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How niche-regime contractual arrangements foster agri-food transition? An in-depth case study in the French dairy system

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Abstract: Sustainability issues in agri-food systems require equitable relationships in value chains and ecological production practices. This paper examines the adaptations of agri-food contractual arrangements between niches and regimes for sustainability transition. Combining the Multi-Level Perspective with New Institutional Economics approaches, we analyse a niche-innovation in the south-west of France, created by a small group of dairy farmers seeking economic safeguarding through better remuneration and autonomy. Through in-depth interviews and regular meetings from 2020 to 2023, we identified how the dynamics of contractual arrangements evolved, allowing this niche-innovation to initiate a sociotechnical reconfiguration of the agri-food system. Recognised as a market niche, this innovation has demonstrated significant potential in enhancing farmers' economic stability by enabling better negotiation leverage and market access through tailored contractual arrangements. Our findings highlight the importance of adapting niche-regime contractual arrangements (NiReCa) for fostering regional agri-food systems, opening a research agenda on their role in transition studies.

Keywords: sustainability; agrifood sector; niche-regime interactions; contracts; territorialised dairy system

1. Introduction

Over the past decades, transition studies incorporated insights from various disciplines and theoretical backgrounds to understand the multifaceted dimensions involved in transition processes towards greater sustainability (Geels, 2022). One of the most prominent frameworks developed is the Multi-Level Perspective. This framework recognises that transitions are profoundly influenced by the dynamics between sociotechnical landscape, sociotechnical regimes, and niche-innovations (Geels, 2002). The sociotechnical landscape consists of deep structural, heterogeneous, and external factors, such as economic growth, politics, cultural values, and norms values. While regimes embody enduring configurations of routines, practices and rules, niche-innovations operate as loci of innovation (Geels, 2004; Ollivier et al., 2018), driven by processes of experiential learning, price/performance improvements, and support from influential groups (Geels, 2002). According to Seyfang and Smith (2007), niche-innovations encompasses socially oriented innovations rooted in values distinct from the mainstream.

Niche-innovations development and the dynamics of niche-regime interactions are central in transitions and led to significant contemporary debate (Dutt, 2022). The success of a niche-innovation is influenced not only by internal processes but also by interactions with the current regime and the broader sociotechnical landscape. The interactions between niche-innovations and regimes are complex and overlapping, adding layers of complexity to understanding (Elzen et al., 2012). These interactions are not static entities with distinct hierarchical boundaries, but are rather dynamic and multifaceted processes.

However, theoretical discussions have predominantly focused on niche-innovations and landscapes, emphasising sources of transition outside the regimes (Runhaar et al., 2020). This focus often neglects an endogenous conceptualisation of transition, i.e. change from within the regimes. Studies have also frequently underestimated the joint analysis of coordination mechanisms that enable the coexistence and coevolution of niche-regime. Discussions of sociotechnical transitions often look at the central role that actors themselves play in generating, sustaining, and overthrowing everyday practices (Shove and Walker, 2010), but little question the device by which niche-innovations and regimes actors interact, such as contractual

arrangements (Cholez and Magrini, 2023). In response to these ongoing issues, our paper aims to examine the adaptations of ‘niche-regime contractual arrangements’, hereafter referred to as NiReCa, which are pivotal for the transition in agri-food systems.

Contractual arrangements are the mechanisms that coordinate interactions and relationships between actors for their market transactions of goods and services (Williamson, 1985). These arrangements, which can be formal (written contracts) or informal (verbal agreements), delineate the rights, duties, and responsibilities of each party involved (UNIDROIT et al., 2015). In economic terms, contractual arrangements are crucial for facilitating transactions and reducing uncertainty (Williamson, 2000, Sykuta and Harvey, 2004). Various forms of these arrangements provide different levels of cooperation and learning (Ménard, 2021, Cholez and Magrini, 2023). As suggested by Magrini (2023), a highly coordinated value chain could operate as a responsible innovation system, depending on the innovation function activated through the collective coordination allowed by the chosen contractual arrangements.

In this paper, given the relative underrepresentation in scientific literature of NiReCa, we investigate a deep understanding of the adaptation (or reconfiguration) of NiReCa by considering the case of the agrifood sector for several reasons. Firstly, agri-food systems significantly impact local territories by being closely linked to essential resources such as land, water, and human labour, thereby directly influencing the sustainability and resilience of local economies. Understanding their dynamics allows agricultural practices to be redesigned to minimise environmental impacts and promote biodiversity. Secondly, research in this area can identify innovations and practices that foster more sustainable and equitable food production. Local initiatives, such as territorialised agri-food systems, can serve as drivers for larger-scale agricultural and food policies, as well as other bottom-up initiatives (see Pachoud et al. 2022 for a review).

The dairy system offers a powerful case study. The deregulation of European dairy markets started in 2004 with the reduction of guaranteed prices, followed by a progressive increase in milk quotas until their permanent abolition in 2015. According to Dervillé and Fink-Kessker (2019), these landscape changes weakened production systems, such as small farms in mountains and low-density areas such as those in the south-west of France, while benefitting others, such as the Irish and Northern European systems. New crises, including the Covid-19 pandemic and the Russia-Ukraine war, alongside stricter environmental regulations such as the EU Farm to Fork Strategy (2020), have exposed the dairy system’s vulnerabilities. In Europe, notably in France, farmers protest their dissatisfaction with agricultural policies, concerns about pricing and challenges posed by international competition. Farmers are expressing their grievances through demonstrations to draw attention to the difficulties they face, and to advocate for changes or support from authorities.

Within this context, niche-innovations such as territorialised dairy systems have emerged, particularly in France, as initiatives started by small groups of farmers looking for a more equitable distribution of value (Barbe et al., 2020). These niche-innovations aim to fortify farmers’ non-cost competitiveness, fostering value creation through territorial claims. These niche-innovations not only promote the image of local products, but also incorporate environmental claims, adhering to public standards such as organic certification label, or utilising custom-tailored standards (Siqueira et al., 2023).

