



Economic Reforms and the Rise of Milk Mega Farms in Vietnam: Governing the Post-socialist Transition

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Abstract

Over the past 30 years, major economic reforms have deeply impacted the Vietnamese agro-food sector. In this study, we use the concept of “sociotechnical transition” to capture the multiple dimensions of this transformation. We focus in particular on the rapid emergence of the Vietnamese dairy industry. Up to the mid-2000s, the sector had been dominated by smallholder dairy farmers working in close collaboration with private milk processors and public services. This resulted in what we propose to call a “peasant” sociotechnical regime. In the late 2000s, the sector experienced a growing competition from agro-industries and mega farms holding several thousand cows. The role of smallholder producers has decreased and the sector has moved toward medium to large-scale producers. This new “corporate” regime profoundly modified the outcome of the post-socialist “transition”. This case-study highlights important issues related to the governance of these rapid changes.

Keywords Sociotechnical transition · Agrarian transition · Capitalism · Dairy sector · Value chain · Vietnam

Résumé

Au cours des 30 dernières années, plusieurs réformes économiques ont profondément transformé le secteur agro-alimentaire vietnamien. Dans cette étude, nous utilisons le concept de « transition sociotechnique » pour analyser ces changements. Jusqu’au milieu des années 2000, le secteur a été dominé par des exploitations familiales de petite taille, travaillant en complémentarité avec les laiteries privées et les services publics. Cette période a été caractérisée par un régime sociotechnique de type « paysan ». A la fin des années 2000, le secteur a été marqué par une compétition accrue des firmes privées et des méga-fermes de plusieurs milliers de vaches. Le rôle des petits éleveurs a sensiblement diminué, laissant plus de place aux exploitations de taille moyenne et aux méga fermes. L’émergence de ce nouveau régime sociotechnique « industriel »

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a profondément modifié l'issue de la transition postsocialiste. La présente étude suggère des pistes pour piloter ces mutations rapides.

Introduction

Over the last 30 years, Asia has undergone a long post-socialist transition that has deeply impacted agriculture. Scholars diverge regarding the consequence of this transition. While some authors highlight the existence of diverse forms of capitalism and the persistent role of small peasant farms in Asian societies (Boyer et al. 2013; Studwell 2014; Rigg et al. 2016; Nguyen Tuan Anh et al. 2020), others worry about negative outcomes. The latter emphasize in particular the social and environmental risks attached to the development of global capitalism, which could eventually lead to the “end of the peasant” (Dirlik et al. 2012). To resolve this controversy, well-documented case-studies are required that can highlight the drivers of the transition and the possible coexistence of peasant farms and the agribusiness sector.

In Vietnam, the agricultural sector has been deeply affected by the *Đổi Mới*¹ economic reforms that were launched in 1986 by the Vietnamese Communist Party (VCP). These have progressively led the country toward a “socialist-oriented market economy”, raising many questions in the process. What have been the impacts of this “post-socialist transition” (Fortier and Trang 2013) on the diversity of agricultural production forms? How did the new forms of capitalist agriculture emerge? Is the country likely to face the “end of the peasant” as suggested by the rise of “large-scale rice fields”² and livestock “mega farms” since the beginning of the 2010s (VNA 2017)?

We propose to approach the agrarian transition underway in Vietnam through an in-depth study of the dairy sector. This sector is an interesting case study due to the very rapid change it has undergone. Between 1990 and 2017, Vietnamese dairy production increased 15-fold, representing the highest rate of growth of a dairy sector in Asia (Table 1). Moreover, this dairy development has been characterized by a huge contrast between small family farms with less than 20 cows, which accounted for over 90% of milk production until 2010, and large-scale farms of more than 500 cows which have emerged very recently (Duteurtre et al. 2015a; Ly Thao 2015). The aim of this article is to characterize the current transition in the dairy sector in Vietnam and understand the technical, economic and institutional factors driving this transition. We use the concept of “sociotechnical regimes” as an interdisciplinary tool to integrate these different factors. Our aim is to highlight in particular the respective roles of these two dairy farms models (small-scale farm and mega farm) in the current development of the Vietnamese dairy sector.

The first section presents the conceptual framework and method used. In the second section, we analyze the transformations that occurred in the dairy sector from the 1980s up to 2008. During this period, one marked by the *Đổi Mới* reforms,

¹ In English: Renovation.

² Also called “large-scale models” (English) or “*mô hình cánh đồng mẫu lớn*” (Vietnamese).



Table 1 Comparison of the evolution of milk production in six Asian countries (tons). *Source* FaoStat, 2019

Year	1990	2000	2010	2017	Ratio 2017/1990
Bangladesh	1,593,503	1,507,310	2,035,550	2,005,405	1.3
Indonesia	599,155	1,009,289	1,492,848	1,540,200	2.6
Thailand	130,278	520,115	911,000	421,961	3.2
India	53,678,000	79,661,000	121,847,000	176,272,357	3.3
China	6,820,400	11,986,000	40,803,769	34,469,224	5.1
Vietnam	60,471	84,525	338,662	909,103	15.0

smallholder farming developed very rapidly. The third section highlights the changes that have been underway since 2008, which are placing an increasing emphasis on industrial dairy farming and agribusiness. In the last section, we discuss development issues attached to the governance of the coexistence of smallholder farms and mega farms.

Theoretical Framework and Method

Addressing the type of agricultural holdings involved in agrifood chains requires referring to clear definitions of smallholders, family farms, and peasantry. In this paper, we consider a “peasant” as an agricultural worker *“whose livelihood is based primarily on have access to land (that is either owned or rented), and who uses his own labor or the labor of other family members to work that land”* (Akram-Lodhi and Kay 2009, p. 3). Of course, this broad definition reflects a large diversity of farms, including what Akram-Lodhi (2004) calls “rich peasants” “small peasants” and “agricultural wage laborers”. This approach stresses the importance of farm assets (labor, land, mechanization) but it does not reflect the different motives that a farmer might have, and in particular his commercial engagement. The peasantry is also presented as a “subordinate class”, which might not represent all situations observed on-field.

Rigg et al. (2016) present a broad review of the dynamics of small farmers in Asia, underlying the persistence of what they prefer to call the “smallholders”. They suggest that the term “smallholder” pays attention to farm size, whereas the term “family farm” stresses issues of land ownership and labor relations and might therefore be larger. *“A common assumption is that because hired labor is limited, farm size must be limited as well. Mechanization can challenge such an assumed link and some mechanized family farms may be quite large”* Rigg et al. (2015, p. 120). In our study, we will preferentially use the term “smallholders” when referring to the size of the tenure or to the size of the dairy herd. But we will also refer time to time to “family farms” in order to underline the property of the assets (those of the household) in comparison to farms using corporate assets.



In Vietnam, smallholder farms are basically defined by “agricultural households” (*hộ nông nghiệp*) by public authorities. Those are family farms managed by peasants (*nông hộ*) who can be engaged in semi-subsistence farming or in market-oriented activities. In 2016, they account for around 99% of the 10.4 million rural households in the country. By contrast, commercial farms (*trang trại*) are larger farming businesses, mostly managed by individual families, but with higher capital and more market-oriented strategies. Other types of agricultural holdings include cooperative (*hợp tác xã*), and corporate farms (*doanh nghiệp*). Cooperatives exist in the dairy sector under the form of service cooperatives. But none of them process their milk independently from private processors. Among the “corporate farms” that exist in the dairy sector, we consider as “mega farms” those with more than 500 dairy cows. There is no clear definition in Vietnam of such industrial holdings. However, the US department for Agriculture defines “Concentrated Animal Feeding Operations (CAFOs)” as farms with more than 700 milking cows, which correspond broadly to what is called “mega farm” in Asia.

