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Structural transformation, agriculture and livestock in Vietnam (1970-2015)

A multi-scale political economy of an ongoing revolution

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Abstract

Vietnam has exhibited rapid economic growth over thirty years of comprehensive economic reforms. However, about half of the country's active population remains in agriculture. In order to characterize the role of agriculture and livestock in Vietnam's structural transformation, we assess ongoing dynamics at three complementary scales: national, sectoral (agriculture and livestock) and local (district of Bavi). We show that the transition since *Doi Moi* (Renovation) has given rise to a political economy that provides incentives to industries and services. However, labor abundance (due to population density) and limited land availability (85% of agricultural land is composed of less than 1 ha farms) have slowed the canonical structural transformation, and widened income inequality between agriculture and non-agricultural workers. In this 'Lewis trap' context, intensive livestock (as it is the case for aquaculture and horticulture) has played a significant role in increasing labor and land productivity, offering some perspectives to secure smallholder agricultural systems. But the emergence of those very intensive systems producing a lot of effluents has in the same time jeopardized sustainable development of rural and peri-urban areas. More recently, the political shift towards industrial corporate agriculture and large-scale farming has increased this pressure on the environment, and endangered inclusive agricultural development. Today, smallholder farming and rural communities encounter many challenges to exploit resources efficiently and gain access to input markets to achieve higher productivity and value added. To avoid the risk of poverty trap and to pursue a sustainable and inclusive development over the long run, deeper and wider reforms are needed based on smallholder viability, agroecological principles, and crop-livestock integration.

Keywords: *Structural transformation, agriculture, Livestock Revolution, development trajectories, Vietnam.*

Résumé

Le Vietnam a connu une croissance économique rapide sur trente ans de réformes économiques. Pourtant, près de la moitié de sa population active demeure encore dans l'agriculture. Afin de caractériser le rôle de l'agriculture et de l'élevage dans cette transformation structurelle, nous évaluons les dynamiques en cours à trois échelles complémentaires: national, sectoriel (agriculture) et local (district de Bavi). Nous montrons que la transition depuis *Doi Moi* (Rénovation) a fait émerger une économie politique qui encourage les industries et les services. Cependant, l'abondance de main-d'œuvre (due à la densité de population) et la disponibilité limitée en terres (85% des terres agricoles sont constituées d'exploitation de moins d'1 ha) ralentissent la transformation structurelle classique; et aggravent les inégalités de revenu entre travail agricole et non-agricole. Dans ce contexte que l'on peut qualifier de 'piège de Lewis', l'élevage intensif (comme l'aquaculture ou l'horticulture) a joué un grand rôle dans l'augmentation de la productivité de la terre et du travail, ce qui a permis de sécuriser nombre des systèmes agricoles familiaux. Mais l'émergence de ces systèmes très intensifs générant de grandes quantités d'effluents a en même temps compromis le développement durable des zones rurales et périurbaines. Plus récemment, le tournant politique vers une agriculture de firmes et des grandes exploitations commerciales a accentué cette pression sur l'environnement, tout en compromettant le développement inclusif des filières agricoles. Aujourd'hui, les petites exploitations agricoles et les communautés rurales sont confrontées à de nombreux défis pour exploiter efficacement les ressources et accéder aux marchés de facteurs pour augmenter leur productivité et valeur ajoutée. Pour éviter le risque de piège à pauvreté et poursuivre un développement durable et inclusif à long terme, de profondes réformes sont nécessaires, orientées sur la viabilité des petites exploitations, sur les perspectives offertes par l'agroécologie et sur une meilleur intégration de l'agriculture et de l'élevage.

Mots-clés: *Transformation structurelle, agriculture, Révolution d'élevage, trajectoire du développement, Vietnam*

1. Introduction

As a major economy of the Indochina peninsula, academics and donors have paid close attention to Vietnam and the political and socio-economic changes taking place there following the country's escape from prolonged wars and subsequent reforms (termed *Doi Moi*). The country has made great strides, thanks to advances in the rural and agricultural sector and poverty reduction (World Bank 2007): nearly half of the population has been lifted out of poverty in less than two decades (poverty headcount from 58% in 1993 to 16.7% in 2008 with poverty line at US$1.25); nutrition has been improved (undernourishment from 45.6% in 1990-1992 to barely 10% in 2012-2014); and the country is now qualified middle-income-country (MIC) (GDP per capita at 2005-USD rose from US$263 in 1986 to US$1116 in 2015 (Faostat 2017)). Agriculture now represents just 19% of GDP, but accounts for 47% of the national workforce and 59% of the rural labor force (GSO 2015), placing the country in the middle of a transition phase.

This dynamic questions the canonic trajectory of 'modern economic growth' (Kuznets, 1966) and 'structural transformation' (Chenery and Srinivasan 1989; Herrendorf et al. 2014) of the Vietnamese economy, where labor should 'discharge' (Sauvy 1981) from agriculture to industry and services and, all in all, eradicate historical rural mass poverty as today in the OECD countries (Dorin et al. 2013; Dorin 2017). Does Vietnam really follow this canonical structural transformation trajectory in the long run? Can Vietnam, a country with land constraints but labor abundance (Ravallion and Walle 2003; Markussen et al. 2016), follow this 'modern growth' pathways of industrialized countries up to a 'world without agriculture' (3% of GDP and 3% of the working population) (Larson and Mundlak 1997; Timmer 2009) but experiencing income convergence between agricultural workers and non-agricultural workers? Regarding smallholder agriculture, what are the technological and institutional innovations that are likely to support a sustainable structural transformation? These questions capture critical concerns about sustainable and inclusive agricultural and rural development. This paper contributes to the discussion on the structural transformation of Vietnam. It assesses those changes and their impact on sustainable development at three complementary scales: national, sectoral (agriculture and livestock) and local (district).

The first section captures macro-economic data at the national level in an aim to illustrate that Vietnam, as well as other Asian countries, is likely to fall into a 'Lewis Trap', in contrast with industrialized countries that have embarked upon a 'Lewis Path' (Dorin et al. 2013). In the second section, we analyze this development trajectory in an institutional and historical perspective through a political economy of Vietnam since 1986, when radical economic reforms were initiated. The third section focuses on the ongoing transformation within the

agricultural sector, especially the place of the livestock sector in the transformation process. The fourth and last section illustrates those global dynamics with the milk production in Ba Vi, a district located in the Hanoi capital region. This local case-study confirms the macro-economic and sectoral development pathways, and underlines some of the risks related to the current changes regarding rural employment, social equity and environmental changes in Vietnam.

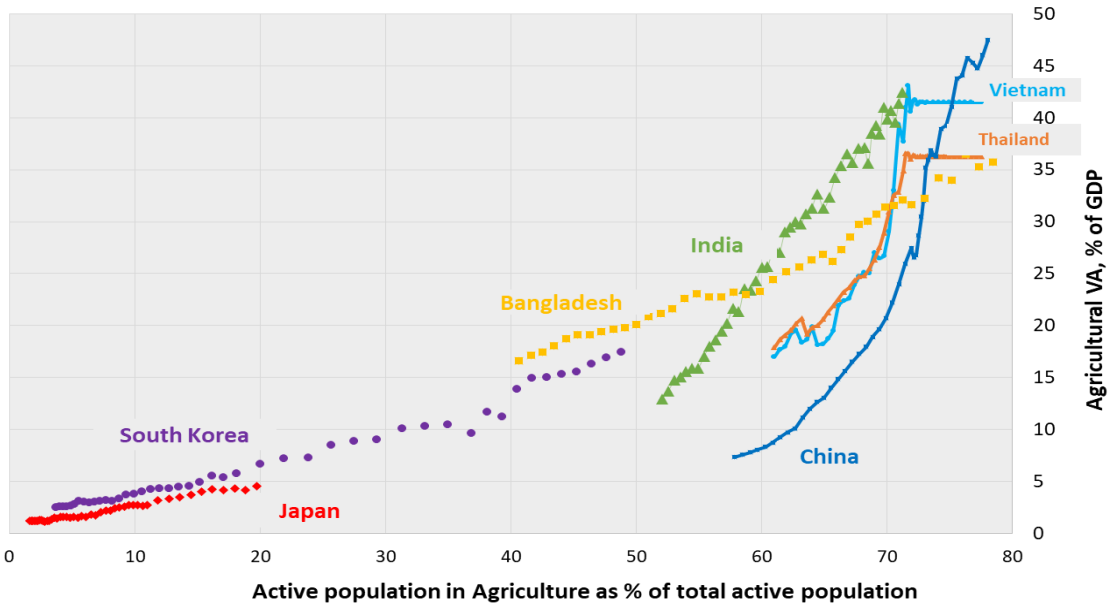
2. The canonical path of structural transformation and Vietnam

In development economics, 'structural transformation' refers to the reallocation of economic activity across three broad sectors: agriculture, industry and services (Chenery and Srinivasan 1989; Herrendorf et al. 2014). It is notably characterized by the decline of the agriculture sector's share in total output, GDP and employment, emphasizing an ever increasing importance of industries and services in national economies (Timmer 1988,1992; Barghouti et al. 1990; Briones and Felipe 2013). Anchored theoretically in the 'dual economy model' of Lewis (Lewis 1954) and empirically in the 'modern economic growth' of Kuznets (Kuznets 1966), structural transformation occurs through the 'push' of low income of the 'traditional' sector (agriculture) and/or the 'pull' of higher wages and incomes in 'modern' sectors (industry and services). Theoretically, agriculture provides cheap labor to the process of industrialization and urbanization and, in turn, receives modern industrial inputs to raise agricultural productivity and produce cheaper food. This improved agricultural productivity is believed to reduce agricultural and rural poverty, to reduce and even eliminate the labour productivity gap between farmers and non-farmers (Dorin et al. 2013). Yet, after the Green Revolution era, many agricultural economists denounced the lack of interest in agriculture which began the mid-1980s from both the academic and donor communities (De Janvry 2010). Even in Asian countries, where the agricultural population[1] accounts for nearly half of the total regional population (FAO 2014), since the 1980s, development was considered to be driven only by the manufacturing or service sectors. In the wake of the subsequent financial crisis in Asia (1997) and the global food crisis (2008), the role of agriculture as a 'development driver' (FAO 2009b), primordially underlined by the Physiocrat (Quesnay) and Classical (Ricardo) schools, has now returned to the scientific and policy agenda. Agriculture for development and food security should search for new technical and institutional models accompanying the development of family farming (World Bank 2007), sustaining smallholder dynamism (Viswanathan et al. 2012) and connecting the poor to the growth process (Timmer 2009).