We conducted an in-depth empirical investigation of a dairy niche-innovation created in 2018 by a small group of dairy farmers in south-west France. Our research examines the adaptation of a spectrum of NiReCA, ranging from cooperative to individual contracts between farmers and incumbent dairies to buy and sell milk, as well as the new contracts that progressively structure the niche-innovation at the roots of a new territorialised dairy system. The case study is based on comprehensive data covering a significant period, which enable us to capture the nuanced evolution of NiReCA and their role in the ongoing transition.

The paper is structured in five sections. The next section presents the analytical framework. Section 3 presents the deep case study choice and the methods used for collecting and analysing empirical data. Section 4 presents and discusses the results. We conclude in section 5 with key findings and implications for researchers and practitioners.

2. Niche-regime interactions with a neo-institutional economics approach

Geels (2004) argues that niche-regime interactions involve a range of strategies, including struggles, alliances, exercise of power, negotiation, and cooperation. These interactions are not static entities with distinct hierarchical boundaries, but are rather dynamic and multifaceted processes. The interplay between niche-innovations and regimes represents a dynamic adaptation process, constantly evolving in response to internal tensions within regimes, broader landscapes, and the adaptive mechanisms of niche-innovations (Ingram, 2015).

Adopting an integrated approach that combines the Multi-Level-Perspective (MLP) and New Institutional Economics (NIE) approaches, our investigation delves into the adapting of NiReCa in agri-food systems. This dual framework aims at understanding the role played by contractual arrangements in the transformative dynamics inherent in niche-regime interactions. As suggested by Shove and Walker (2010), effective innovation arises not only from developing, promoting, adopting, or aligning technologies, nor solely from fostering novelties within existing regimes, and not only from engaging users, but crucially from expanding the range of elements available for interaction.

2.1 The role of contractual arrangements on niche-regime interactions

In extending Geels and Schot's (2007) reconfiguration pathways framework to incorporate a perspective on contractual arrangements, our proposal aligns with the perspective of transition studies, where transition becomes coordinated at some point through the alignment of visions and activities of different groups. The focus lies on agri-food NiReCa, particularly on agri-food transactions, which refer to the transfer of a good or service across a technologically separable interface (Williamson, 1985). Contractual arrangements between producers (farmers) and buyers (processing and marketing firms) support the production and commercialisation of a wide range of agricultural commodities (e.g. Martino al., 2017; Vavra, 2009).

Recognising the critical role of contractual arrangements, it becomes evident that they could be used to facilitate common objectives, such as increasing certainty and transparency in agri-food systems, protecting farmers from unfair practices, and encouraging parties to establish stable relationships in their mutual interest (Cholez and Magrini, 2023; UNIDROIT et al., 2015). The emergence of niche-innovations driven by farmers further underscores the importance of an endogenous vision of transition, and highlights the coexistence and coevolution of conventional and diversified agri-food systems. This dynamic is particularly notable in European agri-food systems, where countries regulate relationships through substantive rules, generally combining mandatory contracts and default rules.

According to Barbier (2011), the agri-food transition to sustainable economic development has remained elusive due to significant policy, market, and institutional failures. Key barriers include institutional rigidities and transaction costs, which perpetuate resource-based development patterns despite the rising costs of environmental degradation. Transaction cost economics (from the NIE approach) suggest that economic agents will choose contractual arrangements aligned to the attributes of transactions (asset specificity, uncertainties surrounding a transaction) to minimise exchange costs. Behavioural assumptions, including bounded rationality (limited cognitive abilities and information processing capacities) and opportunism (exploitation of information asymmetry or contractual loopholes for a more favourable position in a transaction), also play a crucial role in this process. A high level of uncertainty justifies the adoption of more coordinated arrangements, such as hybrid forms or

vertical integration, rather than spot markets (Williamson, 1991; Martino et al., 2017). Asset specificity encompasses physical, human, brand, temporal and dedicated specific elements. The large asset specificity leads to exchange hazards, such as the *ex-ante* problem of under-investment or the *ex-post* hold-up. In some cases, notably in collective actions, collective decisions and pooling resources may be allocated (Ménard, 2011).

We advanced the idea that niche emergence and niche-regime transactions of agri-food become possible when rights are defined, allocated, and supported by contractual arrangements. Property rights determine “WHO in last resort controls what to do with the available resources, and the conditions under which rights over these resources can be transferred”. Decision rights are about “HOW rights to use are going to be actually exercised, and/or about the procedures through which decision-makers can operate” (Ménard, 2018: 5). Taking into consideration the practical allocation of both property and decision rights, evaluating their impacts on their allocation, and assessing associated costs remain essential factors in determining the economic feasibility and social acceptability of a technological or organisational innovation (Ménard, 2011), and thus of a niche-innovation development.

The literature reveals a diversity of contractual arrangements such as agricultural contracts, production contracts, marketing contracts, integration contracts, subcontracting, aggregation contracts, contract farming and agro-industrial contracts. Generally, these agreements between farmers and processing and/or marketing firms take place within the types of agricultural production and/or produce marketing. They typically describe mutually agreed specifications for prices, quality, quantity, and production conditions (MacDonald et al., 2006, Ruml and Qaim, 2020). In the context of this paper, contractual arrangements encompass specifications related to both input and output in agriculture (Wang et al., 2014; Ricome et al., 2016; Cholez et al., 2020).

2.2 Framing the analysis in a dynamic perspective

Our analysis considers that, beyond their role in securing investments (both material and human) and uncertainties, NiReCa are a lever for coordinating actors in agri-food transition, as they create a space for dialogue that promotes co-construction and co-evolution between niche-innovations and regimes. As illustrated in Figure 1, adapted from Geels and Schot (2007), our analysis begins with an examination of the niche-innovation origin as well as its sustainability ambition and values (Ingram, 2015).