Grasping the multiple dimensions of a transition requires an interdisciplinary, or even transdisciplinary, approach to change pathways. The intent is “*not to consider the transition uniquely as a comparison between two situations separated by an interval of time, but to grasp what happens during the transition: the changeover*”³ (de Terssac et al. 2014). As in China, where a comparable change in direction was undertaken with the reforms initiated by Deng Xiao Ping in 1978 (Zufferey 2010), the reforms of Vietnamese economic policies have generated major institutional, economic, social, environmental and cultural consequences. The economic “transition” therefore must be considered together with demographic, dietary, technological and agricultural transitions, resulting in integrated, multiscale changes (Lagrée 2010).

The multi-level perspective framework proposes to consider such pluri-dimensional change as a “sociotechnical transition” (Geels 2004; Geels and Schot 2007). This framework of analysis is particularly suited to the consideration of long-term transitions in the agriculture sector and their impact on sustainable development (Darnhofer 2015). In addition to recognizing the dynamics of “asset ownership” and “technical efficiency” as proposed in the agrarian transition framework (Akram-Lodhi 2004), the sociotechnical transition approach appeals for more interdisciplinary viewpoints, taking into account in particular the importance of cultural values, food standards and market preferences.

The multi-level perspective considers three components (or analytic levels) that determine the change dynamic: sociotechnical regimes, innovation niches, and sociotechnical landscapes. A sociotechnical regime is defined as a coherent set of practices, techniques and social rules which are shaped by varying arrangements of six elements: policies, culture, scientific knowledge, technology, market preferences and industry capacity. At times, one may refer to a stable “dominant” regime to indicate

³ Translated by us from original citation in French: « (...) ne pas considérer la transition uniquement comme une comparaison entre deux situations espacées dans le temps, mais de saisir ce qui se joue pendant la transition: l'état de passage » (de Terssac 2014).



the dominance of one regime at a given moment. Innovation niches are the loci of radical innovations from the dominant regime, and are found at the local level. They originate from small networks of actors that support novelties, and align several elements in a “seamless web”. The various innovations can stabilize into new configurations that challenge the dominant regime, eventually resulting in a new regime. The sociotechnical landscape determines the conditions outside the regime, such as overall demographic and environmental trends, policy directions, social values, etc. This landscape evolves under the influence of decisions or shocks or in a gradual manner (Geels 2004; Geels and Schot 2007).

The multi-level perspective is used in this paper as an open framework for the interpretation of change pathways. However, we also try to identify the uncertain dimensions of changes that themselves depend on more contingent factors. Indeed, *“the notion of a trajectory does not imply that one should conceive of it as having an evolutionary character (...), nor even that one postulates its wholeness or consistency at the risk of simplifying to the extreme the terms of the comparison. History unfolds erratically, and explanations, or to be more realistic, rationalizations, given by those deciphering the past should always take into account pure contingency”* (Bayart 1996⁴).

This paper is based on a multiscale assessment study carried out in Vietnam between 2014 and 2016 to understand the transformation of the dairy sector. Our research relied on a multidisciplinary team composed of economists, sociologists, animal scientists and geographers. In an attempt to build an integrated vision of the long-term “dairy development pathways”, we conducted 4 complementary research and development activities. (i) First, we analyzed the dynamics of the dairy farms and we assessed their sustainability. This “farm-scale assessment” was addressed through field surveys conducted in the Hanoi Province (160 smallholder farms and 1 industrial farm) and in the Nghe An province (1 mega farm) (Pham Duy Khanh et al. 2016; Duteurtre et al. 2015a). (ii) Second, we assessed the dynamics of the whole value chain through a specific field survey conducted among value chain stakeholders in the Hanoi province (Duteurtre et al. 2015b and 2016a, b; Nguyen Mai Huong et al. 2017). (iii) Third, we studied the overall sociotechnical landscape by reviewing national and local regulations, analyzing national secondary databases, and conducting a systematic monthly media review during 4 years. This step resulted in an intermediate policy review document published in 2016 and later on in a national Atlas (Cesaro et al. 2019). (iv) Fourth, we conducted participatory workshops with local authorities and value chain stakeholders in order to discuss our research results in view of policy priorities and challenges. Those workshops included some participatory foresight scenarios exercises. A first workshop was held at the local level in the Ba Vi District, one of the main dairy production district located near the capital city,

⁴ Translated by us from French: *“L'idée de trajectoire n'implique pas que l'on se fasse de celle-ci une conception évolutionniste (...), ni même que l'on postule sa totalité et sa cohérence au risque de simplifier à l'extrême les termes de la comparaison. La donne de l'histoire est erratique et l'explication ou, soyons réaliste, la rationalisation à laquelle se livre le décrypteur du passé doit toujours tenir compte de la pure contingence.”* (Bayart, 1996, p. 13).



on April 3rd, 2015. A second workshop was organized in Hanoi at national level on October 8th, 2015 with representatives of the ministry of Agriculture and rural development and with national livestock associations (Nguyen Mai Huong 2018).

All those activities allowed us to understand the multidisciplinary dimensions of long-term dairy development pathways. They also led us to identify key governance issues related to the future of dairy value chains in Vietnam. Among those issues, we identified the question of the competition between smallholder farms and mega farms as a major policy question to be addressed (Nguyen Mai Huong et al. 2016 and 2018). This experience led us to draw the following sociotechnical transition pathways, starting from the years preceding the main economic reforms of the *Đổi Mới*.

Đổi Mới Policies and the Dominance of Smallholder Farming

The Collectivist System and the “Residual” Peasant Economy Before *Đổi Mới*

Before the *Đổi Mới* reforms, the political system did not formally recognize individual family farms in either the north or south of the country.

In the north, starting in 1958, the Party launched an active collectivization program that supported state farms (*Nông lâm trường*) and cooperatives (*hợp tác xã*). Due to the absence of milking animals in traditional agrarian systems, the cooperatives resulting from collectivization were not involved in dairy farming. Milk production remained limited to large state farms, some of which sprang from the nationalization of former colonial dairy farms. The State dairy farms relied on imported exotic breed dairy animals, and developed high scientific and technical expertise, notably in artificial insemination and forage production. Some held over 1,000 cows (Duteurtre et al. 2015a). However, the coexistence of family plots and home gardens alongside the cooperatives and State-owned farms contributed to the survival of a significant “residual” peasant economy. The 1954–1956 agrarian reform had notably given landless farmers access to micro-plots with a maximum size of 1080 m².⁵ Although these “micro-plots” only amounted to 5–20% of cooperative land, they contributed to more than half of household revenues between 1960 and 1975 (Brocheux 2009). After reunification in 1976, the importance of these family plots continued to increase. Dairy farming was not, however, a part of this residual economy before the *Đổi Mới* reforms.

In the south, the collectivization programs launched after 1975 did not achieve the expected targets in terms of collective farming. By 1981, only 7% of cultivated land had been collectivized (Raymond 2001, cit. in Minh-Tam T. Bui and Preechametta 2016). In this region, the residual “peasant” economy remained and therefore was more important than in the north. It must be noted that milk production was restricted to a very small number of commercial farms. As in the north, traditional agrarian systems in the south did not include dairy animals.

⁵ Equivalent to “3 sào” (local measurement unit).



In January 1981, Resolution 100 set up by the Communist Party created a system of “production contracts” (*khoán sản phẩm*) between families, cooperatives and the State to improve the internal efficiency of cooperatives (Thanh Liem Lan 1991). The regime of course remained “hostile to the free market and private enterprise” (Brocheux 2009). However, this “production contracts” system made it possible for an official “private” form of remuneration of family labor to emerge. Here again, dairy production was not directly affected by these institutional changes since milk was not produced by cooperatives. This first reform was the initial step toward the development of a new private agrarian economy.

