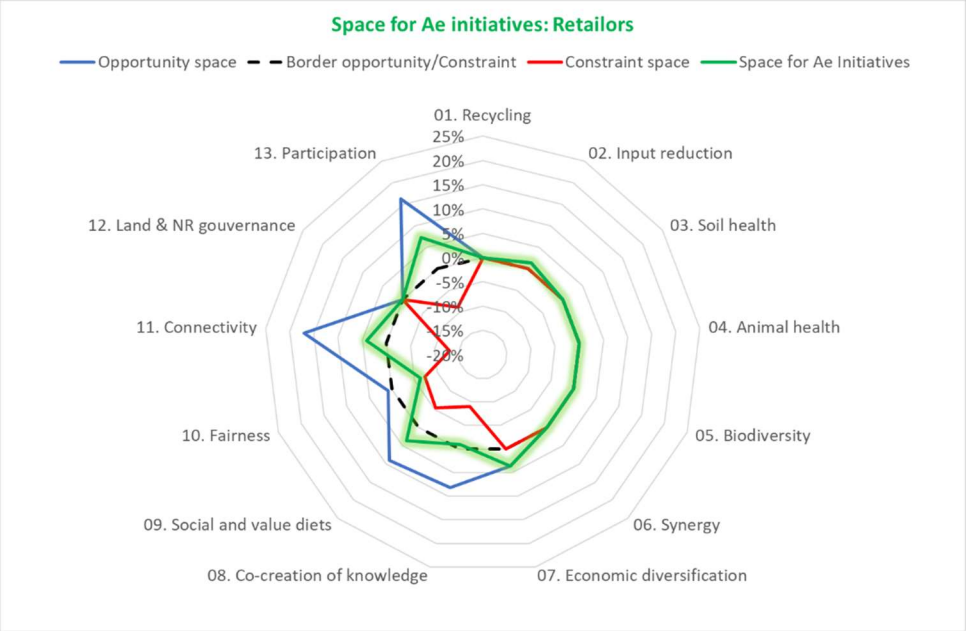


Figure 14. Spaces for agroecological initiatives among dairy retailers

Lack of Fairness seems to be the biggest issue for these stakeholders, whereas Connectivity and Participation (trade fairs and various product promotion events) seem to be their main strengths in terms of opportunities.

5.3.5 Comparing agroecological initiative areas among dairy industry stakeholders

Table 21 outlines the constraint spaces, opportunity spaces and spaces for Ae initiatives identified for dairy industry stakeholders, as well as the corresponding areas. Cells in the table are colour-coded according to each value's intensity level:

1) For constraints: from green (lowest constraints) to red (highest);
2) For opportunities and space for initiatives: from red (lowest values) to green (highest).

In terms of constraints, Connectivity seems to be the most significant (except for MCCs). This is followed by 'Social Values and Diets' (except for MCCs, women farmers and agro-pastoralists). Then come 'Co-creation of Knowledge' constraints, which are often expressed in terms of insufficient and inadequate training provision (except for MCCs). Constraints associated with lack of 'Participation' and 'Fairness' come in last.

Opportunity-wise, the 'Land & NR Governance' dimension hardly affects stakeholders as a whole (although it does affect farmers to some extent). Similarly, the 'Recycling', 'Input Reduction', 'Soil Health', 'Animal Health', 'Biodiversity' and 'Synergy' elements have little bearing on stakeholders downstream from the farm. For those elements of agroecology that are more relevant to farmers, women farmers have fewer opportunities than their male counterparts (agro-pastoralists and mini-farms).

For the other elements of agroecology, the 'Connectivity' dimension is most often cited as an opportunity. This is followed by 'Co-creation of Knowledge', and finally by 'Participation'. Agro-pastoralists and Dairy Collection Centres seem to have few opportunities in the 'Economic Diversification' dimension. For the 'Fairness' dimension of agroecology, agro-pastoralists and retailers also seem to enjoy fewer opportunities. For the 'Social Values & Diets' dimension, dairy farmers (across all categories) have fewer opportunities than other socio-economic groups.

