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Regional Sciences & Development: Countering Transhumance Conflicts through Graduates' Employability Enhancing Mechanisms in Benin

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Abstract

The settlement of transhumant pastoralists in their regions of origin, announced as a public intervention measure to mitigate transhumance conflicts in host communities, would not be economically rewarding. The issue at stake here stems from the search for solutions to community integration challenges through the isolation of the social groups concerned in the first place. In the early 2000s, the practice was to isolate the two groups on the same territory by respecting passageways. Later, in the 2020s, the State decided to separate them physically and territorially. However, literature on living laboratories has revitalised the original solution while stigmatising the flaws in physical isolation. Based on the principles from "Regional Sciences", existing economic opportunities rather than land use planning play a critical role in development. The study analyses how transhumant pastoralism shapes local economies and social tensions in the Agonlin region of Benin. A 2004-2005 budget-consumption survey was converted into a village-level Social Accounting Matrix to compute GDP shares, inter-sector linkages and income multipliers for farming, pastoral and other households. Results indicate weak crop-livestock linkages but a high income multiplier for pastoral households, suggesting untapped economic potential in case of physical isolation. In light of the literature (2021-2022) on "Living Laboratories (Liv.-Lab.)" as socio-territorial and economic innovations, the original solution was reframed as a "Living Laboratory" pilot (2005-2006) that organised community squads to guide herds, reportedly eliminating conflicts for one season but facing financial and governance shortfalls. This reframing allows us to highlight the shortcomings of applying the living laboratory to this social friction, rather than the physical isolation that comes with the sedentarisation of transhumant pastoralists. By expanding this experiment,

it would be possible to mobilise several academic disciplines, students from all three levels of higher education (bachelor's, master's and doctorate), teacher-researchers from several disciplines, financial partners and policy makers in order to effectively address conflicts related to transhumance. The benefits would be manifold in general, but visibility and employability, particularly for university education providers and graduates, would be respective gains.

Keywords

Conflicts Related to Transhumance, Regional Sciences, Economic and Socio-Territorial Innovations, Opportunities for Adapted Literature, Graduates' Employability

1. Introduction

Living laboratories (L.-L.) are mandated to play an important role in experimenting with economic and socio-territorial innovations (ESTIs) in order to rehabilitate harmony in the cohabitation of rival communities, and thus articulate sectors of activity in the economic fabric where appropriate (Klein & Pecqueur, 2017; Rey et al., 2022; Scaillerez, Joncoux, & Guimont, 2022). Indeed, a good articulation of the economic fabric's sectors of activity is a guarantee of sustained economic growth in the face of resource scarcity (Bwire, Asiimw, Tinyinondi, Kisakye, & Ayume, 2016). In developing countries, however, the exclusion of a significant fringe of the local community would mean the obliteration of certain sectors of activity that are just as important to the economic fabric of the community (Wijerathna & Karunagoda, 2007). Hence is the disarticulation of sectors of activity, leading to recurring poverty and a cycle of community conflicts. In fact, by trying to resolve one conflict, intervention could produce another if the solutions prove unsuitable. The parallel between the urban-rural conflicts described by Fonseca & Torre (2025), which the authors likened to urban sprawl and property speculation, the installation of urban infrastructure and the lack of regional management of agricultural production areas, and the transhumance-rural conflicts discussed in this paper would be outdated. The rationale for this is that the latter conflicts are essentially based on social animosity between the actors involved, which can be easily corrected by invoking the functional economy as a model for wealth creation, as Maillefert & Serra (2025) demonstrated. Initially, there was hardship due to climate change in the native environment of the transhumants (Hounnou, Dedehouanou, Zannou, Aguey, & Biaou, 2021; Hounnou, Dedehouanou, Zannou, Bakary, & Mahoussi, 2019a; Hounnou, Dedehouanou, Zannou, Agbahey, & Biaou, 2019b). The result is numerous social conflicts tearing apart the immigrant community from the goals of integrating agriculture and livestock farming in the host environment (Dedehouanou et al., 2014). As solutions to social conflicts with economic repercussions, researchers have advocated economic and socio-territorial

innovations (Klein & Pecqueur, 2017; Scaillerez et al., 2022).

The scarcity of resources has created devastating conflicts that are said to have annihilated certain local development policy efforts made in the past (Ballo, 2025). Conflicts over the shared management of natural resources would multiply, and would be the focus of most of the hotbeds of tension around the world, particularly in countries south of the Sahara (Pabame et al., 2000; Sangaré, 2001). The result would be a drastic decline in the wealth produced, due to missing or undeveloped sectoral linkages (Mukurati & Makonbe, 2017). When wealth is deemed insufficient for sharing, resentment would increase tenfold within local communities, with some casting anathema on others, in this case native farming households blaming non-native pastoralists. These conflicts would have become increasingly fratricidal, involving not only immigrants and residents, but also families on both sides of racial and activity lines. Settlement of transhumant pastoralists is opposed to wealth creation by heterogeneous actors on a territorial scale, as expounded by Maillefert & Serra (2025). The functionality economy model works out as social relationships entangle. The advent of democracy has, above all, rekindled unhealed inter-ethnic or racial friction, which serves as a breeding ground for a few politicians in search of popularity.

The relocation of labor to sectoral activities in a given environment could occur either through natural migration, or through development policy incentives (Ignaciuk, 2015). Likewise, sectoral activities could migrate with their specific workforce to more naturally favorable localities (Civardi, Pansini, & Lenti, 2010; Mbanda & Bonga-Bonga, 2018). In either case, contact between the new arrivals and the territory's former occupants would not be without clashes. These conflicts would generally have turned into bloody social conflicts in place of the sectoral complementarity expected between the communities in place. The answer to these conflicts would be economic and socio-territorial innovation (ESTI) (Klein & Pecqueur, 2017; Rey et al., 2022).

In the study region, the economic failures of resident farming communities are generally attributed to transhumant pastoralists (Dedewanou & Yebadokpo, 2005; van Driel, 2001). These included damage caused by oxen in crop production fields. Many other unspeakable faults are attributed to them, rightly or wrongly. The discrepancy, however, would be that while some native farmers would be sharpening their weapons to slaughter the transhumant animals, others would be preparing to welcome them in an atmosphere of conviviality. Among the latter would be the group of farmers who produce sorghum, the staple grain of transhumant pastoralists; the group of motorized vehicle drivers who take care of the lucrative transport of pastoralists from one camp to another, or of selling drinks at the camp. There are many other players who become impatient to reap benefices with the imminence of the transhumance period, so the fortunes are varied. Just as transhumance is a win-win situation for local players, the complementary nature of agriculture and livestock farming is a reality, despite the many obstacles put in the way by certain categories of members from both sides (Sangaré, 2001).

At the dawn of decentralization in Benin in the early 2000s, with the advent of elections for local political decision-makers, cohabitation between transhumant pastoralists and native farmers would be an important issue of legality and legitimacy, as has been the case elsewhere (MISAT, 2000; Hyden, 2016). Beninese legislation has long authorized national transhumance and recommended the delineation of passage corridors. On the one hand, regional transhumance is based on six routes connecting departure points to destinations via transit points or short-stay points. The village of Gbatèzounmè would be a host village, and transhumance there would be considered legal. On the other hand, the number of local actors opposed to transhumance would have increased due to the population's pronounced infatuation with the resources of the lowlands and especially those of the riverbanks (Sangaré, 2001). Hunting, fishing and out-of-season farming have become highly lucrative new activities in these previously untouched regions. Hence has derived the legitimacy of this issue at local level.