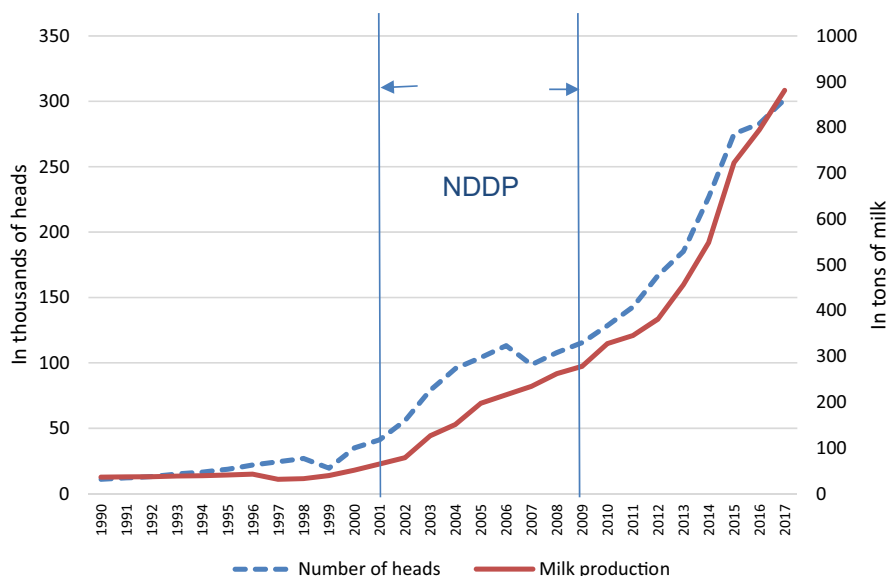
The Crisis of the Collectivist System and the Re-emergence of Family Farms in the Post-*Đổi Mới* Economy

The change in policy originated from domestic factors which were linked to the failures of national five-year plans (1976–80 and 1981–86), as well as to international factors (Brocheux 2009). In the dairy sector, state farms suffered from the weaknesses of the collectivist system that resulted in a severe economic crisis. From the late 1970s up to the mid-1980s, most of them encountered major management problems and lack of financing. On the Ba Vi state farm, for example, the number of dairy cows dropped from 1113 to 265 between 1977 and 1985 (Vien Chan Nuoi 2009 cit. in Duteurtre et al. 2015b). After extensive debate, the new “Renovation” policy (*Đổi Mới*) was ratified at the Sixth Congress of the Communist Party in 1986.

The official re-emergence of family farms in Vietnam was made possible by the economic reforms that followed the Sixth Congress. In 1988, Resolution 10 of the Communist Party recognized family farming as the principal agricultural production model. Market reforms were accelerated by the erosion of public foreign aid after 1989 due to the collapse of the Soviet Union (Lam Thanh Liem 1991). Little by little, family farmers obtained official approval from local authorities to cultivate plots that had been previously cultivated informally or managed collectively. Farmers also were allowed to directly market their production and to earn money from it (Lam Thanh Liem 1991; Pillot 1995).

The 1993 Land Law established the terms of the “right to the private use of land”, organized around short-term land leases. These land use rights certificates (*giấy chứng nhận quyền sử dụng đất*), or “red books” (*sổ đỏ*), were granted for a renewable period, while the land remained the property of the State. This land tenure system enabled a portion of collective land to be redistributed to families “based on the number of eligible beneficiaries per household” (Gironde 2008). These land reforms would lead to the rapid growth of private agricultural production and accumulation (Akram-Lodhi 2004). In 2001, i.e., eight years after this land reform, 10.3 million agricultural households were recognized as individual farmers. They had on average 0.56 hectares of annual and perennial crops (excluding forest land) and 85% of them worked on less than one hectare (GSO 2020).





Source: GSO, 2019 (NDDP = National Dairy Development Program)

Fig. 1 Evolution of dairy herd and national milk production in Vietnam from 1990 to 2017. *Source* GSO, 2019 (NDDP=National Dairy Development Program)

The Emergence of a “Peasant” Milk Production Sector

Consequently, in the context of the *Đổi Mới* reforms, state farms were converted into research and development centers (which was the case of Ba Vi farm near Hanoi) or into semi-private enterprises (which was the case of Moc Chau farm in the northwest mountains, 200 km from Hanoi). The cows were allocated to the former workers of the state farm or to newly established smallholders on a contractual basis. In Ba Vi, those contracts took the form of “share-cropping” arrangements: farmers had to market the milk produced from the allocated cows through the research center, and received services in exchange. These reforms led to the development of a nucleus of peasant dairy farms within the perimeters of former state farms (Duteurtre et al. 2015a, b).

To support this movement, the National Dairy Development Plan (NDDP) launched in 2001 put the growth of rural family farms at the heart of its strategy. Endorsed by the government, Decision No. 167 strengthened public support to smallholders such as credit for the purchase of heifers, technical training, and subsidies for equipment and inputs. In parallel, several public sector investment programs aimed to strengthen rural infrastructure.

The development of the smallholder milk production sector also benefited from a strong public effort to support rural development (Akram-Lodhi 2004). Based on various recommendations of the Vietnamese Communist Party (VCP),



Table 2 Milk consumption in Vietnam and self-sufficiency. *Source* FaoStat for years 1990–2010 and for imports, and MARD (2019) for years 2013–2018 (except imports)

Year	Consumption (in kg of milk equivalent /hab./ year)	Production (in tons of milk/ year)	Self-sufficiency (share of production in total supply) (%)	Imports (in tons of milk equivalent/year)
1990	1	60,000	64	34,000
2000	8	84,000	13	558,000
2008	9	294,000	32	618,000
2010	14	338,000	26	1,184,000
2013	18	456,000	28	1,277,000
2015	21	660,000	35	1,453,000
2016	23.5	795,000	38	1,788,000
2017	24	881,000	40	1,769,000
2018	27.5	936,000	34	1,764,000

the Vietnamese government launched several national rural development programs focused on poverty reduction and infrastructure. Between 1993 and 2010, the share of the population living below the poverty line decreased from 58.1% to less than 10% (Kozel et al., 2013). Among the most significant programs was the Socio-Economic Programme for Extremely Difficult Communes in Ethnic Minorities and Mountainous Areas (Programme 135) that ran from 1999 until 2010.

This post-*Đổi Mới* regulatory context allowed the development of individual smallholder farms. Between 1990 and 2010, dairy production increased fivefold (Table 1). In 2010, there were 20,000 dairy farms that had on average six cows and produced 338,000 tons fresh milk (Fig. 1). In 2014, the average size had increased to around 10 cows per ha (Pham Duy Khanh et al. 2016).

This rise of a “peasant” milk production must also be understood as a response to the emergence of new market for milk.

The Setting up of Inclusive Marketing Chains in Selected Milk Collection Areas

Due to very strong economic growth, milk consumptions habits changed drastically in Vietnam. Per capita consumption of milk rose from 1 to 14 kg per year between 1990 and 2010 (Table 2). In this period, dairy imports rose sharply to respond to this new demand, but processing firms also started to collect local milk.

This rapid growth of the milk production was therefore highly dependent on the emergence of new value chains actors. The milk processing sector relied primarily on several state-owned companies such as the major the Vietnam Dairy Company (Vinamilk) set up in 1992, or the Moc Chau milk company. Some private milk processing industries also emerged supported by foreign investments allowed by the 1987 Foreign Direct Investment law (such as Dutch Lady in 1996, or Nestlé in 1997) or by national investments (such as Hanoimilk in 2001 or IDP in 2004). These industries relied on a network of milk collection centers located around Ho Chi



Minh City, Hanoi and Dalat. Milk companies also provided trainings and credit for feed and for heifers that complemented public programs. Some small and medium enterprises (SMEs) also started to collect milk and to sell milk products as permitted by the new market regulation, with less support from local authorities, but in close contact with farmers (Duteurtre et al. 2015a). Those small and medium-size enterprises developed in the main milk production areas (the “milk-sheds”). They were located around the former state farms, for example in the Cu Chi district in south Vietnam, in Dalat in the center of the country, and in the Ba Vi and Moc Chau districts in the north.