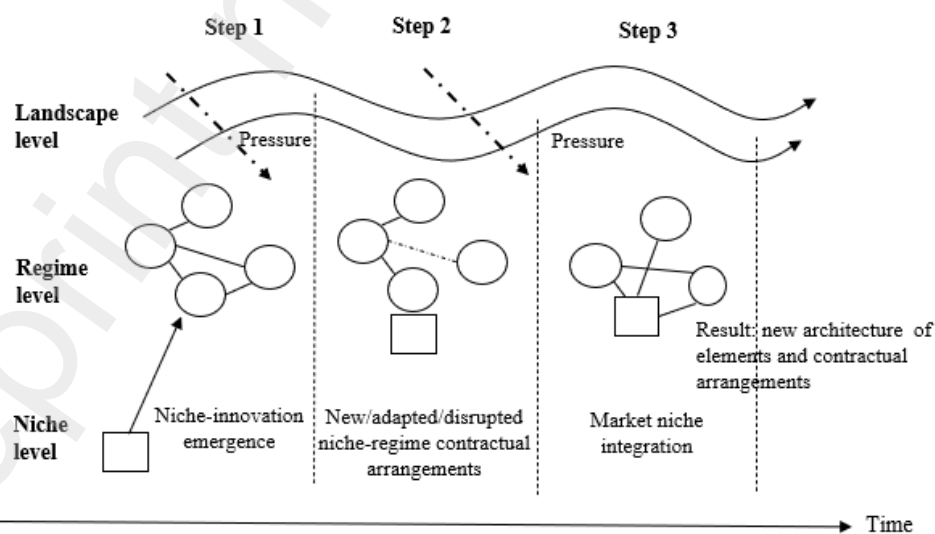


Figure 1. Heuristic framework for the process of adapting NiReCa (Niche Regime Contractual Arrangements), adapted from Geels and Schot (2007)

From the NIE perspective, in this first initial step, we deepen our understanding of the emergence of niche-innovation by investigating their organisation, i.e., entities with rights, and participating in transactions that serve as structures in which coordination modalities are embedded (Ménard, 2018). Coordination modalities involve the mechanisms implemented within organisations or networks of organisations to allocate and monitor assets and rights. We analyse the organisation established to ensure shared ownership of the niche-innovation by farmers, who hold residual control rights over both their individual assets and the collectively owned asset (Raynaud and Sauvée, 2000). This shared ownership necessitates the implementation of a steering mechanism in which the farmer is directly involved or represented. Two primary mechanisms are investigated: (1) the system for steering collective decisions and its operating mode, and (2) the mechanism of incentivising and controlling sustainable transitions, as well as limiting free riders.

Over time, niche-regime actors engage in a myriad of interactions navigating a complex landscape. We recognise the multi-faceted nature of both regime and niche-innovation. Regime, although stable, is continually influenced by selection pressures, internal tensions, policy interpretations, and diverse actor motivations (Geels, 2004). Niche-innovation, on the other hand, exhibits non-linear, fluid, and unstable development, adding complexity to understanding of the interactions (Geels and Raven, 2006). This requires a continuous search for efficient contractual arrangements to optimise the allocation of resources and to reduce transaction costs within an economic system (Ménard, 2011). Acting as both constraining and facilitation factors, NiReCa influence prevailing structures, thereby stimulating transitions within sociotechnical regimes.

As previously indicated, our vision is centred in an endogenous understanding of niche-regime interactions rather than a confrontation. We assume that niche-innovation and regime will gradually recognise the need to coordinate their actions while simultaneously complementing them with further changes in agri-food systems. According to Elzen et al. (2012), the bonding process can lead to changes in both the regime and the niche-innovations. Initially, the interactions formed remain vulnerable; however, as these interactions evolve, the likelihood increases that innovation - whether technological, institutional, or at the level of actor coordination - ultimately contributes to transition.

In the second step, we analyse the evolution of NiReCa, recognising that they adapt in various ways influenced by the specific investments required (physical, human, brand, temporal, or dedicated), by the uncertainty surrounding prices, quality, and volume, and by the rights related to property and decision-making. Based on insights from Costa et al. (2022), we hypothesise that new NiReCa will emerge, while some existing arrangements may be suspended or interrupted due to the evolving interactions between niche-innovation and regime actors. This dynamic process of NiReCa adaptation not only facilitates the coexistence and coevolution of niche-innovation and established regime, but also highlights the importance of continuously updating contractual arrangements to reflect the evolving nature of agri-food systems.

In the third step, we examine whether the process of adaption of NiReCa leads to the reconfiguration of the agri-food systems or a transition process involving de-alignment and re-alignment (Geels and Schot, 2007). In the first case, regime actors adopt component innovations due to economic and functional reasons, followed by new combinations, changing interpretations and new practices. In the second case, changes in deep structures create strong pressure on the regime. Incumbents lose faith and legitimacy, followed by the emergence of multiple novelties. New entrants compete for resources, attention, and legitimacy. Eventually, one novelty prevails, leading to the destabilisation of regime. Niche-innovation can evolve into a market niche which can survive as a subsection of the regime (Elzen et al., 2012). By considering these dimensions, our research aims to unravel the nuanced interplay between the

adaptation of NiReCa, shedding light on their pivotal role in shaping the transition of agri-food systems.

3. Material and methods

This section describes the research context, highlighting the complex scenario of the French dairy agri-food system, and the methods for collecting and analysing empirical data to investigate the adaptations of NiReCa in agri-food systems.

3.1 Research context

Agri-food systems encompass the wide range of actors engaged in interconnected value-adding activities, spanning from primary production to food consumption, including storage, post-harvest handling, transportation, processing, distribution, and marketing, (FAO, 2022). In developed countries, processing and wholesale are typically dominated by a few large companies. Large retail chains hold significant market shares alongside smaller businesses such as convenience shops, traditional food outlets, and small groceries. However, primary production and consumption involve thousands or millions of actors. These actors often experience power imbalances along the agri-food systems, facing significant pressures from monopolised and globalised markets characterised by price volatility, food standardisation, and inadequate attention to issues such as climate change, food security and safety, and health (Salavisa et al., 2021).

In the European agri-food landscape, contractualisation is increasingly prevalent, primarily driven by public policies (Dervillé, 2021). The shift from public regulation to the adoption of private contractual arrangements in key agricultural sectors such as cereals, milk, and beef has disrupted the traditionally relative price stability. In 2010, the European Union began implementing mandatory milk contracts within the dairy system, aiming to regulate relationships between farmers and dairy companies amidst the liberalisation of the European market. The reinforcement of the contractual framework in the agricultural sector is an essential element in promoting price stabilisation and allowing producers to have better overview of their outlets, and to obtain more remunerative transfer prices. However, the impact of these changes in contractual arrangements on sector dynamics and farmers' income is ambivalent. Dairy systems face a sectoral crisis with challenges related to value distribution. Despite being the second-largest producer in Europe, after Germany, the removal of quotas in 2015 definitively exposed the French dairy system to heightened price volatility, thereby limiting both public and sectorial regulatory capacities (Dervillé et al., 2022).