Another issue that would have remained hidden in the absence of a cross-sectoral analysis of the local economy would be the structuring of the various sectors and economic linkages (Dedehouanou, 1995; Njinkeu, Martin, & Bamou, 1998). In the present research, the important argument is based on the postulate that inter-community relations would rub off on cross-sectoral linkages between livestock, especially cattle, and crop production. The originality of this research stems from the question of how such violent conflicts between transhumant pastoralists and local farmers could they be resolved? Avoiding conflict by isolating the two groups is neither a social nor an economic solution. So, what mechanisms could be used to bring the two groups closer while paving the way for appeasement, or even complete social and economic integration in the medium and long term? The literature has suggested forms of territorial, social and economic innovation which, according to the authors, would provide remedies for healing community divisions. The mechanisms to be put in place for this purpose would be commensurate with the performance of multidisciplinary research in HEIs. The increased interest of policy makers and beneficiary communities would be assessed in terms of the well-being of higher education stakeholders. Similarly, the visibility of university providers and the employability of graduates would also be enhanced. The remainder of this research will focus on conceptually reframing the conditions for mitigating conflicts, particularly through socio-economic and territorial innovations, in this case living laboratories that could serve as potential sources of local economic growth, sites for learning in the social sciences (psycho-socio-anthropology), and visibility for university stakeholders, including graduates. This will be followed by the research methodology, results, discussion, and conclusion.

2. Towards Conceptualizing a "Living Laboratory (L.L.)"

Authors recommended Gross Domestic Product (GDP) and Gross National Product (GNP) as approximate measures of community material well-being (Paeth, Capo-Chichi, & Endlicher, 2008). So Scaillerez, Joncoux and Guimont (2022) rec-

ommended economic or socio-territorial innovation as a solution to the welfare deficit in the presence of community conflicts over resources.

Gross Domestic Product (GDP) and Gross National Product (GNP)

GDP and GNP are aggregates used by economists to measure economic growth (Dornbusch & Fischer, 1990). The second aggregate, GNP, takes into account not only the production of goods and services carried out by nationals on their territories, but also the wages and profits earned by them abroad. However, the first aggregate, GDP, which represents the value of the final production of goods and services provided in the course of a year on the territory of a village, is relevant to this study. And for good reason: GDP has been adopted because of the advantage it offers for assessing the participation of foreigners, in this case transhumant pastoralists, in local economic dynamics (Gillis, Perkins, Roemer, & Snodgrass, 2004).

GDP is defined in three ways in national accounting. The first is based on total expenditure on goods and services produced by the economy. The second way of looking at it is based on the total value of the final production of goods and services carried out in the course of a year on the village territory. The third approach is based on the total income of all members of the village's economy. The advantage of using this third approach is that it indicates the increased income of the various components of the local community. Economic growth is a sustained increase in GDP per capita over one or more periods. In this respect, GDP for a single period is not appropriate for assessing growth. However, to compensate for this shortcoming, the literature suggested the use of cross-sectoral linkage analysis as an important tool for forecasting the dynamics or growth of the economy under study (Bagachwa & Stewart, 1990).

Cross-sectoral linkages

Cross-sectoral linkages are of paramount importance in national and local planning (Dedehouanou, 1995). Indeed, simultaneous monitoring of overall macroeconomic balances and judicious articulation between the various sectors ensures economic coherence (Dedewanou & Yebadokpo, 2005). For this reason, one of the tools designed for this purpose, the cross-sectoral exchange table, is discussed in the paper. The table in question is used to show production flows from one sector of activity to another, and from the sectors of activity to the end user (consumer, investor or exporter). Sectors are classified horizontally (on the rows) as producers and vertically (on the columns) as users (Gakuru & Mathenge, 2012). As each producing sector is also a user of intermediate goods, its purchases appear in the columns of the table.

Each row shows production in terms of the jobs (including final demand) it is the subject of, while each column shows the costs and profits entailed by this production (Dedehouanou, 1995; Hounnou et al., 2019c, 2021). So, is it accepted that a snapshot of costs transforms into a production function with constant coefficients? It follows from this that, for any sector of activity, inputs and costs increase in parallel in proportion to expected output. Hence is the possibility of converting the flow matrix into a matrix of ratios, the technical coefficients (Miller & Blair,

2009). From the table containing the various coefficients, it is possible to construct a set of functions known as "production functions" for each sector, presented in the columns known as "Leontief production functions" (Keuning & de Ruijter, 1991). The technical coefficients give the linkages between the different sectors represented in the original matrix. These coefficients are usually denoted by aij (Alarcón, Ernst, Khondker, & Sharma, 2011), the indices referring, in order, to row i (for inputs) and column j (for outputs).

The mechanisms by which the economy functions are thus identified and assessed in the light of the efficiency or degree of productivity of the various sectors, on the one hand, and the coherence of the articulation of existing sectors, on the other.

Importance of economic growth

Identifying the main sectors of an economy and determining the various production flows between them on the one hand, and towards users on the other, has led to the types of linkages existing between sectors (Dedehouanou, 1995). Cross-sectoral analysis enables us not only to estimate the output required by each branch of industry to achieve certain final goods production targets over a given period, but also to assess the amounts and types of investment required to achieve these targets (Alarcón et al., 2011). The scope and scale of these cross-sectoral linkages, which are more a guarantee of the sectors' dependence on one another (Dedehouanou & Quarles van Ufford, 2000) than of their efficiency, explain the quality of the articulation between the different sectors (Boutonnet, Griffon, & Viallet, 2000). Assessments are therefore made on a case-by-case basis. However, the coherence of cross-sectoral linkages in the direction of economic growth is decisive for the economy concerned (INSAE, 2001). This is precisely the case for the increased productivity of production factors such as capital and human resources. As far as material resources are concerned, priority is given to the exploitation of local natural resources over imported ones, as long as such an option is not deemed contrary to the preservation of the environment.

Conceptualizing A "Living Laboratory (L.-L.)"

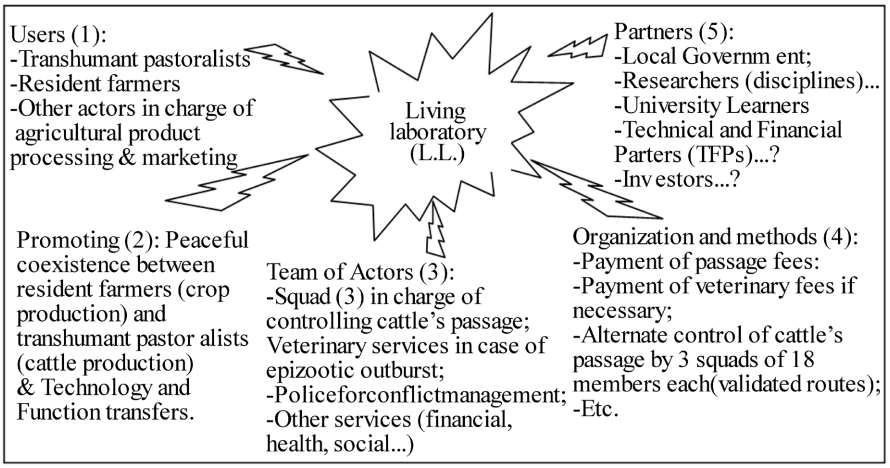
A "L. L." is a kind of economic and socio-territorial innovation (ESTI) (Scaillerez, Joncoux, & Guimont, 2022). While it could be considered both as a process, in which the methodological stages of research take place, and as a milieu, where the specific project takes place and stakeholders interact (Simard, Thivierge, Arbour, & Gaudreau Lavoie, 2022), the present research has opted for the second possibility, i.e. the milieu or territory, at stake in conflicting relations over natural resources. Similarly, the innovation in question in this research would be more socio-territorial than economic, as it has very strong socio-territorial foundations. Indeed, local and regional economic growth would be held hostage by the detestation of two social groups: transhumant allochthonous pastoralists and resident farmers. In the literature, the use of the "L. L." approach was acknowledged to mitigate conflicts (Scaillerez et al., 2022). However, there are a number of shortcomings to be avoided when using this theoretical approach. For example, as-

sessing the impact of this type of approach from the participant's point of view remains an unknown equation (Simard et al., 2022). In addition, certain themes that are essential to understanding the approach are not sufficiently addressed (Scaillerez & Tremblay, 2017).