Smallholder farmers often worked on a “contractual” basis with milk collectors, benefiting from monthly cash payments and feed loans, although those contracts were rarely written. On the opposite, contracts between collectors and processors were more formal: they were based on written documents and involved milk quality control procedures. The combination of oral and written delivery contracts, formal loans, informal debts arrangements, interpersonal trust and moral obligation supported these collection networks (Duteurtre et al. 2016a, b). In some milk-sheds, farmers’ cooperatives were set up in an attempt to promote collective sales and service provision. This was the case for example in Ba Vi, in Cu Chi, and more importantly in Soc Trang with the Evergrowth cooperative.

In parallel, animal feed industries developed at a very high rate. Heifer traders and private vets also emerged progressively (Nguyen Mai Huong et al. 2017).

Interpreting the Post *Đổi Mới* Sociotechnical Regime as a “Peasant” Regime

From 1990 to 2008, dairy farming in Vietnam was dominated by what we propose to call a “peasant” sociotechnical regime. This regime was characterized by the conjunction of a coherent set of practices, techniques and social rules (Table 3).

This growth in the smallholder dairy sector was based on *technical and scientific* solutions adapted to local constraints. The main production model was the one of very small farms on less than one hectare. This labor-intensive system was based on crossbred Holstein cows kept in tie-stall barns and trough feeding with a mix of industrial concentrates and green elephant grass fodder. Through this system, high yields could be obtained on very small areas, with 6 cows per ha on average. Those smallholder farms worked mainly with family labor, delivered their milk on a contractual basis, and were involved in other farm and non-farm activities.

In parallel, an *inclusive dairy industry* emerged, that consisted of a territorial network of service companies up and down the value chain that enabled farm development. The transactions between milk producers, collectors and processors were regulated by both formal and informal contracts and by local arrangements. The emergence of this alliance between private firms and farmers under the peasant regime also was supported by the provision of local public services provided in the context of national *policy* programs (such as NDDP) implemented at the local level. In some cases, local authorities supported the creation of farmers’ cooperatives involved in collective sales and service provision.



Table 3 Description of the two sociotechnical regimes characterizing the dairy sector from 1986 to 2019

Domains	Sociotechnical components of the “peasant” regime (1986–2008)	Sociotechnical components of the “corporate regime” (2008–2019)
Livestock practices	Intensive production practices based on keeping crossbred dairy cows in tie stalls, purchasing industrial feed, cultivating green fodder on small plots	Intensive commercial family farms and industrial mega farms based on pure breed Holstein cows fed with a mix of concentrates and silage
Market organization	<p>Liberalization of domestic markets, regular sale of collected milk to industry</p> <p>Construction of a mixed public–private economic fabric made up of state companies, technical services, private firms and SMEs</p> <p>Emergence of new products and new consumption habits</p>	<p>Development of a mass distribution system (shops, supermarkets)</p> <p>Opening markets to international competition through trade agreements and the establishment of health standards</p> <p>Concentrated dairy sector made up of large dairy companies, some of which encompass all activities up and down the value chain</p> <p>Development of an agro-industrial capitalism based on the Hanoi and Ho Chi Minh City stock markets</p>
Technology, know-how, research and development	Artificial insemination practices enabling crossbreeding, control of the health environment of livestock farms, know-how and innovation involving fodder crops and milk collection and processing	<p>High labor productivity systems based on the mechanization of most livestock practices and advanced dairy technology and high level of capital investment (digital technologies)</p> <p>Industrialization of milk processing and health standards</p>
Cultural values and food and social standards	<p>Social issues: Dairy production as a means for rural families to raise their income and livelihoods</p> <p>Health issues: Milk = health, growth and modernity</p>	<p>Social issues: Interest in digital technology, gigantic-scale technology, international competitiveness, and reduction of import dependency</p> <p>Health issues: Industrial milk = symbol of health security, health and modernity</p>



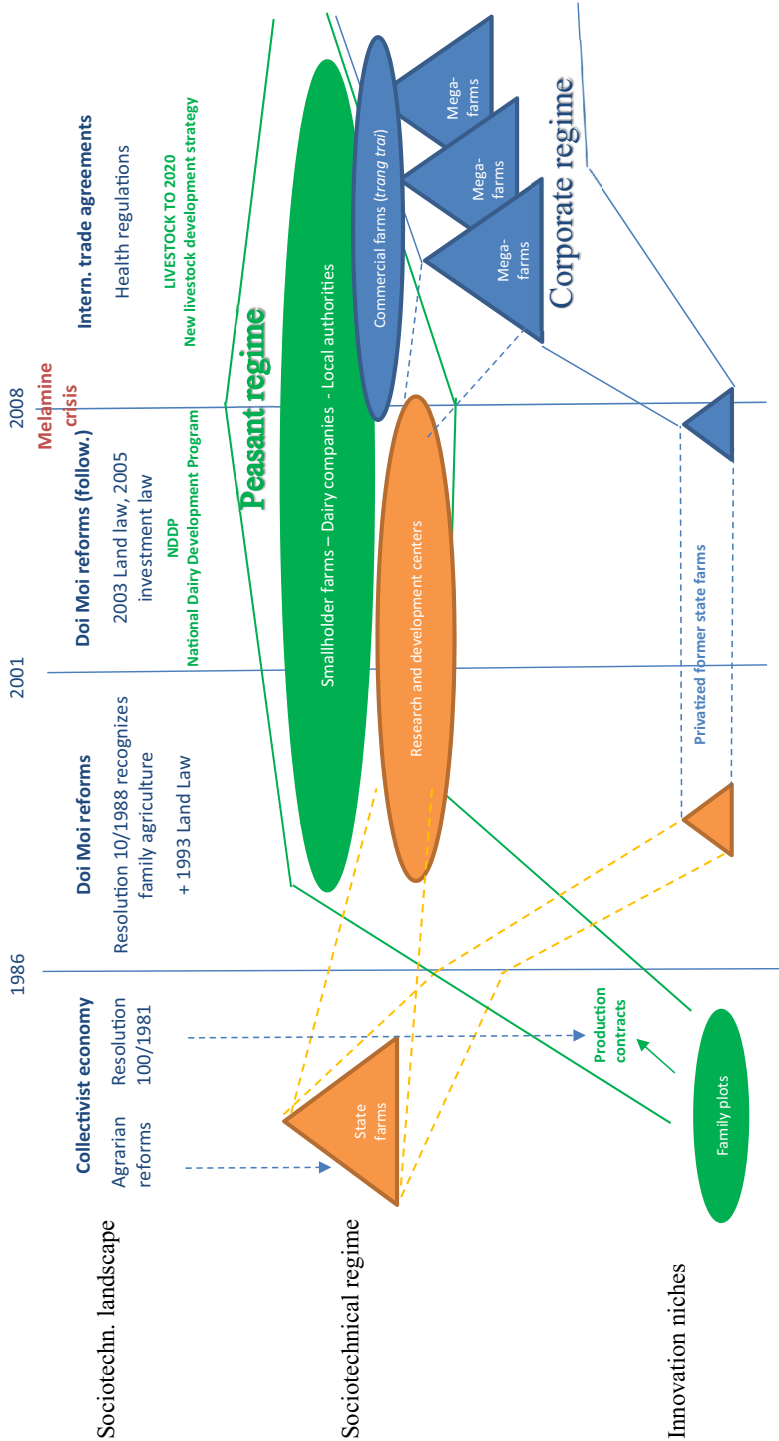


Fig. 2 Sociotechnical pathway of the dairy sector in Vietnam



This period also corresponded to a “*rehabilitation of the family economy*” (Gironde 2008), meaning to changes in collective *norms and cultural values*. A new agriculture development model emerged. It was based on a social conception of the role of agriculture (to provide income for rural smallholder farmers). These changes in values were reflected in several changes in regulations, in particular the Party Resolution n°10/1988 allowing private farmers to settle, and the 1993 Land Law recognizing their land use rights. The emergence of new *market preferences* also witnessed those cultural changes. A demand emerged for diversified foods such as dairy products that were considered synonymous with health and modernity.