In France, milk production remains fragmented and in decline, with 50,000 farmers recorded in the 2020 agricultural census, representing a one-third reduction in the number of farms over the past decade (Agreste - French National Statistics, 2023). This fragmented supply confronts a smaller number of processors (a few hundred), with the top ten handling almost three-quarters of the national milk production (Institut de l'Élevage, 2016). Cooperatives collect 54% of cow's milk, while private dairies collect 46%. In contrast, the number of retailers is even fewer, as only five retail chains account for 90% of purchases by French households.

Farmers face challenges in handling a perishable and bulk product, comprising 88% water. Unlike cereal producers, they cannot store or significantly reduce milk without compromising their productive animal capital. The lengthy production cycle, spanning 24 to 30 months from the birth of a female calf to her first calving and milk production, adds to these challenges (Institut de l'Élevage, 2016). Mandatory contracts, established since 2011, regulate the sale of raw milk and underscore the transformation in the dynamics of farmer-dairy contractual interaction. Despite these contracts, the remuneration of farmers remains a persistent challenge, rendering them more susceptible to market risks than their European counterparts (Lambaré et al., 2018).

New contractual arrangements (e.g. horizontal coordination among farmers and the integration of downstream activities) empower producers to counteract market power, influencing the overall market structure. Our empirical investigation focuses on a specific case in south-west France, involving 17 farmers who established horizontal coordination and integrated activities, leading to adaptations in NiReCa. This case is very interesting as it presents a diversity of contractual arrangements between farmers and incumbent dairies, including cooperative contracts, individual contracts, and contracts with a producer organisation (PO)¹. It also highlights the changes necessary for niche-innovation emergence and consolidation. This case offers an opportunity to understand the coexistence and coevolution of niche-innovations and regimes.

3.2 Study design, data collection and analysis

Data from OECD member countries indicate a significant prevalence of farms and production operating under contracts (Vavra, 2009). Despite this trend, national-level data on contract uses remains scarce in many member countries. Due to limited quantitative data availability, we employ a qualitative approach for understanding NiReCa adaptations and implications in agri-food transition. Our analysis seeks to illuminate the intricate interactions within niche-regime coexistence and coevolution, shedding light on their pivotal role in the transition of agri-food systems.

Given the scarcity of data on territorialised dairy systems and the opacity of contractual arrangements, we adopted an in-depth single-case study approach, chosen for its capacity to offer insights within a specific spatial and temporal context (Yin, 2009). The method allows us to explore a particular phenomenon, event, group, or individuals intentionally chosen to provide a detailed and contextually rich description (Yin, 2018). It proves particularly advantageous when there is limited control over behaviour, allowing a comprehensive analysis of socially complex phenomena from a holistic perspective.

Our primary data collection involved in-depth interviews with six farmers, representatives of two producers' organisations (PO), three incumbents' dairies, three small and medium-sized dairies, and a representative of the National Federation of Milk Producers. Utilising a semi-structured questionnaire, the interviews ranged from 77 to 142 minutes. The participants' commitment and the richness of the information gathered allowed for the analysis of the case study over an extended period. For three years, we participated in niche-innovation general assemblies and meetings, interprofessional meetings, and organised a seminar of exchange between actors and researchers. Regular checkpoints helped to monitor changes (Table 1).

Table 1

Interviews and meetings participation – December 2020 to November 2023

Category of actors	Interviewees	Date/Length
Farmers	Farmer A	October 18 th , 2021 (101min)
	Farmer B	October 25 th , 2021 (89min)
	Farmer C	October 25 th , 2021 (131min)
	Farmer D	October 26 th , 2021 (123min)
	Farmer E	October 26 th , 2021 (124 min)
	Farmer F	October 26 th , 2021 (83 min)
Incumbent dairies	Dairy A	Nov 11 th , 2021 (138min)
	Dairy B	May 3 rd , 2022 (77min)
	Dairy C	September 1 st , 2022 (120min)

¹ These non-commercial POs play a crucial role in organising the market for all or part of fluid milk from farmers. To facilitate this, farmers provide a mandate to negotiate and invoice their production, with no transfer of ownership between the farmers and the PO, as outlined by Lambaré et al. (2018).

Meetings participation	Small and medium-sized dairies	SME A SME B SME C	May 20 th , 2022 (132min) May 25 th , 2022 (89min) November 25 th , 2022 (65min)
	Representative of PO	PO A PO B	October 12 th , 2021 (142min) October 14 th , 2021 (103min)
	Representatives of the National and Regional Federation of Milk Producers		October 14 th , 2021 (103min) December 9 th , 2021 (93 min)
	Interprofessional meetings		September 1 st , 2022; February 7 th , 2022; March 31 th , 2022
	Niche-innovation's General Assemblies		December 16 th , 2020; June 23 th , 2021
	Niche-innovation meeting		March 26 th , 2021; July 19 th , 2021; September 8 th , 2021; October 4 th , 2021; October 8 th , 2021; November 26 th , 2021; December 15 th , 2021; December 16 th , 2021; September 19 th , 2022; February 24 th , 2023; November 22 th , 2023
	Dairy field visit		June 10 th , 2022
	Dairy agri-food actors and researchers' forum		Mars 4 th , 2023; Mars 14 th , 2023

Interviews were recorded and transcribed, and all the data, including meeting notes, underwent thematic content analysis using Atlas.ti software. The content analysis was structured following our analytical framework and concepts presented in Table 2. This analysis allowed us to understand the emergence of niche-innovation within the regime, and the process of adaptation of NiReCa leading to a new architecture of interactions between niche-innovation and regime.