Experimenting with cohabitation between resident farmers and transhumant pastoralists, the "L. L."

Unlike Folco and Stambouli (2022), who lived through the experience of the living laboratory (L. L.), the researcher here simply reported the results of the economic and cross-sectoral diagnosis in the presence of transhumance. The case study here is generally articulated on three levels: description of the mechanism put in place for the L. L., and analysis of the interactions within the compartments of this mechanism as a theoretical background, on the one hand. And then, as results, interpretation of the opinions drawn out after implementing this mechanism for one season (six months) of transhumance (2005-2006), on the other hand.

Description of the mechanism set up for the L. L. (*see* **Graph 1**)



Source: Adapted from Rey et al. (2022): Folco & Stambouli (2022).

Graph 1. "Liv. Lab." as an economic and socio-territorial innovation.

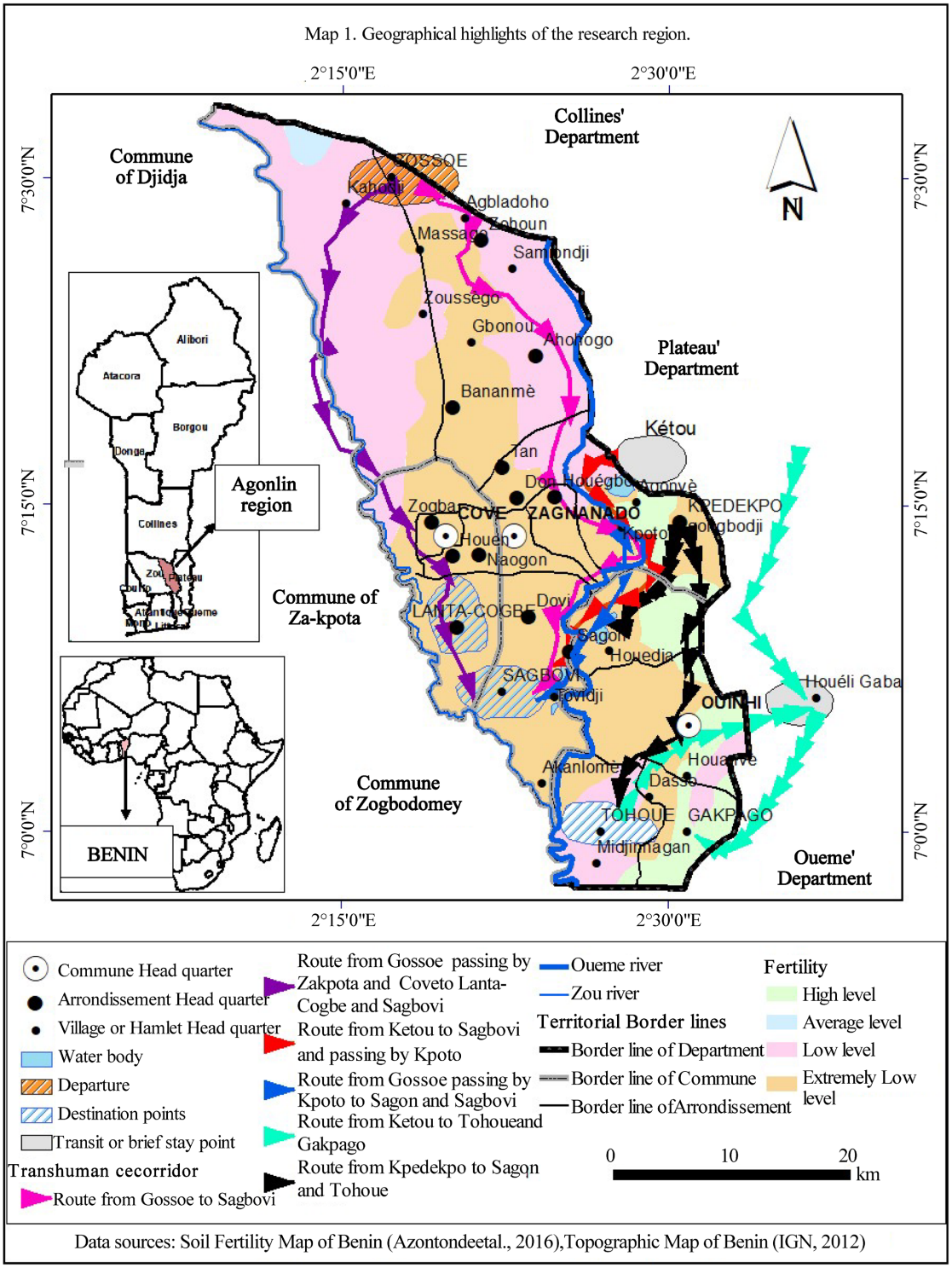
The mechanism set up for the "L. L." would have been based on the promotion of peaceful cohabitation between transhumant pastoralists and resident farmers (compartment 2). There would be three compartments made up of actors: (1), (3) and (5). Compartment (4) would contain the activities that could most accurately reflect the strategy implemented by the creators (5) of the "L. L.".

3. Methodology

Presentation of the research environment

The study region, "Agonlin", currently comprises 3 communes: Zagnanado to the north, Cove to the west and Ouinhi to the southeast (see **Map 1**). However, these localities share a past and present of harmony and human activities. With

regard to transhumance, a seasonal North-South flow of cattle and pastoralists, the commune of Zagnanado was the gateway to Gossoé.



Map 1. Geographical highlights of the research region.

Two routes are then used, the first to the east along the Ouémé River, from

Gossoé to Sagbovi via Kpoto; while the second follows the western corridor to Lanta-Cogbé.

Both host sites are large grass-covered plains along the Zou River. Some derivative routes are observed: the first from Gossoé-Sagbovi to the east, the second from Kpédékpo (Zagnanado) to Tohoué in the Ouémé river valley at Ouinhi, the third and fourth from the northern regions and Nigeria.

Soil and vegetation

Soils used for agriculture in the Agonlin region are severely degraded, with low to very low levels of fertility, on the one hand (see **Map 1**). The receptacles for transhumant oxen are hydromorphic valleys covered with grasses, but unsuitable for crop production, on the other hand.

Materials

The diagnosis was carried out in the village of "Gbatèzounmè", in the Banamè area of Zagnanado. It should be pointed out that the diagnostic restitution took place in all three (3) communes. However, experimentation with the living laboratory took place in Cove.