The emergence of this peasant regime was a response to a radical change in the *sociotechnical landscape*: the collectivist economy collapsed, a new international context arose, and the government launched market reforms and rural programs.

The emergence of this regime over the 1990s and 2000s may also be interpreted as the result of several *innovation niches* that arose during the collectivist crisis: (i) the 1954–1956 land reform that had led to the fragmentation of the land tenure, (ii) the continued use of “family plots” starting from the 1970s, (iii) the development of “production contracts” in the early 1980s (Fig. 2).

If this peasant regime showed a relative stability during the 1990s, the market limitations of this peasant regime opened the door in the 2000s to the corporatization of the sector.

The Emergence of Mega Farms and the Establishment of a “Corporate” Regime

Since 2008, the dairy sector in Vietnam has undergone significant changes that have led to a modified sociotechnical landscape and the emergence of a new regime. Public policies have turned their focus to the industrialization of the dairy sector. This section analyses the drivers, the nature and the consequences of this change of regime.

The “Peasant Regime” Called into Question

Despite the success of peasant milk production in Vietnam, which lasted throughout the 2000s, larger dairy farms began to emerge starting from 2008. Two major elements have to be considered to understand this major shift.

First, the dairy sector in Vietnam was gravely affected by the 2008 melamine crisis. In October 2008, Vietnam had to deal with imports of adulterated milk powder from China. At the time, Vietnam was importing 80% of milk for national consumption in the form of milk powder, i.e., 618,000 tons/year of milk equivalent (Table 2). In China, the presence of melamine in numerous batches of infant milk powder led to the hospitalization of tens of thousands of children and caused the deaths of six infants. Vietnam reacted by ceasing all milk imports from China and by closing certain local industries that used adulterated milk powder. This crisis led to renewed industry interest in local milk production in a context where consumer confidence



in livestock farmers had been deeply damaged. Several industrial actors invested in supporting smallholder producers, while others decided to set up specialized industrial dairy farms.

The melamine crisis also resulted in an emerging demand for “healthy” and “safe” products (*thực phẩm sạch*) in all sectors (not only in the dairy sector). This shift was supported by public policies in favor of industrial standards and safeguards. Following its accession into the World Trade Organization (WTO) in 2007, Vietnam signed multiple trade agreements. Directly related to these developments, Law 55 on Food Safety was ratified in 2010 and led to several guiding decrees and implementation circulars over the years that followed. Certification mechanisms thus emerged in other sectors such as meat and “safe” vegetables. These health safety policies promoted the industrialization of the dairy sector with a greater concentration of production and the integration of production by industrialists themselves.

Second, a new type of livestock development policy also emerged in 2008 that was intended to reduce the country’s dependence on imports. This change in direction was initiated by the Prime Minister’s Decision 10/2008, entitled “Strategy on livestock development to 2020”. The main goal of this strategy was to create the conditions for the emergence of intensive “commercial” family farms and large industrial farms. This Decision was followed six years later by Decision 984/2014 of the Ministry of Agriculture and Rural Development, on “improving the added value of the livestock sector while ensuring sustainable development principles”. This Decision 984/2014 confirmed the orientation of the 2020 livestock strategy while attempting to add some environmental safeguards.

Farm Size Growth and the Promotion of “Commercial farms”

Contract farming in the dairy sector supported farmers in growing their operation. Loans provided by collectors helped them to purchase heifers and equipment. Economies of scales also supported a regular growth of the dairy herd and of the forage crop land managed by farmers. In Ba Vi, the average herd size rose from 6 to 10 milking cows between 2010 and 2016 (Pham Duy Khanh et al. 2016).

In addition, the emergence of farms of higher scale of operation was also encouraged by public authorities through the certification of the largest family farms under the “*trang trại*” label. As noted in the method section, we translate “*trang trại*” as “commercial farms”, although there is no agreement on this in the English scholarly literature. The certification process involved defining criteria for the largest family farms, mobilizing local authorities at the district level to conduct this certification, and using the “*trang trại*” label to steer some aid programs toward these farms. The criteria for certifying farms as *trang trại* were defined first in 2000 by Circular 69 promulgated by the Ministry of Agriculture and Rural Development (MARD) and the General Statistical Office (GSO).⁶ The criteria were revised upwards in 2011 by

⁶ Circular 69/2000/TTLT-BNN-TCTK.



Table 4 Dairy herd in Vietnam per type of farm (2018) *Source* MARD (2019), *: Our estimation from companies 2018 data

Owners of the herd	Farm structure	Number of heads	Share of total herd
Company farms		93,441	32.08
-TH milk	1 mega farm	49,800	16.92
-Vinamilk	12 mega farms	27,000	9.17
-Nutifood/ Hoàng Anh Gia Lai (HAGL)	1 mega farm	5000	1.70
-Moc Chau breeding center	3 mega farms	1800*	0.61
-Others	Large-scale farms	9841*	3.68
Households farms	29,000 small farms	199,941	67.92
-delivering to Vinamilk	6000 small farms*	(est.) 80,000	
-delivering to FrieslandCampina	2500 small farms*	(est.) 31,000	
-delivering to Moc Chau	548 small farms	25,496	
-delivering to other companies	16,952 small farms*	(est.) 43,445	
Total		294,382	100.00

Circular n°27 of MARD.⁷ In the livestock sector, the new criteria corresponded to a minimum turnover of 1 billion VND/year. For a dairy farm, this represented a herd of about 25 adult dairy cows each producing 3000 L/year.

In 2016, there were 33,500 recorded “commercial farms” in accordance with the new circular, of which 21,060 farms were in the livestock sector. These “commercial farms” accounted for only 0.35% of the total number of farms in the country, but their number had increased by 67% from 2011 (Cesaro et al. 2019). In the entire agricultural sector, the “commercial farm economy” (*kinh tế trang trại*) represented 135,500 permanent jobs, one-third of which was composed of family labor and two-thirds of employees. The number of farming households decreased from 10.5 million to 9.3 million between 2006 and 2016 (GSO 2018).

In the dairy sector, the number of farms with more than 20 heads rose rapidly (MARD 2019). The largest family farms seized opportunities offered by the market to increase in size through loans obtained from firms. However, many smallholders struggled to meet the new standards. According to the latest census (MARD 2019), farms with over 20 cows (including mega farms) represented around 40% of the herd in 2016. Of course, a large majority of the farms remained very small. Among the 29,000 family dairy farms existing in 2018, only 6% had 20 or more cows (Table 4).

The Concentration of the Milk Processing Sector

The dairy processing sector became more and more concentrated throughout the 2010s. Some major Vietnamese dairy industries with international ambitions emerged during this period. Following the gradual privatization (starting in 2003) of the old state-owned “Vietnam Dairy Company”, Vinamilk became the major player

⁷ Circular 27/2011/TT-BNN.