Table 21. Constraint, opportunity and initiative areas among dairy industry stakeholders in all 13 dimensions of agroecology

	01. Recycling	02. Input Reduction	03. Soil Health	04. Animal Health	05. Biodiversity	06. Synergy	07. Economic Diversification	08. Co-creation of Knowledge	09. Social Values & Diets	10. Fairness	11. Connectivity	12. Land & NR Governance	13. Participation	Ae Area
Constraints														
Women dairy farmers	1.02	1.02	1.02	1.08	1.03	1.04	1.01	1.06	1.00	1.01	1.01	1.04	1.01	3.19
Agro-pastoralists	1.01	1.02	1.01	1.02	1.02	1.01	1.01	1.05	1.01	1.04	1.04	1.04	1.03	3.17
Mini-farms	1.01	1.01	1.01	1.03	1.01	1.00	1.02	1.04	1.04	1.03	1.04	1.01	1.01	3.15
Independent collectors	1.00	1.01	1.00	1.00	1.00	1.00	1.01	1.11	1.06	1.04	1.17	1.00	1.11	3.26
Milk Collection Centres	0.99	1.00	1.00	1.00	1.00	1.00	0.99	0.98	0.96	0.95	0.92	0.98	0.93	2.88
Processors using local milk	1.00	1.00	1.00	1.00	1.00	1.00	1.03	1.04	1.08	1.03	1.06	1.00	1.04	3.15
Processors using milk powder	1.00	1.01	1.00	1.00	1.00	1.00	1.04	1.04	1.08	1.00	1.09	1.00	1.03	3.16
Retailers	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.09	1.05	1.07	1.13	1.00	1.09	3.23
Opportunities														
Women dairy farmers	1.02	1.03	1.02	1.10	1.02	1.03	1.04	1.08	1.02	1.03	1.12	1.03	1.09	3.32
Agro-pastoralists	1.04	1.06	1.05	1.06	1.04	1.06	1.01	1.12	1.03	1.02	1.07	1.02	1.09	3.34
Mini-farms	1.03	1.05	1.03	1.07	1.04	1.05	1.05	1.13	1.01	1.04	1.10	1.01	1.13	3.37
Independent collectors	1.01	1.00	1.00	1.00	1.00	1.00	1.04	1.06	1.06	1.08	1.16	1.00	1.08	3.25
Milk Collection Centres	1.00	1.00	1.00	1.01	1.00	1.00	1.00	1.12	1.10	1.11	1.21	1.01	1.15	3.35
Processors using local milk	1.01	1.02	1.00	1.00	1.01	1.00	1.06	1.14	1.13	1.08	1.17	1.00	1.11	3.37
Processors using milk powder	1.00	1.03	1.00	1.00	1.00	1.00	1.09	1.13	1.17	1.08	1.13	1.00	1.08	3.36
Retailers	1.00	1.01	1.00	1.00	1.00	1.00	1.04	1.08	1.09	1.01	1.17	1.00	1.16	3.29
Space for initiatives														
Women dairy farmers	1.00	1.01	1.00	1.01	0.99	1.00	1.03	"	1.02	1.02	1.10	0.99	1.08	3.15
Agro-pastoralists	1.03	1.04	1.04	1.04	1.02	1.05	1.00	1.06	1.02	0.99	1.03	0.98	1.06	3.19
Mini-farms	1.02	1.04	1.02	1.04	1.02	1.05	1.03	1.08	0.97	1.01	1.06	1.00	1.12	3.24
Independent collectors	1.01	1.00	1.00	1.00	1.00	1.00	1.04	0.96	1.00	1.04	0.98	1.00	0.96	3.01
Milk Collection Centres	0.99	1.00	1.00	1.01	1.00	1.00	0.99	1.09	1.06	1.06	1.12	0.98	1.07	3.20
Processors using local milk	1.01	1.02	1.00	1.00	1.01	1.00	1.03	1.10	1.05	1.05	1.11	1.00	1.07	3.24
Processors using milk powder	1.00	1.01	1.00	1.00	1.00	1.00	1.05	1.08	1.09	1.08	1.04	1.00	1.05	3.22
Retailers	1.00	1.01	1.00	1.00	1.00	1.00	1.04	0.99	1.04	0.94	1.04	1.00	1.07	3.08

Lastly, within the space for Ae initiatives, 'Connectivity', followed by 'Participation' and 'Co-creation of Knowledge' are the elements most often cited as contributing to the expansion of this space (except in the case of independent collectors).