This research was carried out in two diachronic phases:

- A first phase in 2004-2005 to assess the current state of economic growth and cross-sectoral linkages in the presence of transhumant pastoralists at the launch of decentralization in Benin; and an experiment on the scale of one commune (Cove) in 2005-2006 to mitigate conflicts between the two (2) communities, resident farmers and transhumant pastoralists.

- A second phase in 2021-2022 to mobilize the literature on living laboratories, which led to the designation of the conflict mitigation mechanism implemented in 2005-2006 as the "L. L.".

Phase 2004-2005: Overview of economic growth and cross-sectoral linkages

Materials

The research site is a terroir where cattle sector activities are concentrated, bringing together a community of transhumant herders and resident farmers who are more or less open to inter-change between livestock and crop production. A brief census conducted in the terroir yielded about six hundred households composed of farmers, transhumant herders, others in charge of processing and trading and so on.

Two undergraduate students from the Faculty of Economics and Management at the University of Abomey-Calavi were involved in the survey. The data collected covered the budget-consumption of sixty (60) households in all, including three (3) transhumant pastoralists (Dedewanou & Yebadokpo, 2005). The interviewers benefited above all from training in economic anthropology in order to be able to conduct the research. This enabled them to live alongside the households and collect data on cash inflows and outflows and the activities carried out during one season (five months) of transhumance. The questionnaire, several dozen pages long, was collated and the interviewers forced to return to the research site to complete any missing information.

A preliminary census was conducted during the exploratory phase. The results identified approximately 600 households. The total population of households in the village area is distributed as follows according to main activity: 70% of indigenous agricultural households, 25% of households engaged in activities other than agriculture (trading, health work, teaching, food processing, etc.), and 5% of pastoralist households. The budget-consumption survey took more than six months and extensively documented the salient characteristics of the communities in terms of income and fixed expenses; ostentatious expenses were discussed taking into account their frequency for affectation. The same was true for instantaneous and non-current financial inflows (remittances, important sales, debt repayments, etc.).

Traditionally, public opinion would assume that transhumant herders are introverted. However, there are local resource persons within the communities who respond directly on behalf of them and to whom herders refer or who are referred to. However, at the height of conflicts, they have the magic of making themselves invisible so as not to attract attention. The apparent bias in the sampling was not a bias as such, because the concept of households among the ethnic group of herders does not have the same connotation in the host community. The distinction between the camp, the work unit, the expenditure unit, the income unit, the food unit, the storage unit and other units is still unclear to the outside observer.

The budget-consumption survey is very difficult to conduct. In addition, the need to keep to the schedule within the six-month period when transhumant herders are available, the limited material, human, and financial resources available, and many other constraints may have affected its reliability.

Methods

Sampling

$$\mathbf{nf} = \frac{\mathbf{n}}{1+\left(\frac{\mathbf{n}}{\mathbf{N}}\right)} \tag{1}$$

N: the total number of households in the village area; N = 600;

the degree of representativeness of the sample $n = 1/d^2$;

d: the chosen margin of error is 12.25%; hence n = 150;

nf: the total sample size is 60.

The sample size for transhumant households is 3, as their total number is less than 30.

Calculating three types of village terroir gross domestic product (*GDP*)

1) GDP based on the total income of all members of the economy

$$GDP = \sum W + IN + GOS \tag{2}$$

where ∑W is the sum of employee compensation by resident units,

GOS is gross operating surplus,

IN is taxes on production (net of operating subsidies).

2) GDP as total expenditure on the acquisition of goods and services produced

$$GDP = C + I + G + (X - M) \quad (3)$$

where: C = Consumer spending on goods and services;

I = Investor spending on business capital goods; G = Government spending on public goods and services;

X = exports; M=imports.

3) GDP based on value added (VA)

$$GDP = \Sigma VA + IN = \Sigma(TP - IC) \quad (4)$$

where VA is value added;

IN is net taxes, i.e., taxes on products minus subsidies;

TP is total production and IC is intermediate consumption.

Development of the Social Accounting Matrix (*SAM*) *and subsequent coefficients*

The data was then entered into an "Excel database" and transformed into a Social Accounting Matrix (SAM). This is the macroeconomic tool that is expected, as it has been used for GDP calculations, cross-sectoral analyses and deductions of income-oriented economic multipliers at village terroir level. The SAM does not constitute a model but a conceptual representation of statistical data. Thus, the SAM has to be transformed into an economic model before using it to simulate exogenous shock and analyze transmission effects through the interdependent SAM system (Gakuru & Mathenge, 2012). In this study, production activities, factors, and domestic non-governmental institutions are considered as endogenous, while all other accounts are exogenous.

Let's consider Tij as the matrix of transactions; tij is the payment from column j to row i. The accounting principle of double-entry allows to have total receipts of each account must be equal to total expenditures; in other words, the total of each row has to be equal to the sum of the corresponding columns.

Calculating the technical coefficients of the Leontief Matrix and identifying the main cross-sectoral linkages

The Leontief production matrix could be derived from the SAM by dividing each column value by the column total.

Calculation of the base multiplier (BM) per household type

$$Base\ Multiplyer = \frac{Total\ Income}{(\text{Basic Incom})} \quad (a)$$

Since total income equals basic income plus non-basic income, it follows that:

$$Base\ Multiplyer = \frac{Total\ Income}{(\text{Total Income} - \text{Nonbasic Income})} \quad (b)$$

Basic sector: export-oriented;

Non-basic sector: sector oriented towards local self-sufficiency.

If the right-hand side of this Equation (b) is rearranged by dividing the numerator and denominator by 'Total Income', we would have (Bendavid-Val, 1991: pp. 77-85):

$$Base\ Multiplyer = \frac{1}{\left(1 - Proportion\ of\ \ Income\ from\ nonbasic\ sectors\right)} \quad (c)$$

Let's recall that the so-called nonbasic sectors come from expenditures in the so-called nonbasic sectors multiplied by the fractions of these expenditures that generate local/regional income; and that expenditures in the so-called nonbasic sectors represent a certain proportion of total local/regional income.

$$Base\ Multiplyer = \frac{1}{Leakage\ Fraction} \quad (5)$$

The difference calculated in (c) represents the fraction of income that escapes outside the local/regional income multiplication path.

The Base Multiplier is thus calculated for all 3 types of households.

Method for analyzing interactions within the compartments of this mechanism

Semi-structured interviews were carried out with stakeholders to ascertain their opinions on the mechanism put in place, in the absence of participation. The interviews focused on knowledge/awareness of the context, the environment, potential partners and the issues at stake in the project: legitimacy versus legality of transhumance.

Phase 2021-2022: grounding literature on Living Laboratory (L. L.)

This phase was used to apprehend Economic and Socio-Territorial Innovation (ESTI) and thus to question the fact that the mechanism set up in 2006 to mitigate conflicts between transhumant pastoralists and resident farmers be assimilated to "L. L.". After perusing the aforementioned literature, it was agreed that the experiment set up in 2005-2006 by the locality of Cove in the Agonlin region could be described as a "L. L.". So, this phase above all facilitated the framing of concepts, and to approach transhumance in the "Agonlin" region as a problematic of economic and socio-territorial innovation, to control some of the key parameters determined during the first phase and so infer on the evolutionary trends to.

Limitations of the research

The promising results are very encouraging, despite the lack of depth in the data. Three years (1994-1997) of research into the livelihood of pastoral households in their places of origin (Dedehouanou & Djedjebi, 1997), followed by six months (2005-2006) of research in one of their places of destination in Agonlin, confirm not only the knowledge gathered but also the character traits observed. However, economic data are nearly two decades old and given current changes (population growth, policy shifts besides settlement of herders) could alter the findings.