Source: Data from Ba Vi Cattle and forage research center

Fig. 3 Monthly average farm-gate milk price in Ba Vi (in VND/liter). Source: Data from Ba Vi Cattle and forage research center

in the sector, owning 35% of the market share in 2008 and around 50% in 2017. In 2018, the company became the third largest private company in Vietnam (in all sectors), though it remained partially public, with 36% of the company's shares belonging to the State Capital Investment Corporation (SCIC) (Vinamilk 2019). Mention also should be made of the valuation on the stock market of TH True Milk, the 166th largest private company in Vietnam in 2018. As part of the same dynamics, the International Dairy Product JSC (IDP) was taken over by a Japanese investment fund in 2015. The complete privatization of the Moc Chau Dairy Cattle Breeding Company in 2018, a former state farm that had developed a strong processing capacity, is also a significant sign of this new dairy capitalism.

This concentrated industry generated a high demand for local milk, resulting in the rise of milk prices from 2010 to 2015 (Fig. 3). The development of the industrial milk processing sector also led to the adoption of private milk quality standards and quality control procedures that were implemented by processors and collectors through written contracts. In 2017, the government published the standards QCVN 01-151:2017/BNNPTNT on “National technical regulation on milking and milk collecting establishment—Requirements for food safety”. This regulation made most quality control procedures mandatory, though most farms “had not yet announced the conformity with those standards” (MARD 2019).

It was, however, the emergence of giant dairy “mega farms” that represented to most striking innovation in upheaving the structure of the dairy sector in Vietnam.



Table 5 Mega farms owned by Vinamilk. *Source:* Vinamilk, (2019)

Name	Year of foundation	Herd capacity	Owner (Subsidiary)
Tuyen Quang dairy farm	2007	2,000 heads	Vietnam Dairy Cow Co Ltd
Binh Dinh Dairy farm	2008	2,000 heads	Vietnam Dairy Cow Co Ltd
Nghe An Dairy Farm	2009	2,600 heads	Vietnam Dairy Cow Co Ltd
Thanh Hoa Dairy Farm	2010	1,600 heads	Vietnam Dairy Cow Co Ltd
Vinamilk Dalat Dairy Farm	2012	1,600 heads	Vietnam Dairy Cow Co Ltd
Tay Ninh Dairy Farm	2013	8,000 heads	Vietnam Dairy Cow Co Ltd
Ha Tinh Dairy Farm	2016	2,000 heads	Vietnam Dairy Cow Co Ltd
Nha Thanh Dairy Farm	2016	2,000 heads	Vietnam Dairy Cow Co Ltd
Organic Dairy Farm	2017	1,000 heads	Vietnam Dairy Cow Co Ltd
Vinamilk Da Lat Organic Dairy Farm	2018	1,000 heads	Vietnam Dairy Cow Co Ltd
Total 10 farms end of 2018		23,500 heads	
Thong Nhat Thanh Hoa 1 Dairy farm	2018	3,500 heads (4,000 heads planned in 2018)	Thong Nhat Thanh Hoa Dairy Cow Co. Ltd
Thong Nhat Thanh Hoa 2 Dairy farm	2018	0 heads (4,000 heads to be received in 2019)	Thong Nhat Thanh Hoa Dairy Cow Co. Ltd
Total 2 farms end of 2018		3,500 heads	
Grand Total 12 Farms (2018)		27,000 heads	

The Emergence of the “Mega Farm” Model

Several regulations supported the creation of “private companies” (*doanh nghiệp*) in agriculture and agroindustry. Between 2006 and 2016, these companies doubled in number, rising from 2,136 to 3,846 across the entire country (GSO 2018). Some corporate farms started to emerge in the dairy sector, investing on the American model of “mega” dairy farms.

Consumer enthusiasm for products made from local milk (a consequence of the melamine crisis), government support for this type of huge business projects, and the gains expected from an integrated industrial organization led to the emergence of numerous mega farms. Some state farms that had not yet been privatized were sold at the end of the 2000s to private firms in order to set up private large-scale farms. This was the case for example of Sơn Dương and Yên Sơn dairy farms in the northern province of Tuyên Quang. Some other mega farms settled down on large land holdings made available by the dismantlement of former state farms. This was the case for example of TH milk mega farm in the Nghệ An province.



Between 2007 and 2017, the Vinamilk company, which mainly collected milk from small farms, set up 10 mega farms scattered across the country. In 2018, these industrial farms held a total of 23,500 heads (Table 5). The same year, Vinamilk launched a new mega farm in Thanh Hoa province in the Northern Central region and one year after, in 2019, the company announced the launch of a new mega farm project in Tay Ninh province in the South-East and another in Laos. In total, 27,000 pure Holstein dairy cows are being raised on these 12 mega farms (see Table 5).

In 2009, the TH Milk company founded what would become the largest private mega farm in Vietnam. Set up in Nghe An province, in the Northern Central region, this farm cluster held 45,000 cows in 2014, and 49,895 cows four years later, including 26,231 milking cows (MARD 2019). In 2017, the firm announced a new mega farm project with 10,000 heads in Ha Giang province (in the Northern Mountains), and another with 5,000 heads in Phu Yên province (on the South Central Coast). In 2019, TH Milk started construction of new high-tech concentrated dairy cow cluster projects in the central province of Thanh Hoa (10,000 cows) and in Soc Trang province in the Mekong Delta (20,000 cows).

Other recently established private mega farms include the 1000-head Future-Milk farm installed in 2008 on the former Son Dong state farm, and the three relatively smaller industrial farms established between 2010 and 2015 by the Moc Chau Dairy Cattle Breeding JSC (Moc Chau Milk). In 2018, mega farms held 32% of the national herd (Table 4), compared to 25% in 2014 and less than 5% in 2008 (Nguyen Mai Huong et al. 2016). The rest remained in the hands of family farms.

These mega farms constituted an innovation niche that generated renewed interest in high-tech and capital-intensive systems to the detriment of more labor-intensive family systems. These production units are based on raising pure Holstein cows in barn stalls and using an automated feed system of rations composed of a mix of silage and industrial feed. To complement forage produced on farms, whole plant corn is bought from nearby smallholders and Alfalfa hay is imported. Water filtration systems enable a sufficient amount of water to be provided to the herd. Animal health, milking and breeding procedures are managed through individual animal monitoring software based on digital technologies. The cultivation of fodder crops on large areas, trough feeding and milking activities are all mechanized, resulting in higher labor productivity than on family dairy farms (Pham Duy Khanh et al. 2016). Milk is processed in large-scale processing factories.

The units also are based on the provision of large land holdings, mostly once part of former state farms, contracted by local government. Mega farms are therefore mostly located in rural areas, whereas family farms tend to be concentrated in peri-urban regions (Nguyen Mai Huong et al. 2016). According to Võ Trường Sơn (1989), there were several hundred former state farms throughout the country which had not been entirely privatized or nationalized, and were therefore still managed by local authorities. For large-scale private investors, these former state farms represented an important stock of land for developing large-scale production units throughout the 2000s and 2010s.