The 'Land & NR Governance' dimension hardly comes into play at all, which is no great surprise.

Among farmers, women generally show lower initiative scores than their male counterparts in all the dimensions of agroecology that relate to on-farm production (Ae elements 1 to 6 in the Wezel et al., 2020 grid). Conversely, when it comes to elements more related to the food system (elements 7 to 13 in the grid), their initiative score is often higher than that of their male counterparts.

6 Discussion

6.1 Main results

This study has provided an inventory of opportunities and constraints as perceived by dairy industry stakeholders, who ranked them in order of intensity. Opportunity, constraint and initiative scores (with the latter integrating opportunities and constraints) have been established for each socio-economic group. These scores have helped to define the characteristics of constraint spaces, opportunity spaces and spaces for initiatives for each socio-economic group in two different spaces:

1) One comprising the following five dimensions (Access to Natural Resources, Access to Knowledge, Access to Market, Social Levers, and Political & Institutional Levers);
2) The other the 13 elements of agroecology.

This has enabled us to identify priorities for action by socio-economic group with a view to reducing constraints. These priorities are shown in Table 22 and Table 23.

Looking at the five-dimensional space (Table 22), priorities for action mainly centre on economic constraints (access to market and production factors) as well as institutional and value chain governance constraints. Among farmers, priorities for action are also needed to reduce the constraints they face in accessing knowledge and know-how (particularly among women farmers). Lastly, constraints faced by women producers in terms of access to natural resources need to be addressed.

Table 22. Priorities for action needed to reduce constraints across socio-economic groups

	Natural Resources	Knowledge	Economy / Market	Social	Institutional / Governance
Women	+	++	+		++
Agro-pastoralists		+	+		+
Mini-farms		+	+++		+
Independent collectors		+++	+++		
Milk Collection Centres					
Processors using local milk			+++		+
Processors using milk powder			+++		+
Retailers			+++		++

Key: significance level, (+) being the lowest and (+++) being the highest

Looking at the 13-dimensional Ae space (Table 23), we note that for all actors of the dairy value chain, priorities for action mainly revolve around overcoming the constraints of 'Co-creation of Knowledge', 'Connectivity', 'Participation', 'Fairness', and 'Social Values & Diets'. Integrating the project's actions into Bobo-Dioulasso's Dairy Innovation Platform, which brings together most of the industry stakeholders, creates an ideal framework for addressing all of these constraints. Among farmers, priorities for action are also needed to reduce the constraints they face with regard to all the components of agroecology,

which tend to be more related to the production system (i.e. elements 1 to 6 of the Wezel et al. (2020) grid). Lastly, Milk Collection Centres are largely unaffected by these Ae constraints, which puts them in a strong position to provide support (services) to other socio-economic groups, as envisioned in the Ae business model that the project plans to co-construct with industry stakeholders.

Table 23. Priorities for action needed to reduce constraints on the dimensions of agroecology across socio-economic groups

	01. Recycling 02. Input Reduction 03. Soil Health 04. Animal Health 05. Biodiversity 06. Synergy	07. Economic Diversification	08. Co-creation of Knowledge	09. Social Values & Diets	10. Fairness	11. Connectivity	13. Participation
Constraints							
Women	+	+	++				
Agro-pastoralists			+		+	+	+
Mini-farms		+	+	+	+	+	
Independent collectors			+++	++	+	+++	++
Milk Collection Centres							
Processors using local milk		+	+	++	+	+	+
Processors using milk powder		+	+	++		+	
Retailers			+++	+	++	+++	++

Key: significance level, (+) being the lowest and (+++) being the highest

6.2 Limitations of the method

This participatory approach is heavily reliant on the quality of moderation and stakeholder engagement during the opportunity and constraint inventory process. Time must therefore be set aside to explain the process to participants and to carry out as exhaustive an inventory as possible. Conducting an inventory with a focus group takes a full day's work, including breaks. It is also sometimes necessary to repeat the exercise with several focus groups when a socio-economic group has many representatives (as in the case of agro-pastoralists). Conversely, when a socio-economic group has few representatives, such repetitions are not possible (as was the case with mini-farms for example).