[1] Agricultural population is defined by the FAO as individuals dependent on agriculture, hunting, fishing and forestry for their livelihood

However, while Western economies experienced a rather rapid and complete transition from agricultural to advanced capitalist industrial societies (Timmer 2009; Dorin et al 2013), the process of transformation has been slow in most of Asia, barring a few countries (Viswanathan et al. 2012; Briones and Felipe 2013; Dorin and Aubron 2016). In developing Asia, structural transformation is still characterized by a faster decline in the share of agriculture in total output than in employment (Figure 1). High population growth rates with less and less labour-intensive industry heighten the labour absorption mechanism outside agriculture, leading to a failure in reaching the "*Lewis turning point*"[2] (ADB 2013). Instead of a single linear structural transformation pathway, Dorin et al. (2013) conceptualized 4 different trajectories of structural transformation from two parameters: the active agricultural population in absolute number, and the labour productivity gap between farm and nonfarm activities. They are named as: the *Lewis Path* - decrease in active agricultural population and convergence of farm and nonfarm income, *Farmer Developing* - income convergence but agricultural population on increase, *Farmer Excluding* - widening income disparity and agricultural population on decrease, and *Lewis Trap - both* agricultural active population and income gap are on increase. According to this typology, since the 1970s, developing Asian countries are embarked upon the 'Lewis Trap' (Figure 2), the polar opposite to the 'Lewis Path' which drives economies to a 'world without agriculture'.

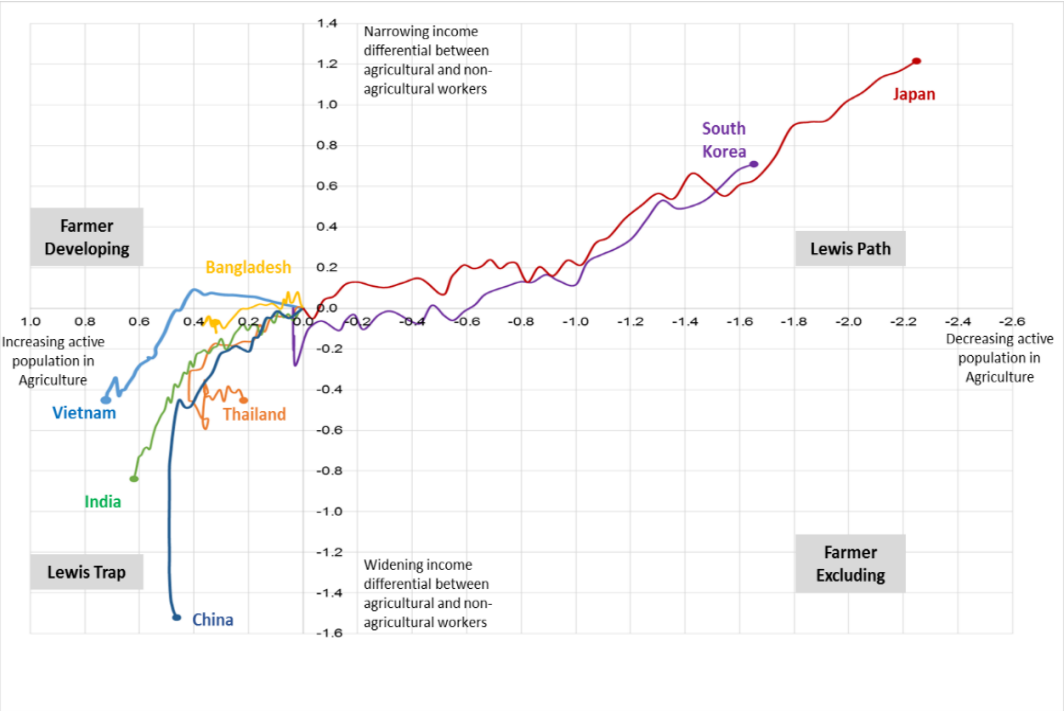
Figure 1: Share of agriculture in GDP and employment (1970-2015)



The dynamics of countries from 1970 to 2015 move from right to left. Data source: Economically active population from Faostat (2014); Value added in 2005 USD by broad sectors from UNSTAT (2015).

[2] The 'Lewis turning point' is defined as the point at which a labor surplus in the agriculture sector shifts to a labor shortage reflected in increasing agriculture wages.

Figure 2: Dynamics of structural transformation in Asian countries (1970 – 2015)



The figure shows the cumulative growth rate (1970=0) of: (i) the growth of the active agricultural population (X-axis); (ii) the income gap between agricultural and non-agricultural workers (Y-axis). Population data from Faostat (2014). Value added in 2005 USD by broad sectors from UNSTAT (2015). Computation follows model of Dorin et al. (2013), Dorin and Aubron (2015)

Table 1: Structural transformation in Asian countries (1970/71-2014/15)

Country	Population (people)	Economic growth (2005-USD)		Workforce (workers)		Labor productivity (2005-USD)		Farm-nonfarm income convergence
		Total	Agriculture	Total	Agriculture	Total	Agriculture	
Bangladesh	+2.04%	+4.29%	+2.46%	+2.32%	+0.72%	+1.93%	+1.75%	-0.15%
China	+1.16%	+8.52%	+4.10%	+1.70%	+1.03%	+6.72%	+3.05%	-3.38%
India	+1.93%	+5.41%	+2.77%	+2.09%	+1.38%	+3.25%	+1.38%	-1.86%
Japan	+0.44%	+2.53%	-0.40%	+0.39%	-5.00%	+2.13%	+4.85%	+2.70%
South Korea	+1.01%	+6.70%	+2.32%	+1.97%	-3.67%	+4.63%	+6.25%	+1.54%
Thailand	+1.37%	+5.71%	+3.21%	+1.79%	+0.49%	+3.86%	+2.72%	-0.98%
Vietnam	+1.71%	+5.83%	+4.15%	+2.15%	+1.60%	+3.60%	+2.50%	-1.01%

Annual growth rate computed from FAOStat data and Bruisma (2009)

The trajectories of structural transformation have been quite distinct in Asia (Figure 2, Table 1). While few newly industrialized economies in East Asia (Japan, South Korea) followed a 'Lewis Path', the middle-income continental Asian economies (China, India, Thailand and Vietnam) seem to be similar to each other when embarking on 'Lewis Trap'. Vietnam and China share many traits with each other having initiated their economic reforms from the agricultural sector with the restoration of individual and private economic incentives to replace

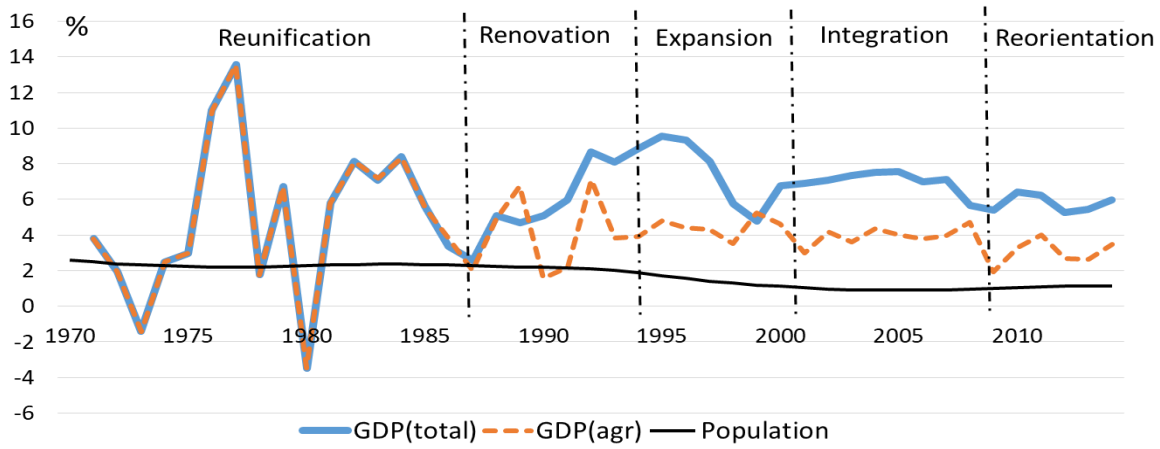
a collective system. However, China has experienced a more rapid structural transformation through rural industrialization supported by town-and-village enterprises, capital accumulation generated mostly by non-agricultural sectors, and a faster decrease in agricultural value-added share. Vietnam and India have followed a similar path, with a lower 'discharge' of labour from agriculture to other sectors, but a farm-nonfarm labour productivity gap increasing less than in China (Vietnam has even been in the 'Farmer Developing' path during the first half of the studied period). Thailand is marked by a decreasing active population during the most recent years, and a stabilization of the income gap between farm and nonfarm workers. The structural dynamics of Thailand have been disturbed by political instability and high exposure to regional and global crises, which have contextualized the mash-up of pro-agricultural policies and agricultural neglecting options over the years. But Thailand may embark upon a 'Lewis Path' in the future or a 'Farmer Excluding' path as may also be the case for China.

Zooming in on Vietnam's trajectory, antipodal to the Lewis Path, we observe two clear-cut phases characterized by the labour productivity gap between agricultural and non-agricultural sectors (Figure 3, Table 2). Incentives at the early stage of reforms (since 1986) brought an ad-hoc positive impact on narrowing the income gap between sectors. Yet since the early 1990s, with the deepening adjustments and speeding-up of economic liberalization and integration, the growth of the active agricultural population has slowed down, while labor productivity has become more divergent among sectors.

3. Political economy of a country in transition

Thirty years after the launch of economic reforms, known as *Doi Moi* (1986), Vietnam has made striking progress among developing Asian countries in moving from the '*beginning*' stage to the '*early integration*' stage (Briones and Felipe 2013) of the four phases of agricultural transformation defined by Timmer (1988). Vietnam has experienced sustained economic growth of between 5% and 6% on average, with exceptional falls during the regional financial crisis in 1999 and global economic downturn in 2008. This section provides an analytical lens and a historical perspective of political economy of development to understand the drivers, causes and effects of structural change and the agricultural transformation process. From a rural and agricultural perspective, our review spans 5 periods in line with segments analyzed by OECD (2015) and World Bank (2016). Those sequences refer to major changes in the national policy context, but also to some events that happened in the regional and global environment. State interventions and policy choices (Appendix 1) have significantly influenced agricultural transformations and structural dynamics.

Figure 3: Economic and demographic growth rate (1970/71 – 2014/15)



Source: FAOStat 2015. GDP in USD-2005.

Table 2: Economic and demographic annual growth rate (1970/71 – 2014/15)

Period	Population	GDP per capita	GDP	GDP_{agri}	GDP/GDP_{agri}	Active population in Agriculture	Agricultural Productivity	LIR
1970 - 1985	+2.16%	+2.65%	+4.87%	+4.86%	3.29	+2.09%	+2.72%	+0.48%
1986 – 1993	+2.09%	+3.50%	+5.71%	+4.02%	3.40	+2.13%	+1.86%	-1.90%
1993 – 2000	+1.54%	+5.75%	+7.38%	+4.49%	4.27	+0.98%	+3.47%	-2.27%
2000 – 2008	+1.14%	+5.83%	+7.04%	+4.09%	5.24	+1.04%	+3.02%	-1.86%
2008 – 2015	+1.07%	+4.87%	+6.00%	+2.68%	6.55	+0.78%	+1.89%	+0.16%

Agricultural Productivity is calculated by dividing GDP_{arg} by active population in agriculture. Labor Productivity Ratio (LIR) show the ratio between the share of agriculture in output and share of agriculture in employment (Hayami and Godo, 2004).
Data source from GSO 2015 and FAOStat 2015. GDP in USD-2005

Table 3: Share of economic sector in the GDP (1986 – 2014)

Period	Agriculture	Industry	Service
1986 – 1993	38.8%	25.9%	35.4%
1993 – 2000	26.0%	31.5%	42.4%
2000 – 2008	20.1%	37.2%	42.7%
2008 – 2015	18.6%	35.2%	40.8%

Source: GSO 2015; FAOStat 2015. GDP in USD-2005.