The rise of mega farms in Vietnam throughout the 2010s resulted in growing competition on the milk market. As a result, the price of milk paid to farmers



Fig. 4 Propaganda picture of the National Target Program for Building New Rural Areas (2015). “Building new rural areas to enjoy civilized villages”

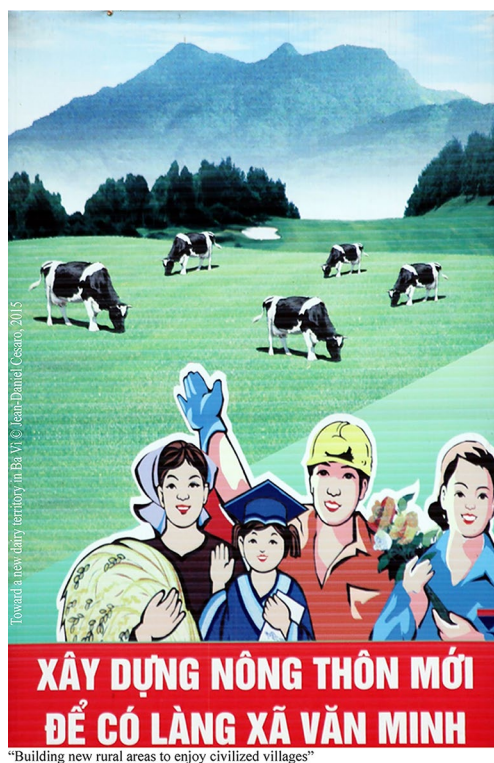


Table 6 Size of “households farms” (*hộ nông nghiệp*) in Vietnam (2016). *Source* 2016 GSO census, cited in MARD (2019) * Proposed by us

Size of households	Number of households	Share of households farm dairy herd	Farm category*
Less than 5 cows	17,792	62.0%	Smallholders
5 to 10 cows	5,622	19.6%	Smallholders
10 to 20 cows	3,564	12.4%	Middle-size family farms
More than 20 cows	1,716	6.0%	Large commercial family farms
Total	28,694	100.0%	

decreased drastically in 2016 and 2017, as illustrated by Fig. 2. Smallholder farmers, who had benefited from increased milk prices in the 2000 – 2015 period, suffered from this new context characterized by depressed prices and higher quality requirements. This resulted in a national “milk crisis” where farmers dumped their milk in protest (Duteurtre et al. 2016a, b).



The Growing Divergence Between Rural Development Programs and Sectoral Policies

This rapid transformation of the milk industry resulted in a growing disinterest of value chain stakeholders for smallholders. Their share in total milk production decreased sharply, representing in 2016 only 82% of the herd of households farms, i.e., 55% of the total dairy herd (Table 6). Yet, the government continued to invest in rural development programs. The Rapid and Sustainable Poverty Reduction Programme for the 62 Poorest Districts (programme 30a) launched in 2008 was a clear example of such policy programs that were more and more disconnected from sectoral policies. More importantly, the Nation Target Programme (NTP) on “New Rural Areas” (*Nông Thôn Mới*) started in 2009 to support huge public investments in rural infrastructure, in particular in milk production districts (Fig. 4) (Trung and Minh Bui 2015).

Interpreting the Post-2008 Sociotechnical Regime as a “Corporate” Regime

We propose to describe the sociotechnical regime that emerged after 2008 as a “corporate regime”. Indeed, this period has been characterized by the domination of large private firms (corporations) that invested in processing factories and integrated industrial mega farms. This new regime aims to promote productive investments in agroindustry at the expense of the complementary relationship between firms and smallholders that had previously prevailed (Table 3). While this new arrangement has not entirely replaced the former “peasant regime”, it appears to have become increasingly important (Table 4). This structural shift is schematized in Fig. 2.

This transformation of the sociotechnical regime relied on major *technical innovations* and a *new scientific context* based on digital technologies that allowed economies of scale. The set-up of large industrial farms raising pure Holstein cows in barn stalls using automated feed systems, water filtration systems, individual animal monitoring software, and work mechanization are the major technical components of this new production model. The new regime also corresponded to a *new industrial context*: as the sector became more concentrated and internationalized, major processing industries were able to invest in large-scale integrated production facilities. These changes were permitted by several *regulations* and by the implementation of new *public policies* supporting integration and concentration in the dairy sector (provision of large land holdings, new livestock development policies, new quality standards). The transformation of the regime also resulted from a major shift of the whole *sociotechnical landscape*, including new international trade agreements, regulation in favor of “commercial farms” and “private firms”, privatization of part of the capital of a former State-owned enterprises (SOEs), development of the private bank sector, etc. This new context has been characterized by a change in *norms and cultural values*. The support of mega farm projects by public authorities appeared to rely on several technical and economic justifications that gave more importance to digital technologies, international competitiveness, food sovereignty and industrial food safety standards. Furthermore, local authorities were promoting the establishment of industrial systems to generate



local jobs and revenues for their districts and to respond to strong growth in domestic demand for milk. New *market preferences* emerged, that awarded higher prices to products “100% fresh” (*100% Sữa Tươi*) made from local milk, and to “safe products” (*thực phẩm sạch*) responding to industrial quality standards. Some of those new quality standards resulted in barriers to smallholders (Table 3).

This re-configuration of value chains led to the “coexistence” of smallholder farms and mega farms. This coexistence of production structures based on different models relied on local adjustments that are discussed in the final section.

Governing the Coexistence of the 2 Regimes: Pragmatic Compromises and the Dynamics of Capitalism

The emergence of the new “corporate regime” has not completely replaced the former “peasant regime”. Rather, peasant farms have been interacting (in complementarity or in competition) with industrial farms and dairy processing firms to access resources and markets. Public services have governed this coexistence at different scales, and through different local pragmatic compromises. Those pragmatic decisions have been illustrated in particular in three important areas of public action: the management of land; the strategic allocation of public resources; and the promotion of local partnerships. These three governance levers played a key role in the evolution of different forms of livestock farming.

Control of Land, a Prerogative of the State to Guide the Transition

Since *Đổi Mới* (and even before), land governance has been a critical element in the sociotechnical landscape. The control of land by government services greatly empowered the State to guide the outcome of the transition.

Beginning in the early 1990s, “land distributions” to individual families supported smallholder farming. The 1993 land reform was particularly equitable and engendered the growth of diversified farming systems that were very land and labor-intensive (Akram-Lodhi 2004; Pham Duy Khanh et al 2016).

Nevertheless, starting from 2008, authorities favored the “consolidation” of land to allow the gradual emergence of larger farms (To et al. 2019). These large farms were expected to achieve economies of scale, and in particular to meet the objectives of the 2020 livestock development strategy. At the same time, local authorities promoted land transactions favoring the emergence of mega farms by attributing rights over land of former state farms that had remained under direct State management. More recently, the 2013 land law reform encouraged land consolidation, and the 12th VCP Congress in 2016 recognized land concentration as a priority (Phuc To et al. 2019).



The Partial Reallocation of Public Resources

The transition to the “corporate” regime has also been governed by a partial shift in the development programs funded by public authorities. This partial reallocation impacted differently rural development programs and livestock sectoral policies. Whereas “pro-poor” rural development programs continued to support small-scale agriculture and rural families throughout the 2000s and 2010s, livestock sectoral policies have been re-oriented from 2008 on toward large-scale farms.

The maintenance of “pro-poor” rural development policies relied on major policy investments that we already mentioned in Sect. 2. Most of these programs were still ongoing in 2020. They were implemented with the strong involvement of local authorities. Provinces and districts have been engaged in issuing local regulations to implement locally adapted development programs. In synergy with many of these programs, the Vietnamese Bank for Social Policies (VBSP) has been engaged since its creation in 2002 in the promotion of micro-credit at a very large scale. In 2017, the bank claimed to have provided credit to a total of 31.5 million households or beneficiary associations (VBSP 2017). Those programs developed in parallel with village-level participatory development programs supported by international donors (Friederichsen and Neef 2010).

In contrast, livestock sectoral policies and economic programs focused on supporting “commercial farms”, large-scale “companies” and “mega farms”. These programs relied on public subsidies as well as on the strong role of the Vietnam Agricultural Bank (Agribank) in supporting private investment and capital accumulation in the sector. All of these sectoral programs promoting large-scale investments were equally implemented by local authorities. Other commercial banks were also involved in the process, such as the Bank of North Asia (Bac A Bank) that supported the creation of the TH Milk company. The role of private business firms (in particular animal feed companies and crop seeds companies) was also crucial.