4. Results

The total population of households in the study village area is distributed as follows according to main activity: 70% of local agricultural households, 25% of households engaged in activities other than agriculture, and 5% of non-local pastoral households. Cross-sectoral analyses in general, and those relating to gross

domestic product (GDP) in particular, provide information on the winners and losers of community integration. The uneven distribution of well-being across the three types of households would be the first significant warning sign, followed by cross-sectoral dysfunctions and finally the contribution of each group to local income generation.

Growth and Cross-sectoral linkages

The cross-sectoral linkage is used to show the flow of production from one sector of activity to another, and from one sector of activity to the end-user in the study terroir. The identification of sectors was guided by the concern to highlight the cross-sectoral relationships between cattle sector and crop production on the one hand, and between cattle sector and other sectors of activities, on the other. In addition, the concerns for aggregation and simplification of the matrix accounts matter.

Gross Domestic Product (GDP) of the study terroir (Gbatèzounmè)

Table 1 is an example of cross-sectoral exchanges with three sectors (crop production, cattle sector and other activities), the flow matrix. The sectors are classified horizontally (on the rows) as producers and vertically (on the columns) as users. Thus, Row 1 "Crop production" indicates that this sector produced items for use in the same sector, with a value equal to 62,578,100 F CFA, in the "Cattle" sector, with a value equal to 11,495,250 FCFA, and in the "Other activities" sector, with a value equal to 65,792,250 FCFA.

Table 1. Cross-sectoral exchanges in the study village (Flow matrix – Unit= 10 F CFA).

	Column 1 CP	Column 2 CS	Column 3 OA	Column 4 IC	Column 5 FC	Column 6 TE
Row 1: CP	6,257,810	1,149,525	6,579,225	13,986,560	130,501,030	144,487,590
Row 2: CS		113,400	84,000	197,400	30,261,150.3	30,458,550
Row 3 = OA	2,087,325		135,000	2,222,325	151,348,623	153,570,948
Row 4: IP	8,345,135	1,262,925	6,798,225	16,406,285		
Row 5: VA	136,142,455	29,195,625	146,772,723		312,110,803	
Row 6: TP	144,487,590	30,458,550	153,570,948			328,517,088

Source: Calculated from the Social Accounting Matrix, Gbatèzounmè (2004-2005). Legend: Crop production = CP; Cattle sector = CS; Other activities = OA; Intermediary consumption = IC; Intermediary production = IP; Value added = VA; Final consumption; Total production = TP; Total expenditures = TE.

Each row shows production in terms of the uses (including final demand) to which it is put, while each column shows the costs and profits generated by production. The equivalence between row totals and column totals is also valid for the totals of columns 4, 5 and 6, as well as for rows 4, 5 and 6 (Table 2).

From an expenditure perspective, GDP is defined as final demand minus net imports. This GDP is broken down by order of contribution and by sector of activity. Row 5 of table 1 gives the value added (VA) by sector, and the total VA,

which gives GDP (see Table 3).

Table 2. Gross domestic product by expenditure.

Sector of activities	FC	GFCF+ ΔS	X	−M	GDP/sector	%
Crop Production	241,568,450	−38,253,350	1,101,695,200	-	1,305,010,300	41.8
Cattle sector	39,777,830	178,950,670	83,883,000	-	302,611,500	9.7
Other activities	223,227,550	147,066,600	1,237,552,680	94,360,600	1,513,486,230	48.5
Total (GDP)	504,573,830	287,763,920	2,423,130,880	94,360,600	3,121,108,030	100.0

Source: Calculated from the Social Accounting Matrix, Gbatèzounmè (2004-2005). Legend: FC = Final consumption; M = Imports; X = Exports; GFCF = Gross Fixed Capital Formation also called "investment"; ΔS = Changes in inventories.

From a production point of view, GDP is the sum of VA by the various sectors; it is calculated from the balances of the production accounts. This GDP corroborates the results of Table 2 in terms of contribution in the form of sectoral VA.

Table 3. Gross domestic product by value added.

Sector of activities	TP	IC	GDP/sector	% of GDP
Crop production	1,444,875,900	83,451,350	1,361,424,550	43.6
Cattle sector	304,585,503	12,629,250	291,956,250	9.4
Other Activities	1,630,070,080	162,342,850	1,467,727,230	47.0
Total (GDP)	3,379,531,480	258,423,450	3,121,108,030	100.0

Source: Calculated from the Social Accounting Matrix, Gbatèzounmè (2004-2005). Legend: TP = Total production; IC = Intermediate consumption.

Table 4. Gross domestic product by distributed income.

Household types	Used Labour	Gross Operating Surplus (GOS)			GDP/Household type	% of GDP
		Production Factor	Income/Household type	Initial Stock		
AH	457,576,250	92,782,000	1,179,004,600	887,080,335	2,616,443,185	83.8
CSH	6,385,500	752,750	67,951,250	67,728,000	142,817,500	4.6
OH	37,437,850	8,534,000	12,881,598	187,059,515	361,847,345	11.6
Total (PIB)	501,399,600	102,068,750	1,375,771,830	1,141,867,850	3,121,108,030	100

Source: Calculated from the Social Accounting Matrix, Gbatèzounmè (2004-2005). Legend: Agricultural households (AH); Cattle sector households (CSH); Other households (OH).

The third approach to calculating non-deductible GDP in Table 4 relates to distributed income. From an income perspective, GDP is the sum of distributed income as described in the operating accounts. Looking at GDP per household, it is observed that agricultural households, representing around 70% of the total, are well rewarded (84% of GDP), in contrast to "Other households", representing 25% of the total, who obtained only 12%. Subsequently, pastoral households represent-

ing 5% of the total obtained around 5% of GDP (Dedewanou & Yebadokpo, 2005; INSAE, 2003).

Cross-sectoral linkages in the study terroir

The flow matrix is here converted into a ratio matrix, with the technical coefficients giving the cross-sectoral linkages existing between the three sectors of activity. Each column of Table 1 has been divided by its total (see Table 5). Column 2, for example, gives the input and output ratios for the "Cattle sector". Each cattle sector unit requires 0.0377 of "Crop products"; 0.0037 of "Cattle sector" products; 0.0000 of "Other activities" products and 0.9585 of value added (VA). The matrix (A) representative of Table 5 can be read in the form aij. For example, a22 = 0.0037 represents the output of "Cattle sector" intermediate goods required per unit of "Cattle" sector goods, while a13 = 0.0428 represents the output of "Crop production" intermediate goods required per unit of "Other activities" sector goods.

Table 5 integrates the sector interaction matrices in pairs. On the one hand, the "Crop production" - "Cattle" cross-sectoral linkage gives a ratio of 1:0, as there are no cross-sectoral linkages between these two sectors in the direction indicated above. On the other hand, the "Cattle" - "Crop production" cross-sectoral linkage gives a ratio of 27:1. Given that the basic monetary unit used to calculate the technical coefficients is the "F CFA", the local currency, the following interpretation follows from Table 5: for every 1 F CFA from crop production, the "Cattle" sector receives nothing. On the contrary, for every 1 FCFA from cattle sector, 0.0377 F CFA goes to crop production. In other words, for crop production to receive 1 F CFA from Cattle, the latter sector must carry out a production activity worth 27 F CFA.

Table 5. Matrix of technical coefficients and main cross-sectoral linkages.