Figure 4: Active population in Vietnam (1970 – 2015)

Source:

- *Total population 1970 – 2015 (FaoStat 2015)*
- *Total active population and Agricultural active population: 1970 – 2004 (FaoStat 2015); 2005 – 2015 (GSO 2015)*

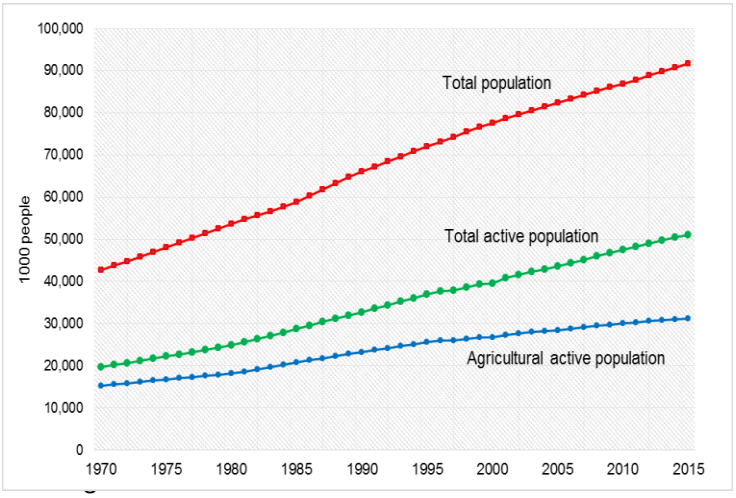
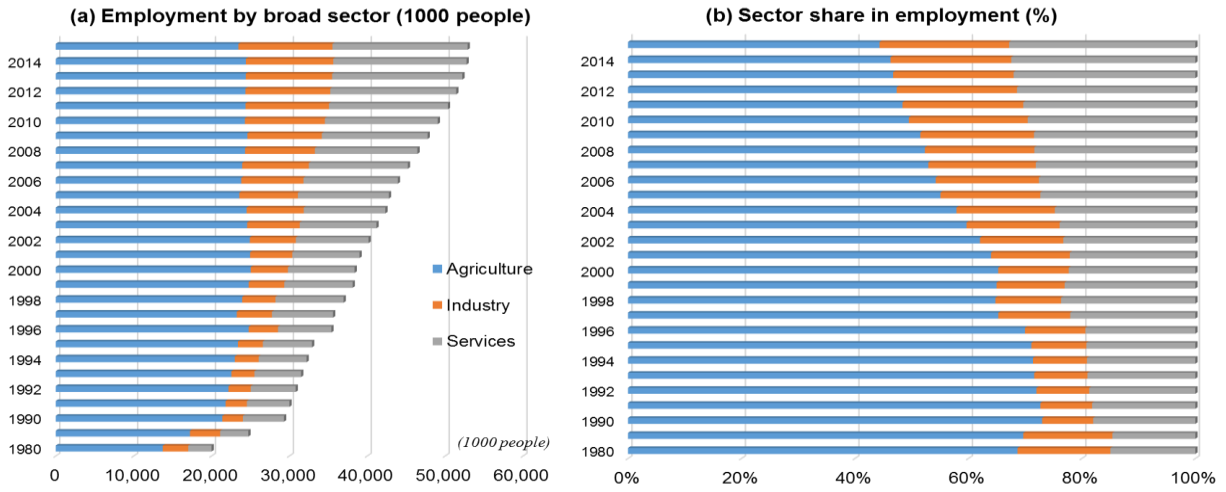


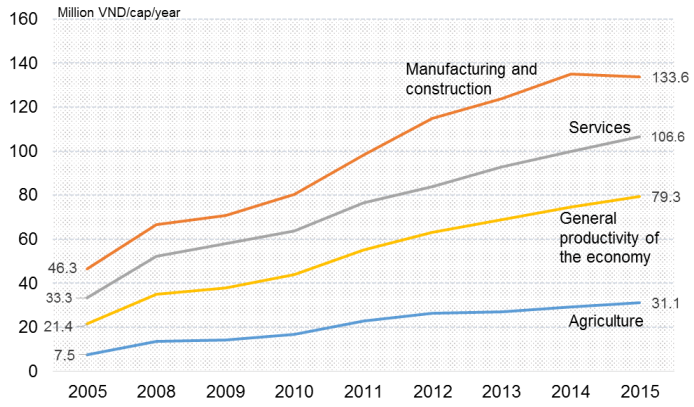
Figure 5: Employment by broad sector (1980 – 2015)



Source: GSO, 2015

Figure 6: Labor productivity by sector (2005 – 2015)

Source: Data of GSO. Calculated by dividing GDP (current price) by total employment by sector



3.1. Vietnam on the Eve of Doi Moi (Reunification, 1970 – 1986)

Prolonged wars put Vietnam into a situation of severe hardship. After Reunification (April 1975), the predominately agrarian country fell into a post-war crisis characterized by a stagnant central planning system, slower economic growth, weak collective production on state farms and cooperatives, cuts in external aid (US embargo on trade and investment, China's aid ended), and conflicts with neighboring countries (Cambodia and China) in the late 1970s. The 'impasse of the collectivist regime' (Gironde 2004) resulted a severe food deficit by the end of the 1970s and early 1980s. From an economic perspective, pilot contractual incentives to release production resources to households were tested in some localities as a remedy for overcoming chronic food access problems. The emergence of such contracts can be interpreted as an experimental phase of market-style reforms which were still debated among policy makers (Que 1998).

During this period, agricultural sector totally reflected the national economic growth (4.8%). Directive 100-CT/TW (13th January 1981, known as *Contract 100*) triggered agricultural

reforms in Vietnam with the introduction of the 'end-production contract' (*khoán cuối cùng*) aiming at empowering farm households (individual or group). Farmers were assigned land under a 3-year contract for farming. After harvests, farmers delivered an output quota to cooperatives and any surplus could be sold on the free market. This new incentive encouraged farmers to increase investment in their land and brought a rise in agriculture (Figure 3): agriculture grew by 7.8% in the 1981-1984 period. However, the centrally-planned economy did not provide adequate institutional innovations to promote the *Contract 100* mechanism (production resources remained under the management of cooperatives, no legal base for the transfer of land from cooperatives to households, strict state control over input and output pricing, insufficient provision of intermediate inputs, deteriorating terms of trade, relatively high agricultural tax). The economy was then crippled by a scarcity of staples and consumer goods, impoverished living conditions, industrial stagnation, and mounting foreign debt (Chinh and Quan 2009; Quan et al. 2011). The dual pricing system[3] resulted in hyperinflation by the mid-1980s: 92% in 1985 and 774% in 1986. Radical price increases, wage readjustment and the monetary exchange exercise in 1985 added to economic hardship and paralyzed the country (Kirk and Tuan 2009).

3.2. Vietnam at the onset of Doi Moi (Renovation: 1986 – 1993)

'Fence-breaking' experiments in the early 1980s inspired subsequent political and economic reforms starting in the mid-1980s. The Sixth Congress of the Communist Party (December 1986) announced economic reforms, named *Doi Moi* (*Renovation*), enabling Vietnam to transform from a centrally planned to a market-based economy based on an export-growth strategy accompanied by sweeping changes (Xuan and Xing 2008; Brand-Weiner et al. 2015). Three economic corrective packages were emphasized: elimination of the central management system by adopting a market-driven economy involving different stakeholders and different types of ownership; economic management reforms; and altering the approach to industrialization by shifting from heavy industry towards the production of food and foodstuffs, and consumer and export goods. Early in the reform process, natural calamities (huge flood in the Red River system in 1986; cold winter and sunless spring in 1987) added to the fragility of agriculture. Successive poor harvests resulted to food shortfalls of nearly 1.5 million tons and severe famine, hitting 21 provinces and cities in the North in March 1988. With 3.6 million people near starvation, agriculture faced a new crisis (Que 1998) that, together with the erosion of state institutions (Kirk and Tuan 2009), called for stronger corrective measures and radical reforms.

[3] The dual price system refers to the official business prices (set by the government) and free market prices. The official prices were fixed and much lower than the market prices (10 times or more), leading to speculation and smuggling of goods.

The most important policy breakthrough was the Politburo's Resolution 10 (known as *Contract 10,* adopted in April 1988) on reforming the management of the agricultural economy through decollectivization. Contract 10 offered a 'package contract' (*khoán gọn*) to peasant households and formally stated certain rights underpinning the economic role of households. Farming households are considered as the basic independent economic unit in agriculture. The key feature of Resolution 10 involved the formalization of extended land use rights (LUR), which was clearly a change from past Directives. Besides longer land tenure (15 years for annual crops, 40 years for perennial crops) with tacit renewal as a form of security, farmers were granted greater production rights (investment, production, and marketing), while cooperatives were only responsible for input and service provision (irrigation, plant protection).

The removal of compulsory public output procurement, the abolishment of the ration system, the price liberalization in March 1989 (freed up prices of goods, interest rates and foreign exchanges) and the formation of a two-tiered banking system in May 1990 contributed to improving the macroeconomy and curbing inflation: for the first time, there was a positive interest rate, higher savings deposits, an increased supply of goods, and excess liquidity. Theoretically, farmers can access credit provided by the state commercial banks.

The better performance of the economy was attributed to the dramatic turnaround of the agriculture sector, especially in rice production. Cropping surfaces increased, especially in the Mekong River Delta (MRD), thanks to an improved irrigation system and widespread application of Green Revolution technologies (seeds, fertilizers, high-yielding varieties) which were largely subsidized by the government. From a net importer of rice, Vietnam catapulted to being the world's third leading rice exporter in 1989 (approximately 1.5 million tons, following the United States and Thailand). At the micro level, higher returns encouraged farmers to invest further in consumer goods and upgrade their farming equipment. At the macro level, more capital savings and an improved trade balance fuelled further structural transformation of the economy in the periods that followed.