Table 2
Main analytical concepts and variables considered

Framework steps	Analytical concepts	Concept delineation	Variables addressed in the case study
STEP 1. Niche-innovation emergence	Origin of the niche-innovation	Space where innovations can emerge, experiment, and develop	-Within the mainstream -Sustainability ambitions -Values
	Steering mechanism	System of collective organisation and decision-making within the niche-innovation	-Establishment of assemblies, councils, or administrative groups
	Incitation and control mechanism	Aims to guarantee product differentiation and prevent free-rider behaviours in the niche-innovation	-Existence of specifications -Incentives (payment contingent on quality or a positive price differential) -External controls or self-enforcement
STEP 2. NiReCa adaptations	Transactions attributes	Specific characteristics of transactions that determine the process of adapting contractual arrangements	-Specific investments required (physic, human, brand, temporal, or dedicated) -Uncertainty (price, quality, and volume) -Property rights and decision rights
	Contractual arrangements	Adaptation of niche-regime contractual arrangements to ensure their coexistence and coevolution	-New, adaptation or interrupt contracts required
STEP 3. New architecture of contractual arrangements	Coevolution of practices, visions, and interactions	New niche-regime interactions lead to a transition pathway	-Reconfiguration -De-alignment and re-alignment

4. Results and discussion: navigating multiple adaptations in niche-regime contractual arrangements

The results are presented and discussed according to the three main steps of our analytical framework on the NiReCa, considering how they shaped the bottom-up emergence of the niche-innovation, and fostered niche-regime coexistence and coevolution.

4.1 STEP 1 - Emergence of the niche-innovation

The emergence of niche-innovation within the dairy system marks a significant turning point for farmers seeking to improve their economic and social conditions while adopting sustainable practices. In this Step 1, we explore the emergence and development of this niche-innovation in three distinct phases. First, we examine how a pioneering initiative in 2018 successfully united farmers around a project aimed at establishing fair milk pricing, and enhancing the value of their production independently from dominant dairies (4.1.1). Next, we discuss the economic, social, and environmental impacts of this initiative (4.1.2). Finally, we describe the internal organisation established to protect farmers' rights and facilitate collective management (4.1.3).

4.1.1 Initial formation and challenges

In 2018, a proactive member of the Chamber of Agriculture initiated a transformative effort to unite farmers in a territorialised dairy initiative. This niche-innovation aimed at enhancing farmers' remuneration and establishing a fair milk price, surpassing that offered by incumbent dairies. Farmer A emphasised the importance of independently valorising their production, highlighting their dependency on incumbent dairies amidst the milk crises: *“given the milk crises, we realise that we are still dependent on our dairies. The price, we don't decide it, so I think it's already very important to be able to sell your product and talk about it. ... All the producers in the department were informed, there was a collective meeting ... a small group was formed, and the story started.”* (Farmer A).

However, not all the farmers shared the same enthusiasm for this niche-innovation. Farmer B expressed contrasting views, noting resistance from incumbent producer organisation (PO) favouring established schemes over the niche-innovation: *“in the village, there is an PO C representative who resisted the collective farmers' initiative; he was much more in favour of the PO scheme. So, many people still listened to him, and we, the farmers advocating for the initiative, were somewhat considered as visionaries initially—people truly breaking away from the established norms and having very little chance of succeeding at the outset”*. The scepticism and resistance faced underscore the challenges of steering away from traditional practices and the dominance of established norms.

4.1.2 Economic, social and environmental impacts

Despite the support from the French government through the EGAlim² laws, ensuring dairies respect production costs, Farmer B highlighted the lack of feedback and accountability: *“We have no feedback. So, what the PO wanted to do is hold the government accountable. They said, ‘The government only tells us to enforce this, but we have no means.’ We go to our dairies, negotiate, and the dairies tell us: ‘Go home, no, we don't take into account what you're telling us”*. To address the pricing challenge, the niche-innovation established higher milk prices in 2019 as compared to incumbent dairies, reflecting its value addition to the dairy system. The

²The EGAlim laws in France include three key legislative measures aimed at fostering fairer commercial practices in agriculture and promoting sustainable food production. EGAlim 1 (2018) set the foundation for fairer pricing and better food quality. EGAlim 2 (2021) reinforced these measures by mandating contracts reflect production costs. EGAlim 3 (2023) further tightened regulations to enhance transparency in commercial practices between suppliers and distributors (Ministry of Agriculture and Food Sovereignty, 2024).

niche-innovation set its base milk price at 380€ per 1000 litres, rising to 400€ per 1000 litres the next year. In contrast, incumbent dairies offered a base price of approximately 330€ per 1000 litres. This territorialised dairy system added significant value, reaching 50€ per 1000 litres in 2019 and 70€ per 1000 litres in 2020 as compared to regime prices. Farmer C points out the tension introduced by the pricing dynamics of incumbent dairies, noting that production costs warrant higher prices: *“if production costs were taken into account, currently, all dairies should pay 400€”*. In 2023, the base price was further increased to 460€ per 1000 litres to reflect the increase in production costs.

Rooted in local, short supply chains and guided by values of solidarity and equity, this niche-innovation emerges on the fringes of the regime. Farmers aimed to take control of a part of the milk valorisation process by transforming their own Ultra-High Temperature (UHT) semi-skimmed milk and selling it directly to local supermarkets, specialty stores, and producer shops. To protect themselves from the influence and power of incumbent dairies, this niche-innovation sought support from the union, notably the Fédération Nationale des Producteurs de Lait (National Federation of Milk Producers, FNPL)³. According to Farmer A, the FNPL president stated: *“As long as it increases the milk price for farmers, the FNPL will always be supportive”*. This niche-innovation aims to reduce farmers’ vulnerability, placing them at the centre of the food-system and addressing economic and social inequalities.

Farmers have developed their own milk production specifications in accordance to the regime regulations set by the National Interprofessional Centre for the Dairy Economy (CNIEL in French). Niche-innovation’s own specifications, such as genetically modified organism-free (GMO-free) feeding and controlled production levels⁴, ensure product quality and traceability, and facilitate market segmentation. Additionally, this niche-innovation serves as a catalyst for the agroecological transition within the agri-food system, integrating environmental claims into milk production practices. As shown by Siqueira et al. (2023), farmers’ collective initiatives not only display the image of a local product, but also integrate environmental claims using both predefined general standards and tailor-made ones.