	Technical Coefficients			Cross-sectoral Linkages			
	CP	Cattle	Others*	Crop Production Cattle		Cattle Crop Production	
CP**	0.0433	0.0377	0.0428	-	-	1	0.0377
Cattle	0.0000	0.0037	0.0005	-	-	27	1
Other activities	0.0144	0.0000	0.0009	Crop production - Others		Others* - Crop production	
Total purchases	0.0578	0.0415	0.0443	1	0.0144	1	0.0428
Value Added	0.9422	0.9585	0.9557	69	1	23	1
				Crop Production - Others		Others* - Crop production	
Total production	10,000	10,000	10,000	-	-	1	0.0005
				-	-	2000	1

Source: Calculated from the Social Accounting Matrix, Gbatèzounmè (2004-2005). Legend: "Others"* is used here for "Other activities"; "CP**" is used for Crop production.

Conditions for economic growth in the study terroir

When asked to identify the vital sector of the local economy in the study terroir,

the informed analyst will opt for the "Other activities" sector, which seems to generate substantial resources through exports (cf. Table 2). Particular attention will also be paid to the linkages between this sector and that of crop production, whose products it adds value to. Indeed, of all the cross-sectoral linkages analyzed in Table 5, the one concerning "Other activities" - "Crop production" appears to be the strongest. This indicates a strong 'upstream' economic linkage between the two sectors.

In this respect, gross fixed capital formation (GFCF) provides an indication of the dynamics thus injected into the local economy. The "Cattle" sector seems to be in the best position in terms of GFCF, as it requires a stock of cattle necessary for the pursuit of its activity (cf. Table 2). The non-existence of the "Crop production" - "cattle" cross-sectoral linkage (1:0) paints an anachronism here, as the usefulness of draught oxen in crop production is well known to farmers. This lack of interest among farmers in the use of cattle products for production purposes would be similar to the situation of cattle pastoralists who do not make use of products from the 'Other activities' sector in the conduct of cattle farming. There is undoubtedly an insufficient transfer of technical functions between players.

Base multipliers (BMs) oriented towards stakeholder income

Based on the social accounting matrix, the base income-oriented multipliers of the three main stakeholders are calculated (see Table 6).

Table 6. Basic income-oriented economic multipliers (BEM) by stakeholder group in the study terroir.

	Agricultural households	Pastoralist households	Other households
BEM	2.17	14.41	4.07

Source: Calculated from the Social Accounting Matrix, Gbatèzounmè (2004-2005).

BEM of agricultural households = 2.17 (1 F CFA injected into the local economy through agricultural households generates 2.17 F CFA);

BEM of pastoralist households = 14.41 (1 F CFA injected into the local economy through pastoralist households generates 14.41 F CFA);

BEM of other households = 4.07 (1 FCFA injected into the local economy trough other households generates 4.07 F CFA).

Experimenting a "living laboratory"

The most convincing result was that there were no conflicts in the commune of "Covè" during this period. All it took was the creation of three (3) squads in charge of the passage of cattle, with a seal of approval from the commune council, and the traditionally belligerent players calmed down.

The situation before the implementation of Liv.-Lab.

Local farmers are increasing opportunities to earn income from cereals and other food crops by partially producing herders' basic necessities. In terms of trade, exchanges have led to small pockets of activity transfer, with the local people beginning to master milk processing, while some local children are learning how

to drive oxen from herders. The violence of inter-community conflicts in no way detracts from the grandeur and beauty of the transfer of activities and then of work between the two groups, and does not bode ill for the precariousness of life. These processes of community integration could have been emulated in the presence of mechanisms for pacification and revitalization. Like industrial communities in decline, the expected rehabilitation is reflected in the bridges to be built between these groups with collective destinies. At this point, it is important to take stock of the successes and failures.

Successes of the liv.-lab.

The deputy chief of police for Cove during the experimental period came from the same ethnic group as the pastoralist transhumants; this strengthened the climate of trust among pastoralists. The monetary payments required for the passage of oxen have not changed, while the services offered have increased and have above all prevented scuffles between transhumant pastoralists and resident agricultural communities. In fact, herders did not have to cope with herding on their own during this season, but benefited from the support of members of the three squads. They also had people to talk to about the problems of epizootic diseases affecting their animals and the social well-being of the members of their community, and no longer had to solve these problems in panic. Fields set up on riverbanks or passageways are no longer a bone of contention between farmers and pastoralists, but are directly decommissioned by the members of the squads who have been given the prerogatives.

Failures of the liv.-lab.

The financial resources generated after five months of transhumance had been spent while ignoring the essential mission of the supervisory squads. The service providers had not been paid, and the coffers of the committee in charge of the "Living Laboratory" were empty. The players who contributed directly or indirectly to pacification had not perceived how this project impacted on their daily lives, apart from a significant increase in requests in the field outside the offices.

By the same token, disciplines such as Economics, Socio-Anthropology, Social Psychology, Andragogy, Ethnography, Linguistics, Engineering Techniques and Sciences, Regional Sciences, Agronomy and others should support economic and socio-territorial innovations in order to mitigate conflicts and ultimately reduce the mechanical role of supervision squads. These shortcomings have deprived the economic and socio-territorial innovation studied of learning grounds for students in the relevant disciplines (Dedehouanou, 2022). Also, have they deprived the liv.-lab. from addressing perspectives such as the motivation of respondent actors, the role of public authorities and civil society, and so on.

The settlement of pastoralists in their native environments

The shocking statistics that led the state to consider settling the transhumant herders were based on dozens of cattle slaughtered annually by locals and the resulting losses of human life caused by herders. It should be noted that the latter community is heavily armed, with weapons that were initially smuggled into Ni-

geria and more recently drawn from the stockpiles of terrorists. Unlike the Guinean zone in southern Benin, Tidjani et al. (2025) reported that 52.29% of their sample of transhumant pastoralists in both areas, one Sudano-Guinean and the other Sudanese, had experienced conflicts with farmers, resulting in collateral damage in the form of blows and injuries to people and animals (38.64%), property damage and animal slaughter (15.13%), and animal poisoning (11.97%).

The rationality of economists who deplore physical separation through settlement is linked to transaction volumes, which increase exponentially during the transhumance season, which lasts three months at worst and six months at best.

The role of regional sciences is to help the economic fabric, which was still in its infancy in 2005, to flourish and to raise it by removing the obstacles to its development; that is to say, the economic contribution of transhumants, the ongoing integration of the agriculture and livestock sectors, the transfer of activities, and the professional retraining of local actors are all signs of hope that development would be achieved.

5. Discussion

If the Agonlin region has a supply of pasture for cattle feed, transhumance could satisfy the region's demand for land fertilization.

Balance of cross-sectoral linkages or otherwise

Improving ratios, or simply strengthening cross-sectoral linkages in favor of greater integration between crop production and cattle sector and better valorization of local resources, were emerging issues. In Benin, the value of a system that fully integrates the two sectors was well established (Dedehouanou et al., 2014; Koura et al., 2015; Kpanou et al., 2015). In some parts of the country, including the study region, such an option is still confronted with the deficit of relations between the actors who pilot the said sectors (Pabame et al., 2000; Tidjani et al., 2025). So, should we admit that the integration of these sectors of activity, although apparent due to their presence within households and even on the terroir, is not technically so? Indeed, watertight compartments are artificially created between the "Crop production" and "Cattle" sectors, which in reality must complement each other for a dynamic and prosperous economy (Sangaré, 2001). However, integration suggests reciprocity in investment from one sector to the other, as in the relationships described by Koura et al. (2015) and Kpanou et al. (2015), which is not the case in the study region. The results suggest that transhumant herders buy only basic agricultural products and make little use of products already processed in the locality. This is also the case for the "Other activities" sector, which receives no demand from the cattle sector. The transfer of activities and skills between the "Other activities" and "Cattle" sectors would flourish if adequate investments were made in durable goods in line with integration (Bassolé, 1990).