3.3. Wider reforms in practice (Expansion: 1993 – 2000)

During this period, Vietnam accelerated the building of market institutions in all sectors to break the State monopolies and to favor a more market-oriented environment. The 1993 Land Law lengthened land tenure (20 years for annual crops, 50 years for perennial crops), and adopted legal land titles, and enabled non-market transmission of land use rights (inheritance, transfer, exchange, lease, and mortgage). However, the egalitarian nature of land distribution (by land quality, by number of household members registered, irrigation system, and capacity

of crop rotation) remained and led to high land fragmentation[4] and scattered farmland, especially in the Northern provinces. In the densely populated Red River Delta (RRD), the average farm size was 0.23ha, one-fourth of the size (1.1ha) cultivated by peasants in the MRD (GSO 1995). Such tacit land distribution also led to an increasing agricultural population and high opportunity costs of agricultural land due to the absence of functioning rental markets.

The status of cooperatives was legally redefined as service providers (irrigation, plant protection, extension services, input supplier, credit provision and output marketing) (Cooperative Law 1996). From there, continued efforts to reform the cooperative system have been observed. The reform agenda also included incentives and policies calling for investments, technological innovations and institutional reforms aiming at improved rural production efficiency and improved cost-effectiveness performance.[5] As a result, agriculture grew 4.5% annually, contributing to the 7% growth of GDP (Table 2). Agricultural productivity rose substantially thanks to intensified rice production and diversification into higher added value crops for export (coffee, rubber, and aquaculture). Household LUR and the liberalization of fertilizer imports encouraged the adoption of improved varieties with widespread integrated pest management and increased application of fertilizers (fertilizer use per hectare tripled between 1990 and 1999). Most of these significant increases in agricultural crops[6] continued to be due to improved irrigation systems (dikes in MRD, rehabilitation of irrigation system in the RRD, private investment in pumps in uplands) that expanded the total irrigated area.

Despite the agricultural sector's improved performance, industry protection interventions (in favor of capital-intensive industry and state-owned enterprises (SOEs)) burdened agriculture and exacerbated the income gap between farm and nonfarm sectors. Protected industries (such as the heavily-subsidized sugar sector) moved the terms of trade against agriculture and hindered the ability of non-protected industries to absorb the labor surplus from agriculture. Tax and fee duties[7] weakened the low income of farmers and slowed their productivity. The relative annual tax burden was estimated to be around 24% of the agricultural output (Barker et al. 2004).

[4] According to the Agricultural Census 1994, average farm size is 0.49 ha, with an average of 0.3 ha for annual crops and 0.06ha for perennial crops.

[5] Decree 12/1993/ND-CP on reforming organization and management of state agricultural enterprises; Decree 13/1993/ND-CP on agricultural extension, Decree 14/1993/ND-CP on credit for extended agriculture and rural development; Law on tax on agricultural land (1993);

[6] Average yield of cereals per hectare was 3.2 tons in 1990-1994 (paddy equivalent), rising to 3.8 tons in 1995-1998 and 4.4 tons in 2000-2004.

[7] Including land-based tax, water use fees, and other local fees levied by provincial, district and commune authorities.

The country was more open to the world: the U.S embargo on Vietnam was totally lifted (1994), the normalization of the relationship between the U.S and Vietnam was announced (1995), the country joined ASEAN as an official member (1995), adhered to AFTA (1996), joined APEC (1998). On one hand, an increasing presence on international markets has enabled deeper reforms and brought about new market opportunities for products (especially agricultural products), on the other hand, it has made farmers more exposed to international price instability. As a young market, Vietnam was not much hurt by the regional financial crisis during 1997-1998, but GDP growth was declining (4.77% in 1998-1999) and the expansion of industries was put on standby.

3.4. Integration into regional and global economy (Integration: 2000 – 2008)

The country was back on track after the Asian financial crisis with reform efforts focusing on SOEs, the financial sector and the development of factor markets.[8] Integration into the regional and global economy was accelerated by further opening: accession to WTO (2007), negotiations on bilateral and multilateral trade agreements.[9] This deeper integration involved fulfilling international trade commitments (eliminating export subsidies, improved hygiene and quality standards, laws on intellectual property rights, lower tariffs, reduced import duty rebates, demanding technical barriers…) that have impacted the structural changes of the economy and particular sectors, especially agriculture. In 2000, the government phased out the agricultural tax, which was a burden on farmers and limited agriculture's contribution to national wealth (Son et al. 2006). Rice export quotas and fertilizer import quotas were then discarded (2001), enabling local firms to engage in international trade. Amendments of the Land Law (2001, 2003) enhanced agricultural market-based growth by allowing foreign investors to acquire LUR and promoting land consolidation in agriculture. Farmland fragmentation (average 4.3 plots per rural household in 2004) has reduced the size of operational holdings, hindering the economies of scale and mechanization. In addition to the additional investments in agricultural infrastructures (roads, irrigation…), facilitated land exchanges and rentals have enabled farmers to have larger areas of more continuous plots to cultivate. Moreover, because land can be transferred to more efficient producers, farmers have diversified their production into aquaculture, livestock breeding, and investments in trees and shrub crops.

[8] The Ho Chi Minh Stock Exchange (2001) and the Ha Noi Stock Exchange (2005) have upheld the capital accumulation and investments

[9] ASEAN-China FTA (2004), ASEAN-Korea FTA (2006), ASEAN-Japan FTA (2008), Vietnam-Japan EPA (2008)

The pace of rural transformations speeded up with various investment patterns and incentives[10]: downsizing public investment in agriculture[11], reducing and restructuring SOEs[12] operating in agriculture, supporting private investment in the rural sector (between 2000 and 2008, number of agricultural enterprises tripled, from 3378 to 8691 enterprises), and promotion of contract farming (Decree 80, 2002). In 2008, public investment in agriculture contributed to support partly the private sector (56% of total public investment), SOEs (34%), and foreign investors (10%).

Economic development was dedicated to the emergence of industry and manufacturing (10% per annum) and surges in Foreign Direct Investment (FDI) inflows (US$ 9.6 billion in 2008, 55% of the export values produced by the FDI sector (Athurokala and Tien 2012). FDI in agriculture went into agro-processing projects (54% of the total registered capital), forestry production and forestry processing (25% of capital), and livestock and animal feed (13%). The dominating role of FDI enterprises in the manufacturing sector did not result in greater social mobility. Despite the dwindling share of agriculture in total employment, we still saw an increase in absolute terms of the contribution of agriculture to total employment (Figure 5). The industrial sector is not very resilient to adverse global trends: 67,000 workers in enterprises lost their jobs and real wages declined in the wake of global economic downturn (2007-2008) (Quynh 2009). The slower GDP growth in 2007-2008, at 5.6%, brought greater reductions in manufacturing and construction than in agriculture (Abbott et al. 2015). Agricultural was continuing to grow by around 4% per year, despite a negative external environment of low commodity prices on the world market.

3.5. Restructuring and adjusting in the motion (Reorientation: since 2008)

Structural transformation has continued to sustain economic growth, which has averaged 6% over the last 6 years (2009-2015), but at the expense of increasing income inequality (GINI coefficient rose from 34.7% in 1992 to 38.7% in 2012). During this period, the structural transformation process has slowed (Figure 3), despite the 'demographic window'[13] which opened in 2010 is expected to be an opportunity for accelerating development due to a young labor force and lower wages (Chung and Dang 2012). The marginal gains of agriculture have become less important: agricultural growth was just one-third of the growth rate of the

[10] A number of National Target Programs (NTPs) were initiated and involved different stakeholders (Government, donor agencies, private sector): NTP on Hunger Eradication and Poverty Reduction, NTP on employment creation, NTP on five-million hectare of forest, NTP on rural water and sanitation.

[11] From 12.2% in 2000 to 8.5% in 2004 (MARD 2004). Share of state agricultural investment just accounted for 3.9% of state budget (2010), lower than other countries (Thailand: 5.8%, Philippines: 5.9%; Malaysia: 6.7%; China: 9%; Myanmar: 8%) (OECD 2015).

[12] Between 2000 and 2008, the number of SOEs operating in agriculture was reduced by half

[13] 'Demographic window' refers to an optimal population structure, in which a large group of working-age people supports relatively fewer older and younger dependents (UNFPA 2002). The demographic window opens once when the dependency ratio is under 50%.

economy and half as quick as the previous period (Table 2); sector share of national employment has dropped by 5% (Figure 5); agricultural productivity growth has slowed and has fallen behind industry and service (Figure 6). The speed and magnitude of these relative shifts have not been translated into absolute labor mobility from farm to nonfarm sectors. Nonfarm sectors are not mature enough to absorb all of the labor surplus from agriculture. Furthermore, rural people have not all been drawn to the cities in search of more remunerative employment opportunities in nonfarm sectors due to certain socio-cultural elements: the permanent household registration system (*'hộ khẩu'*) impedes labor relocalization due to limited access to full welfare packages and public services in urban areas; the limited professional skills of the active rural population obstructs their job opportunities in industry and services; farmland in the village is regarded as a form of security in the event of a crisis. A number of rural households therefore continue to cultivate their land for a living in addition to increasing their income from secondary and tertiary sources (nonfarm activities within the local area locality, migration to the cities or abroad). By 2012, agriculture contributed less than 50% to the total income of more than half of rural households (GSO 2013). Within agriculture, small farm size and limited access to credit (mostly due to the absence of LUR certificates) have handicapped farmers from expanding and diversifying their production to improve productivity.

With regard to the investment portfolio in agriculture, private investment outpaced public investment (64% versus 34% of total investment in 2010). The decline in public investment is offset by an increase in credit provided to famers through credit programs for agriculture and rural development (ARD).[14] 512 FDI projects in agriculture, accounting for 14.7% of the total FDI inflows during the 2000-2013 period, brought earnings of US$ 312 million, of which US$ 100 million from exports (OECD 2015). The high prices of agricultural products during 2007-2008 emphasized the role of agriculture as a buffer during less prosperous time. The growth of agriculture is a resource that maintained overall employment roughly constant while industry and manufacturing generated slower employment growth. The question of how to sustain agricultural growth in coming periods is coming sharply into focus. Major drivers for the increase in total agricultural output over the past 30 years have been institutional changes and increased input usage. Additions to land, labor, fertilizer and irrigation have been the primary causes and now appear to be reaching their limits for generating more growth. Resolution 26 (2008) called for concrete efforts to promote the parallel development of agriculture, rural areas and farmers in the long run. The Agricultural Restructuring Plan (ARP), adopted in 2014, aims for improved value added and sustainable development. The country's agricultural modernization aspirations have been ecologically repackaged (Fortier 2010;

[14] Government's Decision 497 (2009) provided a US$ 1-billion state fund to support farm households in purchase of intermediate inputs and machinery.

Fortier and Trang 2013) as Vietnam is ranked among the five countries most affected by climate change (ADB 2009).

Vietnam is now at the middle-income stage (Briones and Felipe 2013). Being a land-constrained country, Vietnam is challenged by the raising land productivity to generate higher wealth in view of speeding up its structural transformation. Upon constraints and trade-offs, diversification and intensification strategy are opted for raising agricultural productivity in response to growing risks and uncertainties associated to food systems and contributing to poverty reduction. Since scope for expanding agricultural land is limited, higher yields can be generated from different crops and keeping livestock for higher yield and profit per hectare. The next section will zoom the structural transformation in on properties of agricultural transition and livestock dynamics.