The adoption of these niche-innovation standards has required significant collective and individual investments, leading to changes in farming practices, including the exploration of alternative crop rotation to shift away from using imported GMO soy, and adopting collaborative management practices encompassing branding, logistics, product selection, quality engagement, and marketing strategies. Such investments across various resources (human, temporal, brand, and physical assets) are essential for the emergence of niche-innovation.

4.1.3 An in-house organisation to safeguard property and decision rights

An in-house organisation established by this niche-innovation serves as a pivotal mechanism for empowering farmers and safeguarding their rights on the fringes of the regime. Operating under a “cooperative governance model”, where each farmer has equal voting rights (one person, one vote), this niche-innovation enables farmers to act both as associates as well as suppliers. To formalise operational guidelines and mutual commitments among farmers, internal regulations have been established, including the bylaws and internal regulations of the organisation.

Mobilising a portion of farmers’ milk production necessitates that the niche-innovation organise its own milk collection and industrial processing twice a month, with predetermined frequencies and quantities of milk collected. Every farmer contributes all the milk produced in two prior days, initiating a customised processing round for UHT semi-skimmed milk. Farmer

³ Created in 1946, FNPL is the trade union of milk producers and the largest dairy union in France.

⁴ Limit of production to 65 cows per human resource, sourcing most of the feed from the farm and maintaining a presence of grass.

B explains the process: “On the D-day, a message is sent to everyone through WhatsApp to remind us of the collection tonight and to put on the labels since there are two different labels – one for conventional dairy (regime) and the other for us (niche-innovation)”.

Decisions regarding the base milk price are collectively taken during general meetings every six months, or upon the request of at least one associate, fostering interdependence among farmers. Participation in niche-innovation promotional activities is mandatory for farmers, reflecting a commitment to collective success within the organisation (a minimum of 12 half-days per year).

This niche-innovation employs a progressive adaptation, as proposed by Ingram (2015), to create its own rules and practices. By empowering farmers and promoting sustainable practices on the fringes of the regime, it aims to establish a model that not only ensures independent valorisation of milk, but also fosters economic and social resilience. To achieve this, specific investments are necessary, alongside the coordination of property and decision rights. A strong horizontal coordination is crucial for aligning farmers with the niche-innovation’s specificities and for coordinating collective investments. Property rights and decision rights are structured within the in-house organisation, supported by dedicated committees and working groups to optimise operations and responsiveness to market dynamics. However, a central challenge remains the adaptation of existing contractual arrangements between these farmers and incumbent dairies, as they impose constraints that hinder the emergence and growth of niche-innovations.

4.2 STEP 2 – Initiating niche-regime contractual arrangement changes

In this second step of our exploration, we analyse the critical NiReCa adaptations required for the advancement of this niche-innovation. Section 4.2.1 examines the necessity of modifying mandatory contractual arrangements with incumbent dairies, which have historically imposed constraints that stifle innovation and growth. We will explore how these adaptations are a *sine qua non* for the development of niche-innovations, allowing farmers to negotiate more flexible agreements that better fit the evolving demands of their operations. Section 4.2.2 broadens the discussion by highlighting the expansion of NiReCa. It focuses on how niche-innovation navigates a mix of contractual arrangements to coordinate transactions and ensure the traceability and property rights of their milk products. By examining NiReCa adaptations, we reveal the complexities and opportunities that arise when integrating niche-innovations into the broader agri-food system, ultimately fostering a more resilient and sustainable model.

4.2.1 The mandatory contractual arrangements adaptations

The emergence and development of this niche-innovation depend on changes in mandatory contracts between farmers associated with the niche-innovation (territorialised dairy initiative) and their respective incumbent dairies, initiated after the abolition of quotas in 2015⁵. Operating within a framework of progressive NiReCa adaptations, farmers found themselves negotiating tacit agreements with their incumbent dairies. These negotiations aimed to adapt milk volume supply, agreeing to allocate up to 50% of their volumes to the niche-innovation, within their respective cooperative contracts, individual contracts, or framework contracts negotiated by a producer organisation (PO).

Initially, disruptive interactions emerged, marked by instances of pressure and opposition. The transitions literature underscores the role of niche-innovations as a space where new socio-technical practices can develop, while regimes resist change due to technological,

⁵ The termination of milk quotas on April 1, 2015, mandated the establishment of a written contractual mechanism between milk farmers and dairies in 2011 (first generation of contracts). The contract outlines the mode of price determination, considering milk quality, delivery volume, collection methods, and conditions for reviewing and terminating the agreement (Trouvé et al., 2016).

organisational, and institutional lock-in (Geels, 2020). Dairies B and D demonstrated conservatism and resistance, reflecting challenges linked to path dependence. Dairy C strongly opposed reducing farmers' contractual milk volume commitments, leading to drastic ultimatums: “No way, either you leave entirely, or you stay with us” (Farmer F). As noted by the Institut de l’Elevage (2016), the farmer's “captive” relationship with their dairy primarily stems from the era of milk quotas, resulting in a significant “freeze” of relational dynamics.

Adapting the cooperative contract poses many significant challenges. The cooperative contract formally designates farmers as both members and milk contributors, incorporating standard marketing contract clauses (Institut de l’Elevage, 2016). Farmers are required to contribute their entire production, which complicates their involvement in the niche-innovation. Drawing inspiration from prevalent exchange agreements among incumbent dairies, an informal arrangement allows the niche-innovation to collect milk from this farmer. However, the niche-innovation is held to compensate and return the collected volume to the cooperative. Through this agreement, the niche-innovation demonstrates its ability to secure significant cooperation from the cooperative dairy. This not only shows the counterbalance power held by the farmers but also the cooperative’s endorsement of the niche-innovation’s validity and potential for broader adoption.

Aware of a beginning of counterpower, the farmer under contract with dairy C requested an agreement to use 50% of their volume to the niche-innovation. In case of refusal, as observed with dairy D, the threat of contract termination was used. We notice that the adaptation of NiReMa occurs in a non-linear manner, based on informal agreements and pressures. Ménard (2018) notes the limited understanding of the impact of nonstandard organisational arrangements on bargaining and power allocation. We observe how a niche-innovation successfully pressured an incumbent dairy through a united front.