In other words, resident farmers need to be more conciliatory with transhumant pastoralists if there was to be a real transfer of functions between the two

communities. The substitution of draught oxen for human energy would be a potential gain for resident farmers (Sangaré, 2001). The competitiveness of cattle production in a context of increased globalization is a guarantee of the need for transhumance on the part of pastoralists (Boutonnet et al., 2000), who, like the Lake Nokoué fishing community (Kpanou et al., 2022), clearly have a transhumant lifestyle. So, does the harmony of a definite integration between crop and cattle production lie only in the creation of local committees charged with guiding transhumants during their stay of a few months in the Agonlin region? In light of the approach used in this research and based on the findings of Tidjani et al. (2025), the formal organization of transhumance in host regions would make it possible to curb 24.48% of the causes of illegal occupation of cattle passage sites. Motivating the players in both communities is the key to successful integration (Pabame et al., 2000). To this end, the mobilization of a number of related disciplines—some to influence the prevailing negative trends, others to reinforce the positive ones—is to be rehearsed.

Significant contribution of transhumance to the host locality

While activities central to crop production such as ploughing, weeding and product transport are expected to benefit from the substitution of draught oxen for human energy (Kpanou et al., 2015), there is evidence of low labor productivity in general and low growth in the local economy concerned (Bagachwa & Stewart, 1990; Sangaré, 2001). And for good reason, latent conflicts have not facilitated the integration of cattle sector to the crop production sector (Pabame et al., 2000).

In terms of base multipliers (BMs), the results clearly separated the two communities (Scaillerez & Tremblay, 2017: p. 5): "frugality economy" for resident farmers, and "happy sobriety economy" for transhumant pastoralists. However, the fact that transhumant herders buy nothing from the "Other activities" sector somewhat mitigates the sobriety attributed to this group of actors. Could this be the result of insufficient transfer of activities from the transhumants to the resident communities, who engage in processing on the terroir? Could the fact that these two types of economy co-exist side by side be seen as participating in a recomposition whose results are rarely known in advance? (Radjou & Prabhu, 2015). This is the place to index the role of the ESTI, a living laboratory, and its multidisciplinary research support in the inflections to be given to formerly conflicting relationships in order to convert them into complementary relationships (Rey et al., 2022).

Living Laboratory, strengths and weaknesses

Economic and social innovation (*ESI*): *the living laboratory's approach and its embedded environment*

The primacy of economics over the sociology of communities justified the somewhat cavalier promotion of the Living Laboratory in 2005, whereas the co-construction of the legitimacy of such a project would have made it possible to reap results with "oil stain" effects (Folco & Stambouli, 2022). On the contrary, the absence of such legitimacy doomed the project to forgetfulness, justifying the

lack of visibility of the positive effects of the experiment in the eyes of multiple stakeholders (Farag & Komendantova, 2014), living and cohabiting in both competitive and cooperative modes; the inability to mobilize interpretive frameworks likely to lend credibility to the mechanism put in place; the insufficient inclusion of stakeholders (key players in the environment and above all the failure to take into account the socio-economic relationships between them) that would give a certain authority to the experiment (Rey et al., 2022), and finally the unlikelihood of persuading central public authorities to invest in the project (Folco & Stambouli, 2022). Although ESTI, in this case the living laboratory, has shown its limits in terms of standard models for evaluating either the process or the tangible and intangible effects at various levels (individual-organizational-territorial) (Rey et al., 2022); on the one hand, the involvement of partners (actual number of exchange meetings, partnership agreements) and the building of trust between actors could be assimilated to intangible effects. On the other hand, innovations in technology and farming practices, the drastic reduction in cases of malnutrition, sustainable soil conservation (organic fertilization, avoidance of soil compaction, installation of grasses on grazed rangelands etc.) could be counted among the tangible effects. A range of methods-tools-approaches would then depend on the research (e.g. ethnography, case study, facilitation, focus group, evaluative matrix and questioning...); and on the disciplines mobilized, socio-anthropology, linguistics, psychology, engineering techniques and sciences, regional sciences, agronomy, agro-economics etc. (Dedehouanou, 2022).

Interactions within and between the various compartments have been obscured by a lack of transparency in a global decentralization process in the making, with varying degrees of slippage (Bardhan & Mookherjee, 2006). Setting up a living laboratory can be a highly enriching exercise for a community, but studies on the spin-offs of this kind of exercise are still needed (Simard et al., 2022). In the implementation of the economic and socio-territorial innovation (ESTI) that was the case of the living laboratory in real territory (Cove) with a view to mitigating conflicts linked to transhumance, actors may not have perceived that ESTI should be conceived and implemented as innovative interventions capable of adapting to the coevolution and non-linearity of socio-economic changes, the interdependence of causes and effects, the emergence of interactions between actors, and the unforeseen effects of their projects (Rey et al., 2022). The partners of such a project are multiple, i.e. the communal council (CC), a multidisciplinary team of scientists and researchers, the technical and financial partners (TFPs), the private investors, the civil society organization (CSO) etc. (Liefooghe, 2022; Simard et al., 2022), in this case the four P's: public-private-producer partnership (Rey et al., 2022). It was advocated that education providers in general and researchers in particular conveyed into such a process the added value of an independent broker (Liefooghe, 2022).

Designating the Communal Council (CC) as the sole stakeholder in piloting the living laboratory project implemented at Cove (Agonlin) in Benin would have

been a tall order. Indeed, the impregnation of the approach has currently revealed the lack of involvement of three major players within the "Partners" compartment (5): a multidisciplinary team of scientists and researchers (Rey et al., 2022), technical and financial partners (PTFs), and investors (Fuglsang & Hansen, 2022). Above all, certain players were missing: the central government and the TFPs. There was a need for introspection of the system in place in technical, organizational, financial and human terms, as transhumance is not just a local phenomenon, but a national one. The absence of the central government has proved to be an obvious shortcoming. Similarly, the non-involvement of TFPs is an indisputable shortcoming that has isolated ESTI from existing models and deprived it of lessons from elsewhere (Liefooghe, 2022).

On the one hand, the choice of the living laboratory as a medium rather than an approach was a significant constraint (Simard et al., 2022). Rationality at base would explain the above shortcomings, as a scientifically orchestrated approach would prune some of them. Not only would partners, users and stakeholders operate according to duly developed methodologies, the authors asserted that the approach being developed would above all guarantee collaboration between stakeholders, and the adaptation of actions to user needs.

On the other hand, the environment-based project does not seem to have contributed to the reconfiguration of relations between stakeholders, farmers and transhumant pastoralists, insofar as it has been a question of conflict avoidance rather than resolution. However, in order to play the role of "vector of territorial recomposition", i.e. to facilitate a "democratic reconfiguration", a territorialized "living laboratory" should enable a community of stakeholders to co-construct solutions adapted to local needs (Liefooghe, 2022).