4. Agricultural transformation and livestock revolution

Compared to its neighbors, Vietnam has enjoyed relatively stable growth in the agriculture sector since the launching of *Doi Moi* (World Bank 2016). The structural transformation has been underpinned by the agricultural transformation itself. This section highlights the changes within the agriculture sector with its sub-sector composition, emergence of commercial farms, and dynamics of agricultural value chains.

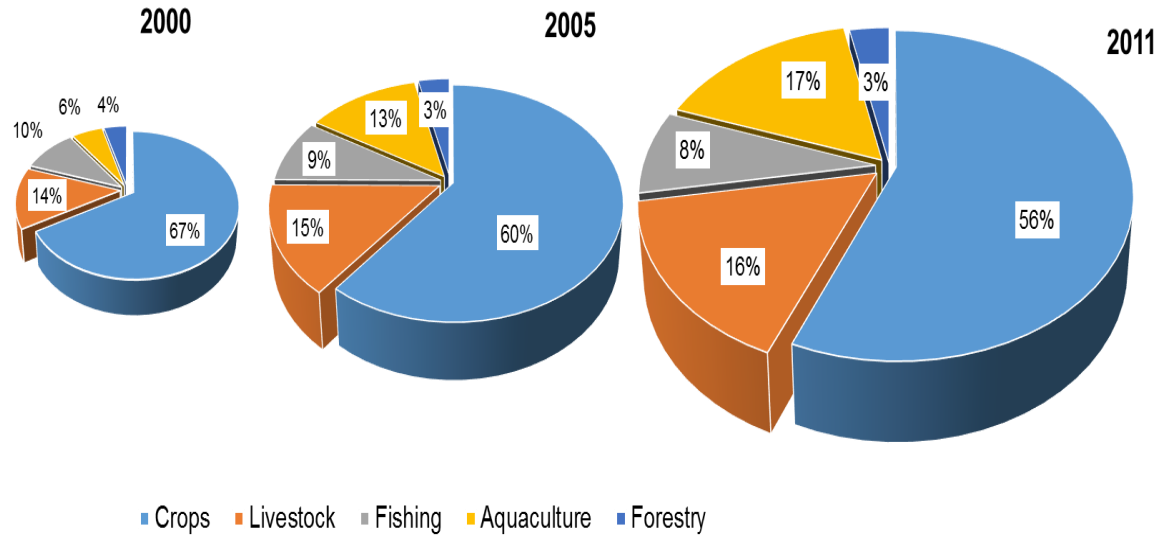
4.1. Composition of agriculture

Rural and agricultural policies since *Doi Moi* have shed light on the government's priorities towards valorizing 'Green Revolution' endeavors, increasing the productivity and quality of agricultural production that is limited by a shortage of productive land. Changes in land policies (decollectivization, land title, land tenure, etc.) have encouraged diversification from rice production to other crops (perennial, aquaculture) in order to reach higher income per hectare. Agricultural output has shifted dramatically from traditional to high-value market products (pepper, coffee, catfish and shrimps, etc…), albeit with the increasing regional and international trade (Figure 7). The continued growth in agriculture is fuelled by not only increasing yields for traditional crops (cereals), but also expanding demand for livestock products and other high-value crops, which are also more labor-intensive. Agriculture has undergone rapid industrialization and intensification, with livestock playing a driving role. Since 2005, the growth rate of livestock has surpassed that of crop production, growing by about 5.3% a year from 2005 to 2013 (Figure 8), accounting for about 25% of agricultural GDP. As it was the case for many developing countries, Vietnam has entered the demand-driven 'livestock revolution' (Delgado et al. 1999) which is reflected in both booming production (larger animal stock, higher animal density, higher output) (Figure 9, Figure10) and

consumption and catalyzed by increasing urbanization, social transformation, food habit changes, and rising purchase power.

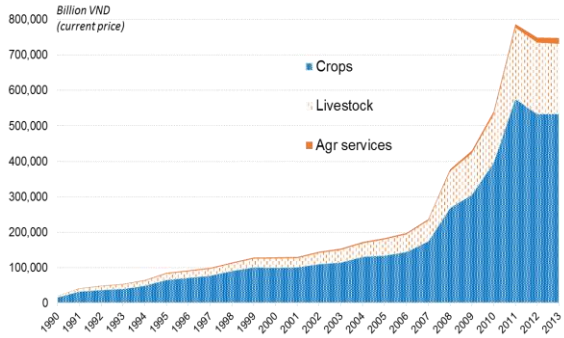
Nevertheless, such broad-based agricultural growth, within limited land availability, has faced challenges in view of sustainability. From an economic angle, Vietnam's agriculture has withstood more negative terms of trade since its market opened (higher input prices against unstable and lower output prices). While crop production relies greatly on external fertilizer sources, livestock and aquaculture are dependent on imported feed and feed ingredients: soybean meals and fish meal (90% imported); minerals, vitamins, premix and other additives (100% imported). Vietnam has been a net importer of feedstuffs: 7.6 million tons of corn, 1.7 million tons of soybean (equivalent to USD 2.5 billion) in 2015 (Vietnam Customs 2016). This high dependency renders the livestock sector more susceptible to the fluctuations of supply sources and international prices. From an ecological perspective, a degrading environment and depleted agricultural landscape (due to overexploitation, abnormal and extreme weather events, mushrooming hydropower facilities in the upstream…) make agriculture more fragile. For instance, aquaculture that developed along the coastal areas begins to suffer from negative environmental externalities (saltwater and brackish areas); water shortages during the dry season impairs the development of coffee areas; or rubber extension has generated uncontrolled deforestation over the past years). Therefore, debates have arisen over relevant farming arrangements in regard to import substitution for feeding animals to reduce animal feed imports and the depletion of the environment.

Figure 7: Structural changes in the agriculture sector



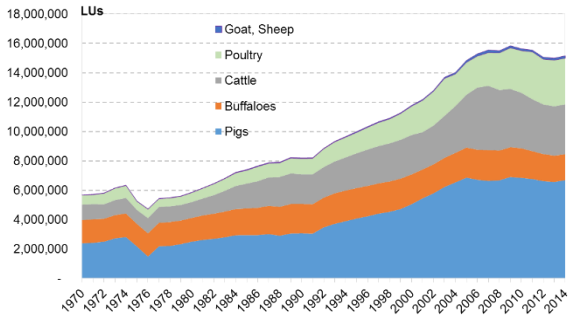
Source: Computation from GSO. Shares of sub-sectors in Gross Production Output, in current VND

Figure 8: Agricultural production output



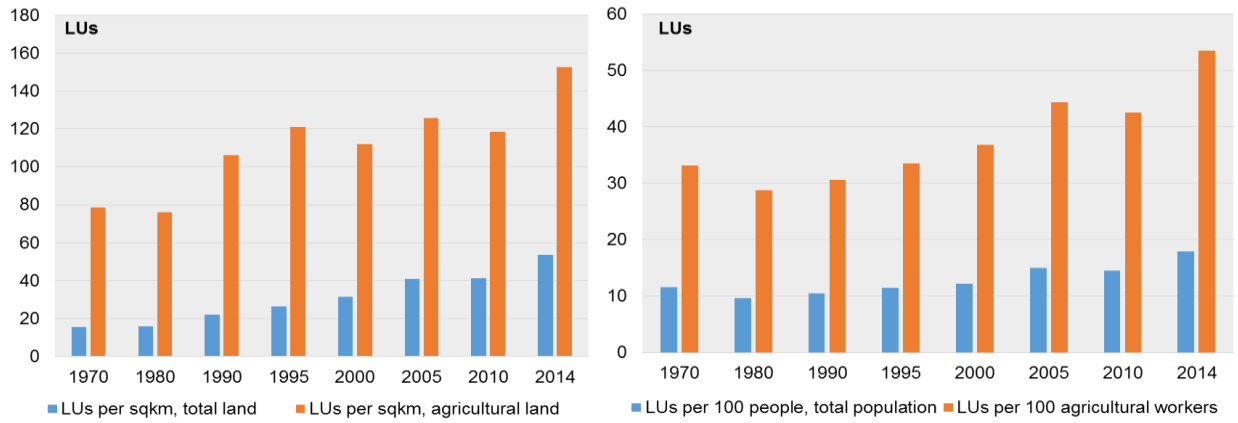
Source: Computation from GSO. Shares of sub-sectors in Gross Production Output, in current VND

Figure 9: Livestock units by species (1970 – 2014)



*Data source: Data on herd population: 1970 – 2000 (FAOStat, 2015); 2001 – 2014 (Strategy for Restructuring Livestock sector, DLP, 2014). **LU:** Livestock units. Conversion parameter (FAO 2005): Cattle (0.65); Buffalos (0.70); Sheep, Goats (0.10); Pigs (0.25); Poultry (0.01).*

Figure10: Density indicators of livestock resources



Source: Data on herd population: 1970 – 1989 (FAOStat, 2015); 1990 – 2014 (GSO, 2015). **LU:** Livestock units. Conversion parameter (FAO 2005): Cattle (0.65); Buffalos (0.70); Sheep, Goats (0.10); Pigs (0.25); Poultry (0.01).

4.2. Smallholder farms versus commercial farms

The redistribution of land in the late 1980s and early 1990s has contributed to the growth of the country, but also left a heritage of small farms with very little and scattered farmland (Table 4). Both good and poor quality land was distributed to every households following principles of 'egalitarian' distribution. As collectivization was much radical in the North than in the South, the Northern provinces were affected more severely (Ravallion and Walle 2003). In 2003, there were around 75 million plots, each household held title from five to eight scattered plots, and 10% of these plots were smaller than 100m^2 (Markussen et al. 2016). Vietnamese family farms are very small (on average 0.8ha per farm, 0.12ha per farmer) compared to the regional and global level[15] (Chung and Dang 2012). Moreover, farmland has been shrinking

[15] Global average farm size is 2.3 ha. At the regional scale, average farm sizes are: 0.73 ha in Bangladesh, 1.33 ha in India, 1.37 ha in South Korea, 3.65 ha in Thailand (FAO 2009)

under the pressure of urbanization and industrialization. Urban areas have spatially expanded by 2.8% a year (World Bank and MPI 2016). While most of industrial and transition countries can expand their land per farm and per farmer as the number of agricultural workers decrease, with very little land available (under 1ha per farm), Vietnam is following the opposite trend of the Lewis Path (Dorin et al. 2013). Currently, on average, each household has 4 plots of land. Land consolidation is favored by the Government with respect to input intensive production, but concerns over environmental degradation have been voiced (deforestation, fishery resource depletion, land degradation, water pollution, nutriment surplus). The environmental footprint of agriculture has been broadened by the indiscriminative exploitation of land and water resources along with the intensive use of chemical fertilizers and pesticides (OECD 2015; World Bank 2016).