The coherence between “pro-poor” development programs and business-oriented livestock policies required adequate trade-offs and pragmatic compromises from local authorities. Local partnerships helped these compromises to emerge.

Local Partnerships: A Factor Structuring the Milk-Sheds

In the districts where the National Dairy Development Plan had supported small-holder milk production in the 2000s, the establishment of milk processors were supported by local authorities. These local partnerships relied on a close collaboration between farmers, government institutions, and companies (Duteurtre et al. 2015b). Due to the importance of public services (such as research on cattle and forage, artificial insemination, training and innovation, etc.) the influence of private firms remained limited.

However, in the 2010s, these “tripartite” partnerships gradually evolved into “bilateral” formal agreements between companies and local authorities, and the role of smallholder farmers was reduced. This was the case in Ba Vi with the MOU



signed in 2012 between IDP and Bavi district authorities. Public authorities also supported the establishment of local products certifications in close partnership with private firms. In Moc Chau district, for example, the “Moc Chau milk” trademark is owned the Moc Chau Dairy Cattle Breeding Company. In Ba Vi, the certification trademark “Cow Milk from Ba Vi” is owned by the district, but its use is restricted to the two largest dairy processors of the district (the IDP company and the Ba Vi Milk company). In Ha Nam province in the northern part of Vietnam, the Friesland Campina milk processing company established a partnership with 189 dairy farmers who each held on average 17 cows. With the support of the local authorities, they intended to set up 50 “professional farms” of 80 to 100 cows on a total of 65 ha of land dedicated for this project in the Moc Bac Commune (Duy Tien district) (MARD 2019).

When private firms established mega farm projects, they set up close partnerships with national and local authorities. Here again, public authorities did not prioritize smallholder farms in the development plans. However, in areas where small-scale farms already existed, these partnerships led to the inclusion of smallholder farmers in the project. Mega farms were either presented as “demonstration farms” (case of Ba Vi industrial farm) or as “offspring production units” that could supply quality heifers to the surrounding farmers (case of Moc Chau industrial milk farms). The mega farms also offered the creation of local jobs, the purchase of maize fodder from smallholder farmers in the area, and the sale of manure to crop farms.

In the midst of these adjustments, local authorities acted to ensure this coexistence. Along these lines, Circular 14 issued by MARD in 2017 encouraged and guided public–private partnerships (PPP) in agriculture. This Circular was designed to support investments of private firms while promoting partnerships with public authorities and smallholder farmers. In 2018, Vietnam adopted a Livestock Law (Law n° 32) that emphasized the need for cooperation between actors of the livestock sector, the promotion of production areas with high health safety standards and the continued coexistence of different livestock farming models. This clear inclusion in the law of the term “coexistence” well illustrates the State’s concern regarding the serious challenges to the peasant regime brought about by the rapid growth of large farms. To implement this new strategy, in September 2019, MARD set up a PPP Task Force on Livestock gathering both departments under MARD, international donors and lead firms operating in the livestock sector (Decision 1322 of MARD).

Nevertheless, coexistence and complementarity between smallholder farms and mega farms did not always appear to be possible. In these local partnerships, sector rationales sometimes outweighed the pursuit of the coexistence, resulting in competition and exclusion.

The Limits of Sector Rationale: The Risks of Farmers’ Exclusion

In 2015–2016, for example, the drop in milk prices led many companies to concentrate on collecting milk from large farmers to reduce their procurement costs. Smaller farmers were advised to stop dairy production and to change farm activities (Duteurtre et al. 2016b). In the south of the country, during the same milk price



crisis, the district authorities of Cu Chi wanted to develop a local certification trademark for products made from local milk. However, the district's identity was not sufficiently renowned to support the development of a distinct market niche for products with this label.

The absence of compromise sometimes has led to local tensions. The 2015 milk price crises illustrates this type of tensions that eventually resulted in local conflicts (Duteurtre et al. 2016b). These experiences show that the transition of dairy milk-sheds in Vietnam has been heavily influenced by the collaboration—and contestation—between the State, companies, and smallholder farmers. Due to the contingency of local trade-offs, the outcome of the transition remains uncertain, and might lead to local imbalances.

In addition to social tensions, environmental imbalances are certainly of primary importance in the current socio-ecological transition. The pollution issue of large-scale producers points to the ecological problems that are introduced through corporatisation. Around the Nghia Dan TH Milk mega farm, nearby villages were polluted by manure overflows in 2014. These problems would need further research, and they have not been addressed in the present paper.

Nevertheless, the risk of social tensions and environmental pollutions calls for more territorial strategies, where coexistence between firms and smallholder farmers could be promoted in favor of more balanced, sustainable dairy development pathways (Duteurtre et al. 2016a, b).

Conclusion

The emergence of mega farms represents a radical shift in the transition of the livestock economy that started during the *Đổi Mới* reforms in 1986. The concentrated mega farm model that emerged at the end of the 2000s closely resembles the state farms that were set up during the collectivist period. The difference is that the mega farm model relies on private financial capital and digital technology. As De Koninck (2010) notes with regard to the agrarian transition, we are witnessing a “*change-over from a society characterized by accumulation in agriculture to a society where accumulation takes place within the industrial sector*”. Moreover, it is important to note the inclusion of these mega farms in “integrated value chains” managed by processing firms, and the coexistence of these farms with peasant farms that emerged during the 2000s. The new regime also relies on a social construction of new food models concerned with “health safety”.

Our observations of the livestock transition in Vietnam emphasizes the multi-dimensional character of the sociotechnical change. The transition appears to be a gradual process in which individual, collective and cognitive dimensions (norms and values) are interacting to produce differentiated pathways (De Terssac et al. 2014). Rather than replacing some forms by others, the transition is resulting in parallel – and sometime intertwined—pathways, or, in other words, in the superposition of several regimes whose importance varies according to trade-offs made at the local level (and to the resulting contingency). Ultimately, the trade-offs made by public



authorities appear to be “pragmatic” to the extent that they reflect adjustments to socioeconomic contexts undergoing radical change.

In Vietnam, the agrarian economy appears to be deeply impacted by the rise of capitalistic forms of production such as mega farms, which are based on private investment, market forces but also public policies. Three main organizations appear to jointly promote this agrarian capitalism and to manage its impact on the whole society: the State (through subsidies, public services, impersonal law, etc.), private firms (through private contracts, competition, innovation, investment, price system related to supply and demand, etc.) and local networks of interpersonal relations (through local arrangement, social and moral obligation, informal credit, etc.).

Private processing industries clearly benefit from the rise of mega farms, as they allow them to secure their sourcing of raw materials. Industrial farms also support the government strategy to reduce the country’s dependency on imports at a higher rate than what could have been possible with medium-scale farms only, if we consider for example the massive imports of heifers undertaken by mega farms. The rise of mega farms directly competes with smallholder milk production on the milk market and for access to public resources and land. Furthermore, the emergence of the mega farm model tends to reduce the legitimacy of family production in the eyes of consumers and decision makers.

This economic and cultural competition does not, however, appear to be as clear cut in local level trade-offs, where one finds the coexistence, the superposition and the entanglement of different forms of production. Since most land remains in the hands of family farms, smallholders are still part of this “agrarian capitalism”. They remain today the major milk and maize providers and are therefore essential to the growth of private industries. The only question that remains unclear for the future is the capacity of the smallest farmers to respond to the requirements of the market (Le Thi Thanh Huyen and Valle Zarate. 2010). This could eventually be a reason to support the transformation of small family farms toward middle scale models.

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Declarations

Conflict of interest None.



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