The participants seem to have perceived the project as a series of one-off activities concerning transhumance, of which they were unaware of the details of the operating mechanism. Whereas the living laboratory brought out needs on the part of actors who are in fact at the interface between farmers and transhumant pastoralists. According to Fine (2015), the "good" produced by effective engagement in local development is most often concrete and important for society as a whole, whereas this is not the case here.

Economic and socio-territorial innovation (*ESTI*): *a living laboratory to facilitate the employability of graduates from universities*

The multi-disciplinary presence required by the approach makes it a testing ground for applied development research in a real-life setting, an experience from which all three levels of university education (bachelor's, master's, doctorate) could validly benefit (Scaillerez, Joncoux, & Guimont, 2022; Simard et al., 2022). This is a dimension that has been little explored in the past, and for good reason: the skills that companies are looking for and that are useful in implementing this innovation were less prized in higher education. This new situation will inspire university education providers to pay more attention to behavioral or cross-disciplinary skills and to methods for infusing them into learners, such as tutoring, mentoring

and coaching.

Politics has eclipsed economics

While equity and efficiency have good roles to play in deciding whether or not to provide development infrastructures in developed countries (Bardhan & Mookherjee, 2006), it has been clearly demonstrated that political economy plays a large part in public choices for developing countries in general and African countries in particular (Dedehouanou, 2014). In a local institutional context subject to the national injunction to experiment with new territorial policies deemed more efficient and politically coherent (Liefooghe, 2022), in this case the settlement of transhumant pastoralists, is there room for research, especially since rumors about social conflicts are more amplified than relevant research findings?

Indeed, researchers would recommend requalification or rehabilitation in general in the event of devitalization due to community conflicts, whereas political decision-makers who abhor conflict would recommend the installation of a separation wall. There is no doubt, however, that political actors pay little heed to contradictions between the desiderata of beneficiary populations and their conjecture (Rey & Rétif, 2020). Contrary to Ségas' (2025) assumption, informal public/private coalitions which rule regional development are rarely stable over time. In fact, a shared goal changes with the change from one coalition to another. However, Rey et al. (2022) proposed a middle ground whereby research would mobilize various "approaches-methods-tools", as well as theories of social action and/or change, while precedence would be given to policy-makers through instruments of public action (IPA) that could not be differentiated from "Living Laboratories".

6. Conclusion and Implications for Regional Development

Crop production and cattle sector, far from constituting independent sectors of activity, as farmers in the study terroir assume, are in fact linked and complementary. Low labour productivity in agriculture is not inevitable, as it can be improved by integrating draught oxen into crop production. Ploughing, weeding and, above all, transporting agricultural produce can be made easier by substituting draught oxen for human energy. The resulting labor savings could then be reinvested in other productive activities. Soil fertility can also be improved by keeping cattle on the land for varying lengths of time. These functions, already exploited elsewhere, need to be created or reinforced in order to improve the performance of existing or new cross-sectoral linkages, and above all for sustained economic growth.

Continued growth in GDP requires stronger cross-sectoral linkages. To achieve this, the presence of transhumant herders should be accepted, if not tolerated. In fact, it appears that the "cattle" sector contributes 9.4% or 9.7% to GDP, depending on the production or expenditure option respectively. These results place this sector in last position among the three defined; however, the presence of "upstream" cross-sectoral linkages between this sector and the "Crop Production" sector indicates not only that cattle management makes use of inputs from crop production, but above all that transhumant pastoralists take the plunge to go to resident

farmers. Similarly, the presence of downstream economic linkages (still weak) between the "cattle" and "other activities" sectors suggests the existence of human contacts between the players involved. It is therefore essential to strengthen these contacts between the two communities in order to facilitate the transfer of functions, i.e. the creation of "downstream" and "upstream" economic linkages, which are currently non-existent.

To achieve this, local authorities need to develop a public communication plan that takes into account the positive aspects of the presence of transhumant pastoralists. These include, above all, the availability of meat products, not forgetting the no less important functions of draught oxen for both "crop production" and "other activities". The target groups primarily concerned are those who derive their income directly from transhumance, such as millers, motorcycle cab drivers and tobacconists. These actors would serve as relays for advocacy in favor of transhumance.

In terms of conflict prevention, the organization of civilian squads/brigades responsible for guiding transhumant cattle through the region in general and the locality in particular would facilitate cohabitation between the two communities. As for the transhumant herders, they must not only adhere individually to the discipline thus instituted, but also cooperate in discouraging the lone riders lurking in their ranks. However, the availability of abundant pastures and watering holes, reflecting the carrying capacity of the environment, will continue to be a major obstacle to the arrival of more and more transhumant herders, if management efforts were insufficient. This is when the living laboratory and the cohort of disciplines required to diagnose and find solutions come into its own.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix

To construct a Social Accounting Matrix (SAM) such as the one below, the technical work is facilitated by several assumptions:

The contiguity of the local areas prevents any dispersion of actors outside of the arrivals and departures of transhumant herders.

Agregated Social Accounting Matrix of Gbatezounme, Locality of Zagnanado/Agonly Region (Values are in 10 francs CFA, local currency).

	Agriculture	Livestock	Other sectors	Production factors	Labor	Expenditures from enterprises	Agri. farm households	Liv. farm households	Other households	Govern ment	Capital stock	Outside World	Total/Line
Agriculture	6,257,810	1,149,525	6,579,225				17,646,870	1,969,400	4,540,575		−3,825,335	110,169,520	144,487,590
Livestock		113,400	84,000				3,191,283.33	536,500	250,000		17,895,067	8,388,300	30,458,550.3
Other sectors	2,087,325		135,000				16,192,815	2,395,490	3,734,450		14,706,660	123,755,268	163,007,008
Production Factors	8,729,710	1,477,165											10,206,875
Labor	48,694,950	622,000	823,010										50,139,960
Income to enterprises	78,717,795	11,173,010	47,686,378										1,375,577,183
Agri. farm households					45,078,240	117,900,460		25,000					163,003,700
Liv. farm households					605,900	6,795,125						16,630,977.5	24,032,002.5
Other households					3,632,810	12,881,598				712,548		2,456,296.5	19,683,252.5
Government							294,864.8	144,757.75	75,643.75				515,266,3
Capital stock		15,923,450	98,263,335				52,568,935.5	17,482,950	6,479,290	−197,281.7		−100,044,286	90,476,392.8
Outside World			9,436,060	10,206,875	823,010		73,108,931.4	1,477,904.75	4,603,293.75		61,700,000.8		161,356,076
Total/ Column	144,487,590	30,458,550	163,007,008	10,206,875	50,139,960	137,577,183	163,003,700	24,032,003	19,683,253	515,266	90,476,393	161,356,076	3,121,108,030

Source: Données d'enquête de terrain (2004-2005).Legends: Row1 to Row3/Column1 to Column3: Activity sector; Row7 to Row9/Column7 to Column9: three types of households (Agricultural farm, Livestock farm/pastoralist, other activities). In the rows, there are incomes accruing to activity sectors, institutions and others, while in the columns there ares expenditures from activity sectors, institutions and others.

A single market implies a certain homogeneity of prices, except that exchanges between the local community and the herders are at a ratio of 1:3 in favour of the local communities. The apparent fluctuation in prices is balanced over time, while it is to the detriment of foreigners. The difference in diet mainly contrasts the local communities, who consume cereals stored after harvest, with the herders, who consume milk, giving rise to some trade. The Fulani rarely leave the village to seek out exotic consumer products, whereas the locals do.

Data from a few additional households not included in the consumption budget survey are used to verify that the loop is closed and to make adjustments if necessary.