Table 4: Share of households by farmland size (%)

Farm size	2002	2006	2008	2010	2012
Under 0.5 ha	71.2	81.4	66.3	71.3	69.7
from 0.5 to 1 ha	11.9	4.3	16.1	14.3	15.4
From 1 to 3 ha	13.2	2.9	14.4	12.0	12.8
Above 3 ha	3.8	11.4	3.2	2.3	2.2
Total	100.0	100.0	100.0	100.0	100.0

Source: Computations from VHLSS 2002 – 2012

The land consolidation process is clearly shown in the changes in the proportion of farm subgroups of under 1 hectare (Table 4). Land consolidation occurs through land transfers from the poor to the non-poor group, or from service households to agricultural households to optimize available resource endowment. This trend has been accompanied by a decreasing number of agricultural households (from 11.2 million to 9.3 million households between 2001 and 2016), especially in rural areas. Among 13 million rural households in 2001, 80% were invovled in agriculture production. Fifteen years later (2016), only 53% of the 15.9 million rural households worked in the agriculture (Appendix 2). Small productive land, labor-intensive work and low returns push rural farmers to diversify their activities from farm to non-farm work and generate income from different sources or migrate to cities for seasonal opportunities. An 'Archipelago household' (Losch et al 2012) in rural Vietnam can generate income from 8 different sources (Son et al. 2006).

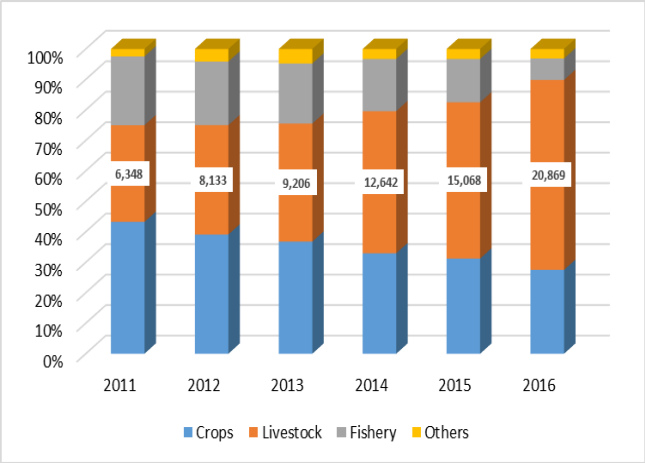
Agricultural policies and incentives have facilitated the switch from subsistence farming to commercial-oriented farming with higher concentration of land, capital, and hired labor. Large-scale farms allow farmers to benefit from economies of scale, especially in the context of more expensive agricultural labor and labor saving technology. Commercial farms in Vietnam are characterized by either large-scale land (for cultivation and aquaculture) and/or big animal

herds (for livestock). Farmers expand their operational farmland in different ways: additional land transferred by or contracted with local authorities or cooperatives (for annual crops, aquaculture or fisheries); leasing land from former state farms[16] (for perennial crops) (Son et al. 2006). However, the increase in number of commercial farms while land availability is limited explains the decreasing farmland: on average, from 7.7 ha per commercial farm in 2011 to 5.6 ha in 2016 (GSO 2017). Despite changes in the legal definition of commercial farms (2001, 2011), the most rapid increase over time has been observed in livestock commercial farms (Figure 11). In the context where most arable land is devoted to crop production (especially rice), livestock farmers enlarge their production to a commercial scale through intensification: bigger herd within stable acreage, leading to higher density. The increasing concentration and intensification of livestock production is on one hand a response to the booming demand that has shaped the 'livestock revolution', and, on the other, to policy incentives. The Livestock Development Strategy (2008) and the Plan for Restructuring the Livestock Sector (2014) highlight the transformation of the sector toward industrialized and modern modes of production, i.e., more intensive, more specialized and more concentrated, in order to reduce imports and be better prepared to compete with imported livestock products under FTAs (VERP 2015). Smallholder livestock structures were once considered by the Government as an effective means to reduce poverty and improve livelihood (ILRI 2000), but now are perceived as a factor limiting enhanced economic productivity and competiveness advantages. From a social viewpoint, the development of intensive and large-scale modern farms will increase labor productivity, but hamper rural employment. So, in the prevailing livestock revolution, should smallholder farms or large-scale intensive farms be valorized? The participation of farmers in value chains and modern distribution revolution are likely to have a substantial impact on agriculture systems (Reardon and Berdegué 2002; Thapa and Gaiha 2014; Hazell and Rahman 2014).

Figure 11: Emergence of commercial farms

Source: AgroCensus 2011, 2016 (GSO); Annual statistics 2012-2015 (GSO).

Note: Since 2011, Vietnam Government amended the criteria for commercial farms (Circular 27/2011/TT-BNN (2011) replacing the Interministerial Circular 69/2000/TTLT-BNN-TCKT (2000). Accordingly, commercial farms are certified as such they meet stricter criteria with regard to the scale of production (farmland, animal herd) and/or production output value. The previous criteria referred only to the scale of production.



[16] During the land reforms in 1988, only 75% of total disposable land was allocated to households. The remaining 25% of agricultural land were still managed and used by state agro-forestry farms.

4.3. Restructuring the value chain

The change in the agricultural sector has occurred within a broader diversification, known as the value chain transition, involving input providers (feed, seed, fertilizers, farm equipment, logistic firms, business service providers) as well as agribusinesses (processors, distributors, retailers) (World Bank 2007, 2016). There have been a number of public and private efforts to restructure and upgrade fragmented value chains, i.e., organizing both upstream and downstream of the farming stage that accommodates smallholder farmers: schemes of 'large fields' (termed *'cánh đồng lớn'*)[17] in crop production, vegetable outgrowing scheme for large distributors (Metro Cash and Carry, Big C, etc.), various contract farming patterns in livestock production (integrated linkage with CP, captive governance steered by dairy companies (Vinamilk, IDP, Fresh Campina Vietnam, ….). Increasing vertical capital accumulation (Fortier and Trang 2013) and larger production scale, thanks to market reforms, enable stakeholders higher and lower along the value chain to benefit from the deeper dependency of farmers on inputs and services as well as processing and trading oligopolies. Farmers get smaller profit margins because of the larger pie parts caught by upstream service providers and downstream processors or wholesalers. Vietnamese farmers, due to their small production scale, are locked into the trap of more capital and credit to raise productivity (chemicalization, mechanization and commercialization) and higher exposure to wider risks in the hope of recovering profit from diminishing returns (Young et al. 2002). Furthermore, the emergence of agribusiness with closed production-commercialization cycles (for instance, TH Milk) puts further pressure on rural labor, especially agricultural labor. The income gaps between farmers and other workers therefore persist.

In Vietnam, as in many other Asian countries that have experienced the Green Revolution, livestock development is an important component of the current transition. We observe in particular the simultaneous presence of: (i) important land constraints linked to the concentration of human populations underlying land fragmentation and smallholder farming (Viswanathan et al. 2012), (ii) an increase in the consumption of animal products (milk in India, pork in China, milk and pork in Vietnam...) linked to population growth and rising living standards (Tisdell 2011; Briones and Felipe 2013). Growing demand for animal products dramatically intensifies the pressure on the land, since each calorie or protein consumed in these forms (milk, meat, eggs) requires an average of three times as much plant equivalent (cereals and oilseeds in particular) (Le Cotty and Dorin 2012). The production of non-food

[17] '*Cánh đồng lớn*' refers to a way of organizing agricultural production based on linkage between farmers, farmer organizations and enterprises: all participating farmers cultivate on a certain large area (aggregated by their land parcels) with a same code of practice and enterprises are responsible for product sales. By 2016, there are 2,262 '*Cánh đồng lớn'* across the country, involved by 619,343 households, covering 579,284 hectares (253 ha per field on average). Most of *Cánh đồng lớn* are dedicated to rice production (1161 fields). Other main cash crops include: corn (50), sugarcane (95), vegetables (162), tea (38) (GSO 2017).

biomass (fodders, pastures, crop residues) used to feed animals is also putting pressure on the land. This growth has multiple implications, notably in the following three dimensions: *(i)* the restructuring of the agricultural sector (composition of sub-sector, localization of agricultural workers and farm holdings, optimal farm size, etc.) in relation to non-agricultural sectors regarding resources endowment and capital allocation (land, labor, financial and social capital); *(ii)* international trade, particularly with a strong development of feed imports of Asian countries (mainly soybean and maize meal) from regions with much lower land pressure (FAO 2009a); *(iii)* degradation of local and global environmental goods: increasing consumption of water, fertilizers and pesticides to produce feed, overexploitation of land and/or cultivation of forests or pastures (two important carbon and biodiversity reservoirs), emissions (CH_4 and N_2O in particular) related to the production of animal feed and to breeding activity, and pollution of water and soils caused by geographical concentration of solid and liquid animal effluents (Steinfeld et al. 2010).

5. Transformation and development trajectory at the territory level (Ba Vi district)

National dynamics also put social and structural changes in motion at the local level (province, district) in the motion. This section explores how the above-mentioned structural changes and agricultural transformations have happened at the local level, specifically in Ba Vì district, which is located in the vicinity of Hanoi city, at the heart of the Red River Delta – the most densely populated area of Vietnam (Map in *Appendix 3*). Prior to its integration into Hanoi in 2008, Ba Vì was the largest district of Hà Tây province. Ba Vì is located around 50 km to the west of Hanoi centre with the Red River to the north, Đà River to the west, and the Bavi mountain range standing as a buffer between the Red River Delta and the northwest mountains (*Tây Bắc*). As home to three ethnicities, of which *Mường* and *Dao* are native to the area while *Kinh* have migrated there since the 1960s, the district consists of 1 town and 31 communes spread accross a diversified landscape: lowland, hilly and upland. The diversity of the particular landscape reflects a long historical process of economic and political changes, especially in agriculture, which encompasses a variety of farming activities (rice growing in lowland zones by the rivers, perenial crops (tea, fruit) in the hilly zone, livestock in the upland zone) as well as toursism actvitities in close to Hanoi. Tourism (natural-ecologic and spiritual) contributed 29% of the district's GDP in 2015 (2.5 million visitors).

5.1. From collectivization and de-collectivization

Like elsewhere in the country, the district witnessed a significant collectivization of productive means and assets during the 1960s-1970s. The government launched an economic development movement in upland and remote regions by setting up a number of state agroforestry farms. Increasing demand for labor for land reclamation to boost agricultural

production encouraged a great flow of migration from other provinces into the Red River Delta, where the population was increasing. Rice was not only grown in lowland accessible to irrigation, but also hillsides. In addition to traditional crops like rice, sweet potatoes, plantation crops (tea, fruits), livestock (meat and dairy cattle) and forage crops were introduced and encouraged. Dairy cow herd under the management of Ba Vi State farm was tripled during the 1960-1970 period (from 384 to 1067 cows, from 147 tons to 718 tons of milk) (BVFRC 2009). Cropping rotations were put in place to make the soil fertile (peanut- sweet potato-pangola grass or peanut-elephant grass-peanut) or to produce crop residues for feeding animals (sugarcane for example). Collectivization transformed the local agrarian system, but also posed a number of challenges to farmers' livelihoods and territorial development.