Methods used to calculate initiative scores (opportunities and constraints) can certainly be improved to take better account of the number of opportunities and constraints identified by socio-economic groups, and to review weightings for degrees of intensity among opportunities and constraints in order to bring out the characteristics of each group.

Lastly, opportunities and constraints mapping requires collective validation involving a group of experts familiar with the proposed grids (5 dimensions, or 13 elements).

6.3 Outlook

We see two prospects arising from this project.

We intend to submit this work to Bobo Dioulasso's Dairy Innovation Platform for results validation purposes and, above all, to turn recommendations arising from it into tangible actions aimed at maximising stakeholders' space for initiatives by seeking to optimise their opportunities and reduce their constraints. This will involve putting forward a list of actions to be taken, tailored to the situation and needs of each socio-economic group.

From a research point of view, findings from this project will need to be refined and published.

7 References

Sumberg, J. and Okali, C., 2013. Young People, Agriculture, and Transformation in Rural Africa: An "Opportunity Space" Approach. Innovations, 8, (1-2): 259-269.

Rietveld, A. M., van der Burg, M., Groot, J. C. J., 2020. Bridging youth and gender studies to analyse rural young women and men's livelihood pathways in Central Uganda. Journal of Rural Studies, 5: 152-163

8 Appendix

Annexe 1. Liste de questions de relance pour animer la réflexion et l'inventaire des contraintes (Producteurs)

1. Quelles sont les contraintes que vous rencontrez dans l'utilisation des ressources naturelles (forêts, eaux, pâturage, etc.) pour la conduite de votre activité ?
2. Quelles sont les contraintes auxquelles vous faites face pour des formations professionnelles (agro-pasteurs extensif / mini-ferme semi-intensive / productrice de lait) ?
3. Quelles sont les contraintes auxquelles vous faites face pour écouler vos produits (bovin, lait, fumier)?
4. Quelles sont les contraintes auxquelles vous faites face pour accéder aux facteurs de production (terre, travail, capital) ?
5. Les relations entre les personnes avec qui vous vivez, que ce soit au niveau familial ou professionnel, constituent-elles des contraintes pour vous ?
6. Les services publics vous proposent-ils des services ou des mesures qui constituent pour vous des contraintes pour développer votre activité professionnelle (financement, informations, conseils, garantie, label…) ? Si oui, lesquels ?
7. Voyez-vous des contraintes pour le recyclage des sous-produits de l'élevage (fumier de parc) ?
8. Voyez-vous des contraintes pour réduire l'utilisation des intrants dans l'élevage (aliments bétail, produits vétérinaires, engrais minéraux, pesticides) ?
9. Voyez-vous des opportunités pour améliorer la santé de vos sols avec des produits naturels ?
10. Voyez-vous des contraintes pour améliorer la santé des animaux avec des produits naturels ?
11. Voyez-vous des contraintes pour que votre activité professionnelle (agro-pasteurs extensif / mini-ferme semi-intensive / productrice de lait) contribue à la richesse de la nature (environnement) où vous vivez ?
12. Voyez-vous des contraintes pour renforcer les liens entre les acteurs de la filière lait ?
13. Voyez-vous des contraintes pour diversifier votre activité professionnelle en rapport avec le lait ?
14. Voyez-vous des contraintes pour construire des changements de pratiques avec les acteurs de la filière lait ?
15. Voyez-vous des contraintes pour faire la promotion du lait local et des produits laitiers fait à base de lait local ?
16. Voyez-vous des contraintes pour que les relations entre les acteurs de la filière lait soient plus équitables ?
17. Voyez-vous des contraintes pour renforcer la proximité et la confiance avec les consommateurs des produits laitiers ?
18. Voyez-vous des contraintes pour améliorer les règles d'accès et d'utilisation des ressources naturelles nécessaires à la conduite de votre activité ?
19. Voyez-vous des contraintes pour améliorer la participation de l'ensemble des acteurs de la filière lait dans la recherche de solutions aux problèmes ?