To strengthen their power, certain farmers opted to shift to a dairy that embraces this niche-innovation and promotes a more open environment. This enabled farmers to join a dairy sharing a common vision. As a result, a concentration in dairy A could be observed, increasing from nine out of 17 farmers to 12 out of 17. Dairy A played a pivotal role by demonstrating openness to accepting a reduction in milk volume due to farmers’ involvement in the niche-innovation, and by providing significant support to facilitate this transition.

However, modifications to the framework contract between PO A and Dairy A occurred two years after the start of the niche-innovation. A representative from PO A stated, “Let's be honest, we're kind of doing it in reverse, meaning we let them launch the project to see how it works, and we'll adjust the framework contract based on their operation”. Thus, this niche-innovation acted as a catalyst for horizontal framework contracts. In France, vertical POs (single-buyer) represent three-quarters of the producer organisations (CGAAER, 2015). Horizontal POs (multi-buyer) should take precedence over vertical ones, as they have the potential to incorporate the territorial dimension. Adapting mandatory contractual arrangements is a *sine qua non* condition for the development of niche-innovations. These adaptations of NiReMa are crucial not only to facilitate the growth of niche-innovations, but also to ensure that they can operate flexibly and sustainably within the broader agri-food system.

4.2.2 The broadening of contractual changes in niche-innovation structuration

Ensuring the traceability and property rights of milk product transformation became priorities for the niche-innovation. The coordinated efforts in milk collection and control of their own specifications led the niche-innovation to contract service providers, i.e. a company or individual that offers specialised services to other businesses or consumers. Unlike subcontractors, service providers usually offer ongoing services and may not be tied to a specific project. The same logistic service provider handles milk collection for several incumbent dairies in the south-west of France and has become the collector for the niche-

innovation. Additionally, the Chamber of Agriculture, acting as a service provider, audits the farmers twice a year to ensure compliance with the established specifications, and the niche-innovation contracts a laboratory for the analysis of their separate volumes of milk.

To further enhance the value of the niche-innovation milk products, the establishment of industrial subcontracts with local actors is important. Industrial subcontracting is a contractual arrangement where a company outsources certain stages or the entirety of its manufacturing process to another company. This allows the main company to focus on its core competencies or other aspects of its value chain. It allows the niche-innovations to concentrate on their core competencies, such as milk production and the commercialisation of processed dairy products. While industrial subcontracting is very common generally, in the dairy system it is a relatively recent phenomenon, but essential for the niche innovations' development.

The initiation of industrial subcontracting with a cooperative factory initially raised strong concerns among some farmers, as expressed by Farmer A: *"Oh no, we're not going to join a cooperative, no, no, we won't go there."* However, the niche-innovation remained open to possibilities, suggesting, *"Maybe as a collection of farmers, we can negotiate. They produce the brick for us, and they will also manufacture UHT cream"* (Farmer A). Over time, the cooperative dairy unit embraced industrial subcontracting for UHT semi-skimmed milk production and bottling, provided a stockage service, and began exploring additional opportunities, stating, *"If you want to make butter, we produce butter in another industrial unit"* (Farmer A).

The cooperative dairy in the south-west of France aims at some level of independence from national policies, as indicated by Farmer B: *"They are trying to manage their small business regionally, already to save jobs and to save the factory."* Informal industrial subcontracting is utilised, with Farmer B explaining, *"We wanted to formalise it with a formal contract, but he made us understand that, as it was a local specificity, everyone turns a blind eye and there are no traces, which is still dangerous, meaning that we work without a contract. It's a matter of personal relationships"*. Against all expectations, the cooperative opened to industrial subcontracting, driven by territorial synergies. The development of other dairy products (butter, yogurt, cream etc.) led to NiReCa with other dairies, particularly small and medium-sized enterprises (SME). As emphasised by Lamine et al. (2012), who conducted an analysis focusing on the transition processes of agri-food systems at the territorial scale, the interdependencies and possible complementarities between the various actors of agri-food systems are crucial.

Service provision and industrial subcontracting, as depicted, emerged to structure the niche-innovation and safeguard farmers' property rights through NiReCa. As observed by Nguyen et al. (2022), a "simple subcontracting" arrangement can also evolve into more "strategic subcontracting", involving alliances facilitated by informal and relational contracts based on trust, mutual problem-solving, and reputation. In the south-west region of France, addressing mutual challenges is central to maintaining employment and dairy expertise by optimising the utilization rates of processing units.

4.3 STEP 3 – New architecture of niche-regime contractual arrangements

A five-year follow-up confirmed the ongoing development of this niche-innovation, evident in its persistent characteristics, internal structural-functional organisation, social cohesion, and regulatory processes (Geels, 2022). By the end of 2021, the niche-innovation accounted for 20% of the overall farmers' milk volume, surpassing 1,700,000 litres. In 2023, following the introduction of new milk product references, this percentage surged to 28%. Facing Dairy A's stopping with milk collection in the south-west of France, a new tension in the dairy systems, the farmers of this niche-innovation had to decide whether to follow the farmers from PO A to a new one, and be responsible for negotiating framework contracts with another incumbent dairy. Bolstered by the growth of the niche-innovation, they opted to evolve into a fully-fledged

dairy: “It’s a take-back of farmers’ destiny, and with a commercial aspect that we don’t find in other PO. We are a commercial PO, in my opinion, so it’s this aspect that appealed to me, the independence” (Farmer B). The goal is to valorise 50% of farmers’ production under their own brand and supply the remaining 50% as a provider of quality milk to the cooperative dairy as part of the exchange agreements between dairies, thereby achieving a more favourable milk price. All of the farmers’ specialised milk production is now valorised.

As summarised in Figure 2, the emergence of this niche-innovation has prompted significant changes and adaptations in NiReCA. Operating in a progressive adaptation mode, farmers have actively engaged in negotiations with incumbent dairies, leading to the development of tacit agreements. Initially observed disruptions in individual, PO, and cooperative contracts have gradually evolved into informal arrangements, resulting in shifts in NiReCa power dynamics. This ongoing process has resulted in a new regime architecture, driven by the necessity to streamline operations and maximise profitability. These contractual adaptations have not only facilitated the onset of structural transformations in the socio-technical regime, but have also reconfigured the power dynamics between niche-innovation and established actors, highlighting the interplay between economic and functional forces in driving this transition.