Reforms and incentives under *Doi Moi* (1986) opened a new phase of development as private sector and family farming were encouraged. Land and livestock distributions (first distribution in 1987; second distribution in 1989-1990) from State farm to farm workers enabled farmers to generate initial capital stock for further investment in livestock later on. Land was always allocated in an equal manner (cattle, active members of the households and quality of land plot).[18] Paddy land of the Ba Vi Research Center was also distributed to households which then tripled rice yield (3 tons per hectare, or even 5 tons) (BVFRC 2009). Intensive crop production has grown with average earnings increasing by 25% based on high-yielding cash crops: expansion of soybean and peanut, promotion of winter crops. Extended land use tenure and LUR (certificated in form of 'Red Books') have endowed farmers as a resilience of those farming systems by encouraging long-term investment. However, for those set up on the land of the State farm, the absence of 'Red Books' prevents them from accessing credit.

Although land tittle issue somewhat hinders the agriculture growth, contribution of agriculture to the district GDP (45% in 2013) is supported by government interventions: biologisation, irrigation, mechanization, chemicalization and electrification. These interventions have also facilitated the shift of agricultural labor to non-agricultural activities. The proportion of households engaged in agricultural production shows a downward trend, from 81% in 2007 to 75% in 2013 (Table 5). A significant portion of labor have been withdrawing from agricultural activities to engage in services activities (catering, handicrafts, etc.) around tourism places in the district or to migrate to Hanoi for off-farm job opportunities.

[18] Land distribution principles: 1260m^2 or 360m^2 (above 55 years old or under 18 years old); 50% of "land of bad quality" (not irrigated – 1 crop cycle) and 50% of "land of good quality" (irrigated – 2 cropping cycles)

Table 5: Dynamics of rural households in Ba Vi

	2007		2009		2013	
Total households (HHs)	58,384	*(100.0%)*	56,982	*(100.0%)*	52,715	*(100.0%)*
Agricultural HH	47,291	*(81.0%)*	43,876	*(77.0%)*	39,616	*(75.2%)*
Non-agricultural HH	8,758	*(15.0%)*	10,825	*(19.0%)*	10,832	*(20.5%)*
Mixed HH	2,335	*(4.0%)*	2,281	*(4.0%)*	2,267	*(4.3%)*
Total employment (emp.)	125,296	*(100.0%)*	129,835	*(100.0%)*	123,731	*(100.0%)*
Agricultural emp.	101,201	*(80.8%)*	97,508	*(75.1%)*	91,510	*(74.0%)*
Nonagricultural emp.	19,547	*(15.6%)*	26,082	*(20.1%)*	26,078	*(21.1%)*
Other employment	4,548	*(3.6%)*	6,245	*(4.8%)*	6,143	*(5.0%)*

Source: Economic Department, DPC of BA Vi, 2014. Figures in bracket are share of household groups

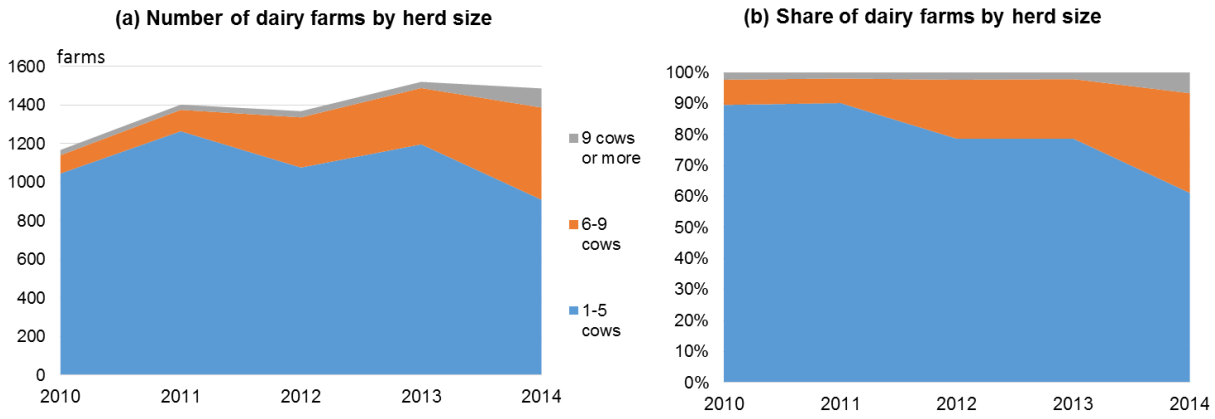
5.2. Livestock taking stock

Apace with the process of de-collectivization and market liberalization, livestock has been emerging as a contributor to local development. Livestock accounted for 65.6% of the total agricultural output of the district in 2014 while crops accounted for 32% and agricultural services contributed 2.4% (Ba-Vi DPC 2014). Pig and poultry did not make great gains due to price fluctuations and animal diseases. The pig and poultry population has gone down, while dairy production has been on the increase with bigger herds (eightfold increase from 1088 cows to 8871 cows between 2001 and 2014). This upward trend of dairy production has been supported by Government policies since 2000 (Decision 167, National Dairy Development Program in 2001) and agribusiness investments (Nestle from 1997 to 2005; IDP since 2007) and stabilized farm-gate prices. Ba Vi is currently the second largest milk basin in North Vietnam.

The expansion of dairy production goes with the changing land use pattern characterized by an intensification between 2003 and 2013. In winter, the index of vegetation increase with the introduction of a 3rd cycle of corn production and a significant increase of fodder crops. Tea and rice have gradually been replaced by corn and elephant grass for feeding cattle. Dairy farms, in place of diversifying food or cash crops, focus on fodder production and dedicate 60% of their agricultural land within farms to grow grass (elephant grass, king grass, VA06). However, it is difficult for local breeders to find sustainable fodder and forage resources. On average, a small-scale farmer in Ba Vi has 4545 m^2 for dairy production. In terms of land per cattle, this area is relatively sufficient to raise intensively 4 to 5 cows under suburban conditions in Vietnam (Garcia et al. 2006) (equivalent to 14 cows per ha, while density in France on average is 2 cows per ha). It is a very intensive crop-livestock system as crops produce 70% of the biomass consumed by cows. However, given the limited land available, it is difficult to find sufficient green feed for large herds. For instant, agricultural land (for production of grass, maize, cassava, rice straw) in the Tan Linh commune just meets the herd

of 1,700 dairy cows. An additional 300 cows by 2013 would require a further 300 tons of dry matter, or an additional 10 ha producing feed crops. If the herd increased to 11,000 cows in 2020, according to the scenario of the local government, an additional 300 ha would need to be allocated to forage production. Ba Vi is still characterized by small farms and limited land for dairy production (0.39 ha land per farm of which 0.29 ha for forage) that challenges environmental management at the farm level (manure and liquid waste treatment). Although the majority of dairy farms have small herds, from 1 to 5 cows, an upward trend of bigger herds of more than 9 cows is observed (100 herds in 2014). In the local cut-and-carry system, dairy cows are all raised in barns and fed with concentrates bought outside together with forage. Lairez (2012) and Khanh (2016) show that diversified farms (crops and dairy production) are more resilient and more associated with an autonomous fodder system. It is not the case for other farms which have to buy corn, rice straw, king grass or cassava. Meanwhile, the informal market of fodder is not well organized and access to local feed is not transparent. Farmers have to rent 20% of their agricultural land (from land owners who are Hanoi investors) for feed crops and continue to rely on industrial concentrates. Feed account for 70% of the total production costs and burden the income of farmers.

Figure 12: Dairy farm size in Ba Vi (2010 – 2014)



Source: Center for Livestock Development of Hanoi, 2015.

5.3. Urbanization and industrialization challenge land and employment availability

Proximity to Hanoi, a large city, offers the locals both advantages and disadvantages. On one hand, farmers have convenient access to input and output markets as well as seasonal off-farm work and nonfarm opportunities. On the other hand, the rapid urbanization and industrialization of the capital region is putting pressure on agriculture. Land in Ba Vi is mainly agricultural land, 28,567 ha out of 42,804-ha total land. There is a slight declining trend in agricultural areas over the past years due to expanded residential land and land for industrial purposes. The situation is much worse if per capita landholding (0,08 ha) and land per agricultural worker (0,17-0.18ha) are considered. With the boom in the real estate market in

1990s and early 2000s, many locals sold their by-road land and moved to further away. However, these 'agricultural' lands are not fixed on the base of market prices. The system excluded the poor farmers from development (Mellac et al. 2010). Accordingly, local dairy farmers have to hire land from estate investors to produce forage.

Under rapid urbanization, a number of households lost their means of subsistence due to reclaimed agricultural land (Thắng 2009), forcing them to earn their livelihood outside farming activities. Furthermore, instability of prices of agricultural products (pork, poultry) also pushed farmers to give up agricultural activities to take up other occupations (i.e., non-farm activities at home or in Hanoi center). The formation of BaVi National Park (1991), Tourism Development Scheme (2000), Hanoi geographical extension (2008) have jeopardized the economic structure of the district. Extended tourism facilities have not helped the poor and have not sought to balance their needs in terms of resource use (land, water, forest) with those of the farming sector in the region. The most difficult task is to make the gains and benefits from farming (especially dairy production) and non-farming activities (especially tourism) converge. Hanoi have planned in 2016 an amended expansion scheme in its vision for 2030-2050. Accordingly, the region is planned to integrate surrounding provinces as satellites of Hanoi. This strategy will place higher pressure on agricultural land, agricultural labor and pose other challenges to the sustainable and inclusive development of BA Vi district in particular and other peri-urban zones in general.

6. Conclusion: Way forward to sustainable and inclusive development

The comprehensive political and economic reforms of 1986 initially backstopped by agrarian reforms has transformed Vietnam from a centrally-planned economy to a *'socialist-oriented market economy*'. It has contributed to poverty reduction and the country has emerged as a major exporter of agricultural commodities. The theoretical Lewisian development pathway opposes to the ongoing dynamics of the country: decline in share of agriculture in GDP, the continued predominance of rural population (60% of the total population in 2015), farmers on the increase (in absolute terms) but getting poorer compared to other workers in the economy. This dynamic acutely reflects the general trajectory of growth and structural transformation of most Asian economies. Theoretical and empirical facts and figures at different levels (national, sector, territory) suggest that the expected sustainable and inclusive development of Vietnam is beset with a number of challenges.