Annexe 2. Liste de questions de relance pour animer la réflexion et l'inventaire des contraintes (Collecteurs de lait)

1. Quelles sont les contraintes auxquelles vous faites face pour des formations professionnelles ?
2. Quelles sont les contraintes auxquelles vous faites face pour écouler vos produits (lait cru)?
3. Quelles sont les contraintes auxquelles vous faites face pour accéder aux facteurs de production (terre, travail, capital) ?
4. Les relations entre les personnes avec qui vous vivez, que ce soit au niveau familial ou professionnel, constituent-elles des contraintes pour vous ?
5. Les services publics vous proposent-ils des services ou des mesures qui constituent pour vous des contraintes pour développer votre activité professionnelle (financement, informations, conseils, garantie, label…) ? Si oui, lesquels ?
6. Voyez-vous des contraintes pour le recyclage des résidus de votre activité ?
7. Voyez-vous des contraintes pour que votre activité professionnelle contribue à la richesse de la nature (amoindrir la pollution de l'environnement) où vous vivez ?
8. Voyez-vous des contraintes pour renforcer les liens entre les acteurs de la filière lait ?
9. Voyez-vous des contraintes pour diversifier votre activité professionnelle en rapport avec le lait ?
10. Voyez-vous des contraintes pour construire des changements de pratiques avec les acteurs de la filière lait ?
11. Voyez-vous des contraintes pour faire la promotion du lait local et des produits laitiers fait à base de lait local ?
12. Voyez-vous des contraintes pour que les relations entre les acteurs de la filière lait soient plus équitables ?
13. Voyez-vous des contraintes pour renforcer la proximité et la confiance avec les consommateurs des produits laitiers ?
14. Voyez-vous des contraintes pour améliorer les règles d'accès et d'utilisation des pistes rurales nécessaires à la conduite de votre activité ?
15. Voyez-vous des contraintes pour améliorer la participation de l'ensemble des acteurs de la filière lait dans la recherche de solutions aux problèmes ?

Annexe 3. Liste de questions de relance pour animer la réflexion et l'inventaire des contraintes (Transformateurs de lait)

1. Les ressources (eau, lait local) que vous exploitez pour votre activité constituent-elles des contraintes ? et si oui lesquelles ?
2. Quelles sont les contraintes auxquelles vous faites face pour des formations professionnelles (transformation du lait local) ?
3. Quelles sont les contraintes auxquelles vous faites face pour écouler vos produits ou accéder aux facteurs de production (espace d'installation, main d'œuvre, capital)?
4. Les relations entre les personnes avec qui vous vivez, que ce soit au niveau familial ou professionnel, constituent-elles des contraintes pour vous ?
5. Les services publics vous proposent-ils des services ou des mesures qui limitent le développement de votre activité professionnelle (financement, informations, conseils, garantie, label…) ?
6. Voyez-vous des contraintes pour recycler les sous-produits issus de la transformation du lait (local/poudre) ?
7. Voyez-vous des contraintes pour réduire l'utilisation des intrants dans la transformation du lait local/ en poudre ?
8. Voyez-vous des contraintes pour améliorer les matériels/équipements de transformation ?
9. Voyez-vous des contraintes pour améliorer la qualité de vos produits laitiers sans utiliser des produits de synthèse)
10. Voyez-vous des contraintes pour que votre activité professionnelle contribue à la richesse de votre environnement (entourage) où vous vivez ?
11. Voyez-vous des contraintes pour renforcer les liens entre les acteurs de la filière lait ?
12. Voyez-vous des contraintes pour diversifier votre activité professionnelle en rapport avec le lait ?
13. Voyez-vous des contraintes pour construire des changements de pratiques avec les acteurs de la filière lait ?
14. Voyez-vous des contraintes pour faire la promotion du lait local et des produits laitiers fait à base de lait local ?
15. Voyez-vous des contraintes pour que les relations entre les acteurs de la filière lait soient plus équitables ?
16. Voyez-vous des contraintes pour renforcer la proximité et la confiance avec les consommateurs des produits laitiers ?
17. Voyez-vous des contraintes pour améliorer les règles d'accès et d'utilisation des produits naturels nécessaires à la conduite de votre activité ?
18. Voyez-vous des contraintes pour améliorer la participation de l'ensemble des acteurs de la filière lait dans la recherche de solutions aux problèmes