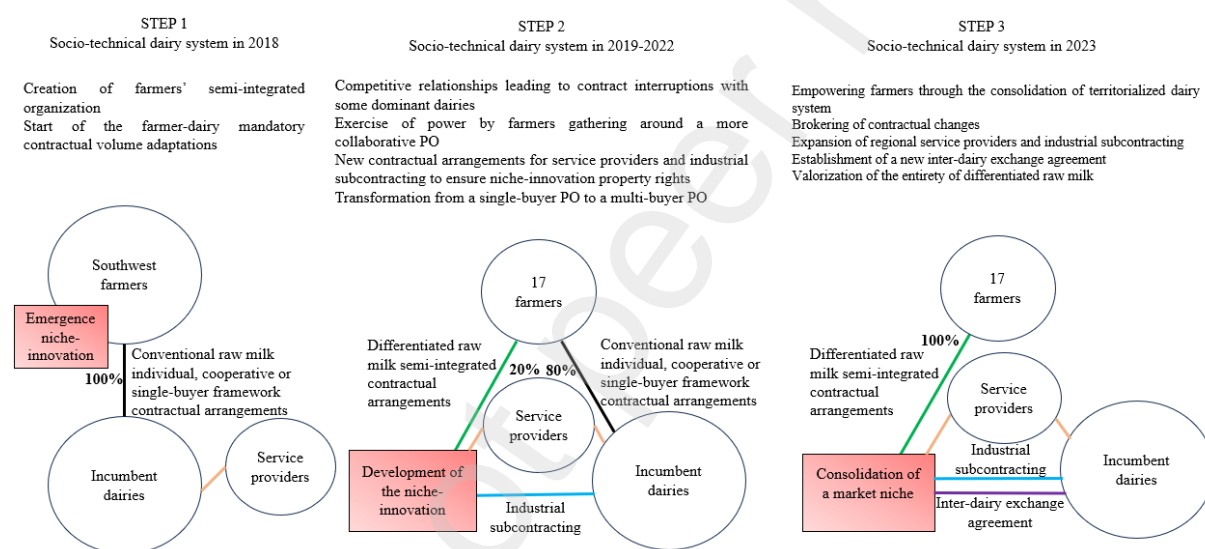


Figure 2. Contractual adaptation and the onset of transformation in socio-technical regime

Changes to framework contracts reflect an official recognition of the niche-innovation’s existence and its capacity to influence contractual arrangements. Specific investments and uncertainties, coupled with the imperative to ensure property rights, engage the niche-innovation in industrial subcontracting in collaboration with cooperative and SMEs dairies, as well as with service providers. The cessation of milk collection by a private incumbent dairy in the south-west of France, in which most of the niche-innovation’s farmers participated, created new pressure that led the niche-innovation to transform into a fully-fledged dairy. This transformation enabled the niche-innovation to carve out a market niche capable of valorising 100% of the differentiated raw milk produced by its farmers. The milk is valorised through the sale of processed products under their own brand and by supplying another incumbent dairy seeking non-standard milk. This transformation signifies an ongoing reconfiguration of the agri-food system’s structure. As indicated by Elzen et al. (2012), this suggests that this niche-innovation can survive as a subsection of the regime without protection. Here, we observe niche-regime coevolution and coexistence, along with their capacity to adapt NiReCA for the valorisation of specific and regional milk.

5. Conclusion

Our investigation led to an initial understanding of the critical role that NiReCa plays in the transition to sustainable agri-food systems, focusing on a new dairy niche-innovation in the south-west of France. We highlighted how their contractual arrangements not only enhance the value of farmers' milk and secure farmers' property rights, but also foster significant territorial synergies. It enabled the relaxation of traditional contractual exclusivities held by incumbent dairies, encouraging farmers to reinvent manufacturing and marketing, and diversifying quality standards, NiReCa has proven instrumental in integrating a new niche-innovation into the regime. This study underlines the importance of flexible contractual arrangements, crucial to the coexistence and coevolution of niche-innovations and regimes, fostering innovation and resilience in the agri-food systems, and creating conditions conducive to sustainable transitions.

Furthermore, our findings significantly contribute to the understanding of agri-food systems transitions through the combined lens of Multi-Level Perspective (MLP) and New Institutional Economics (NIE) approaches. This analytical framework bridges these two isolated theoretical paradigms, offering a dynamic perspective on niche-regime interactions through the analysis of contractual arrangements. This integration of theories not only enriches the understanding of niche-regime interactions, but also offers a dynamic perspective on contractual arrangements, transcending the conventional static view of the NIE (Hodgson, 2010). By demonstrating how MLP and NIE can be effectively combined to analyse systemic transitions, our study opens new venues for research, providing a robust tool to explore structural and socio-economic drivers of sustainability and resilience in agri-food systems.

Policymakers and practitioners should consider these findings to promote institutions that support such contractual flexibility. This could include increasing the involvement of niche-innovation representatives in professional bodies, and the encouragement of collective agreements. Specifically, we recommend shifting the initiation of the contractualisation process from dairies to farmers' collectives. The reinforcement of a transition from individual contracts to collective contracts, and from single-buyer to multi-buyer POs, opens opportunities for farmers to explore new customer bases and usage patterns, demonstrating a synergistic interaction between the niche-innovation, cooperative dairy, and local small and medium-sized enterprises. Given the specific investments made by farmers, and their vulnerability concerning the inclusion of production costs in milk prices, compliance with the French EGAlim law is crucial. Considering the role of contracts as institutional mechanisms allows for expansion of actionable possibilities and will influence several parameters simultaneously: structuring of POs, bilateral negotiations, evolution of public policies, and updates to quality standards and professional or normative rules.

Looking forward, further research is crucial to deepen our understanding of NiReCa across various regions and sectors. It is essential to explore how these arrangements facilitate the diffusion of niche-innovations into mainstream markets and to assess the development of new socio-technical systems. Future studies should focus on the long-term impacts of NiReCa on the sustainability and resilience of agri-food systems, and how they can be adapted to support continuous socio-technical evolution in diverse contexts. Addressing these challenges will be key to ensuring a resilient and sustainable future for the agri-food system.

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