Annexe 4. Liste de questions de relance pour animer la réflexion et l'inventaire des contraintes (Distributeurs de produits laitiers)

1. Quelles sont les contraintes auxquelles vous faites face pour des formations professionnelles ?
2. Quelles sont les contraintes auxquelles vous faites face pour écouler vos produits (lait cru et produits dérivés)?
3. Quelles sont les contraintes auxquelles vous faites face pour accéder aux facteurs de production (terre, travail, capital) ?
4. Les relations entre les personnes avec qui vous vivez, que ce soit au niveau familial ou professionnel, constituent-elles des contraintes pour vous ?
5. Les services publics vous proposent-ils des services ou des mesures qui constituent pour vous des contraintes pour développer votre activité professionnelle (financement, informations, conseils, garantie, label…) ? Si oui, lesquels ?
6. Voyez-vous des contraintes pour le recyclage des résidus de votre activité ?
7. Voyez-vous des contraintes pour que votre activité professionnelle contribue à la richesse de la nature (amoindrir la pollution de l'environnement) où vous vivez ?
8. Voyez-vous des contraintes pour renforcer les liens entre les acteurs de la filière lait ?
9. Voyez-vous des contraintes pour diversifier votre activité professionnelle en rapport avec le lait ?
10. Voyez-vous des contraintes pour construire des changements de pratiques avec les acteurs de la filière lait ?
11. Voyez-vous des contraintes pour faire la promotion du lait local et des produits laitiers fait à base de lait local ?
12. Voyez-vous des contraintes pour que les relations entre les acteurs de la filière lait soient plus équitables ?
13. Voyez-vous des contraintes pour renforcer la proximité et la confiance avec les consommateurs des produits laitiers ?
14. Voyez-vous des contraintes pour améliorer les règles d'accès et d'utilisation des pistes rurales nécessaires à la conduite de votre activité ?
15. Voyez-vous des contraintes pour améliorer la participation de l'ensemble des acteurs de la filière lait dans la recherche de solutions aux problèmes ?

The 13 principles of agroecology (Wezel et al., 2020)

1) **Recycling**: Preferentially use local renewable resources and close as far as possible resource cycles of nutrients and biomass.
2) **Input Reduction**: Reduce or eliminate dependency on purchased inputs and increase self-sufficiency.
3) **Soil Health**: Secure and enhance soil health and functioning for improved plant growth, particularly by managing organic matter and by enhancing soil biological activity. Reflect in diversity, synergies and resilience.
4) **Animal Health**: Ensure animal health and welfare.
5) **Biodiversity**: Maintain and enhance diversity of species, functional diversity and genetic resources, and maintain biodiversity in the agroecosystem over time and space at field, farm and landscape scales.
6) **Synergy**: Enhance positive ecological interaction, synergy, integration, and complementarity amongst the elements of agroecosystems (animals, plants, trees, soil, water).
7) **Economic Diversification**: Diversify on-farm incomes by ensuring small-scale farmers have greater financial independence and value addition opportunities while enabling them to respond to demand from consumers.
8) **Co-creation of Knowledge**: Enhance co-creation and horizontal sharing of knowledge including local and scientific innovation, especially through farmer-to-farmer exchange.
9) **Social Values and Diets**: Build food systems based on the culture, identity, tradition, social and gender equity of local communities that provide healthy, diversified, seasonally and culturally appropriate diets.
10) **Fairness**: Support dignified and robust livelihoods for all players engaged in food systems, especially small-scale food producers, based on fair trade, fair employment and fair treatment of intellectual property rights.
11) **Connectivity**: Ensure proximity and confidence between producers and consumers through promotion of fair and short distribution networks and by re-embedding food systems into local economies.
12) **Land and Natural Resource Governance**: Strengthen institutional provisions to improve land and natural resource governance, including the recognition and support of family farmers, smallholders and peasant food producers as sustainable managers of natural and genetic resources.
13) **Participation**: Encourage social organisation and greater participation in decision-making by food producers and consumers to support decentralised governance and local adaptive management of agricultural and food systems.