As the structural transformation continues, will Vietnam follow the current development path (i.e., Lewis Trap)? Although growth can be regarded as a credible performance for the agriculture sector, recent emerging problems (rising labor costs, income inequality, resources management, environmental degradation, etc.) have left doubts to sustain GDP growth and to

accelerate structural transformation in the coming time. Slower growth in agriculture reveals that the sector, which once enjoyed fast growth driven by institutional changes, is now trapped by out-of-disposal cheap resources. Increasing demographic pressure on land and a shortage of alternative nonfarm employment opportunities continue to aggravate the situation. Both the public and privates sector will be further challenged by the twin goals of the structural transformation: improving the welfare of farmers and the poor and decreasing income equality. Policies and investments should therefore incentivize productivity increases in agriculture (improving access to credit for small and medium farmers, education and extension services enabling farmers to adopt technology; no distortion of trade on production factors) in parallel with the creation of non-farm opportunities.

Doi Moi has revitalized family farms that have been the backbone of national development for the last 30 years. However, ongoing agrarian dynamics (sectorally and locally) have not been entirely inclusive from the angle of different farming structures. Government policies have recently offered more support to large-scale farms than to small and resource-poor farmers. Proponents of large-scale farms and mega farms claim that economies of scale are more remunerative, especially in the context of more expensive agricultural labor and numerous labor saving technologies. Large-scale farms and modern agriculture are promoted for their responses to the skyrocketing demand for food (especially livestock products in the current "Livestock Revolution"), ability to adopt advanced technology, mechanization, and standardized quality controls, better addressing adverse environmental externalities (diseases control, waste treatment, …) and response to pressing competition from foreign products. However, the form of large-scale farms poses ecological, economic and social threats in rural areas. Under increasing competition from nonfarm sectors and cities (for land, labor and water), over-intensive inputs and natural resource use have significant consequences on farm profitability, farmer wealth and the environment. Land constraints also are hindering farmland expansion. It seems that farms in Vietnam will remain small by international standards in the future. But small farm size will not necessarily mean that farm households will remain poor or become inefficient. Smallholder agriculture could be viable, and more socially and environmentally efficient than larger farms (IPES-Food 2016). Therefore, more evidence is needed to prove that small farms are less efficient than large farms. For now, to meet the different inclusive development objectives, Vietnam is likely to embrace a dual farming model. On one side, like industrialized countries located on the Lewis Path, Vietnam will accommodate large-scale farms and agro-industries to feed its people with cheap protein, carbohydrates and lipids. On the other side, smallholders and family farms which are more connected to the market will continue. The operations of smallholder farms will be conditioned by the investment portfolios and policy choices made by the Government (i.e., interventions in

different domains concerning agricultural and rural areas: food safety, environmental standards, irrigation, investment regulations and incentives, provision of pubic goods (both hard and soft elements: roads, electricity, education and training…). From a value chain perspective, Vietnam will follow Asian countries to rely on small farms upstream and large trading and large processing operations downstream.

Like its neighbours, Vietnam is challenged by a declining share of agriculture in GDP and increasing demographic pressure. The country has reached the cultivation frontier where there is hardly any new land available for agricultural production and forest land has been overexploited for the sake of hydropower plants. More deforestation for farmland will increase the risks of drought, floods, land degradation and environmental instability that adversely affect agriculture, forestry and fisheries. However, agricultural transformation, has shown its second environmental facet: natural landscapes depleted by intensive agricultural production (over use of pesticide and fertilizers), decreasing mangrove areas due to rapid aquaculture expansion, absence of environmental regulations….Threats posed by high human and livestock densities may lead to environmental degradation and limit the eradication of animal diseases. This will have a negative influence on sustainable growth. In this context, besides accelerating sector convergence in terms of income and job opportunities (i.e., Lewis Path), from multi-dimensional standpoints (economic, social and environment) and from a multi-functional agriculture perspective (socio-cultural role, ecosystem services) (Viswanathan et al. 2012), *"a paradigm shift from industrial agriculture to diversified agro-ecological systems"* (IPES-Food 2016) in the continuing agrarian transformation and structural transformation has emerged in policy discussions and calls for further R&D, technology changes and institutional innovations. For farming to be a viable pursuit in the future, the performance of the existing system must be improved by adopting more sustainable farming practices which enable internalize any costs to the environment (i.e., mixed crop livestock system, agro-ecological agriculture, climate-smart agriculture, etc.) (Altieri 2002; Wezel et al. 2009; Gliessman 2014; Poyyamoli 2017).

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Appendix:

Appendix 1: Milestones of policies in agriculture and rural development

Year	Agricultural sector reforms
	Reunification period (1976-1985)
1979	Experiments with contract system in agricultural and industry production
1981	Decree 100 implemented as pilot for unleashing the agricultural sector
1985	Failure of price-wage-money adjustment scheme
	Renovation (1986-1993)
1986	*Doi Moi* (Renovation) adopted
1987	Promulgation of Foreign Investment Law
1988	Resolution 10 launched, abandoning the collectivization system: *Allocating collective land to individual farm household on long term basis*
1989	Price reforms: *liberalizing all prices, including interest rates and the foreign exchange rates;*
	Banking system decentralization;
	Commercial control quotas for 12 commodities
1990	Law on Companies and Law on Private Enterprises;
	Law on State Bank and Law on financial institutions;
	Re-arrangement of state enterprises;
1991	Abolition of most incentives and supports to SOEs
1992	Constitution 1992 was adopted and replaced Constitution 1980. The private sector is acknowledged and recognized in the paper.
	Expansion (1993-2000)
1993	The Land Law was adopted. It gave 20-year contract for land assigned for the growing of annual crops and 50-year contract for land assigned for growing perennial crops; Regulations on land limits, and Land use right (LUR);
	Establishment of floor price for rice
1996	Law on Cooperatives: clarifying cooperatives' role as providers of services to households.
1998	Revise and Amend Land Law
2000	Amended Law on Foreign Investment;
	Combine Law on Enterprises and Law on Companies
	Removal of quotas on fertilizer imports
	VN-USA Bilateral Trade Agreement signed
	Resolution 03/2000/NQ-CP (02 Feb 2000) on farm economy
	Integration (2000-2008)
2001	The Land Law was amended to permit foreign investor to acquire agricultural land and to allow farmers to exchange portions of fragmented land holdings to consolidated holdings;
2002	Decision 80/2002/QD-TTg (24 June 2002) on farming contract
2003	Amended Land Law: to allow holders of land-use certificate (contracts) to buy and sell their usufruct rights in land or change the functional assignation of their land, within the overall indicative planning framework of the government. Communes were allowed to change functional purpose classification of land.
	Re-arrangement and reformation of state agro-forestry farms. State forestry farms were obliged to reform and to reallocate forestry land to local communities that mostly are composed of ethnic minorities

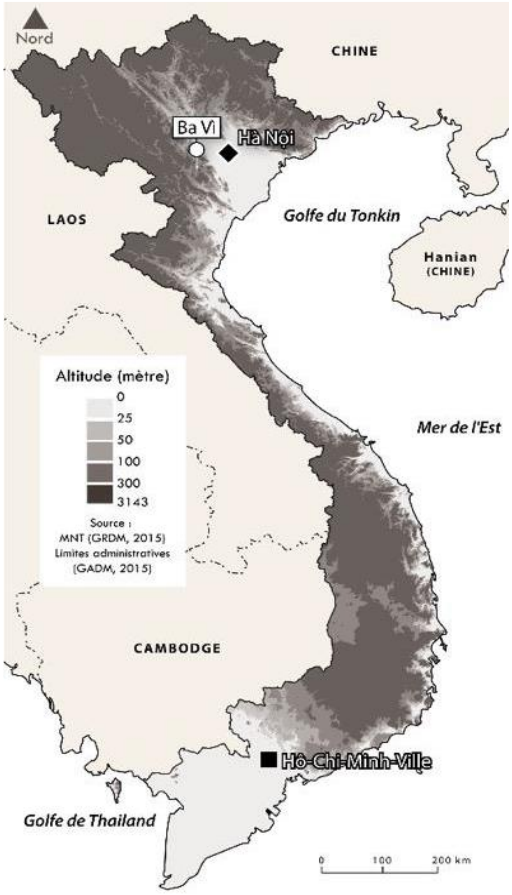
2004	Further changes of the land law gave land rights to both husbands and wives thereby promoting gender equality
	Reorientation (from 2008)
2008	Resolution 26 on Agriculture – Farmer – Rural development
2010	Decision 800 - National Target Program New Rural Development (NTP-NRD)
2012	The Law on Cooperatives was amended
2013	Decree 210 on encouraging enterprises invest in agriculture and rural sector
	Decision 62 on encouraging cooperation and linkage in contract farming and large-scale fields
2014	Agricultural Restructuring Plan (ARP) was adopted. Then, a series of detailed restructuring schemes for sub-sectors were constituted, livestock restructuring scheme

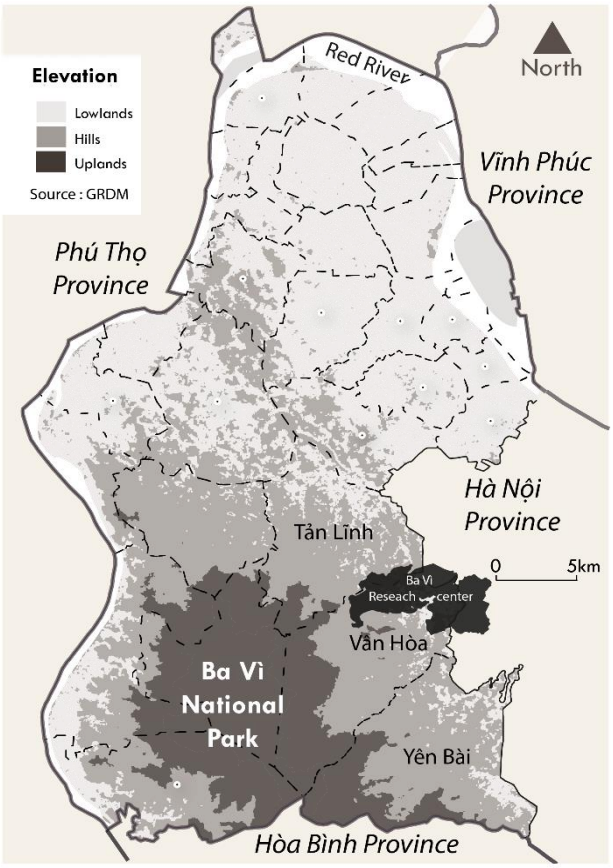
Appendix 2: Changes of agricultural household over Agri-Census (2001 – 2016)

	2001	2006	2011	2016
Agricultural Households (whole country)	**11,228,701**	**10,462,367**	**10,368,143**	**9,318,307**
By zone				
- *Rural areas*	10,573,597	9,783,644	9,535,548	8,610,269
- *Urban areas*	*655,104*	678,723	832,595	708,038
By activity				
- *Agri. HHs (crop and livestock)*	10,689,753	9,740,160	9,591,696	8,490,611
- *Forestry households*	26,606	34,233	56,692	114,543
- *Aquaculture households*	512,342	687,984	719,755	713,153
By region				
- *Red River Detal*	2,787,505	2,248,062	1,999,522	1,555,821
- *Northeast and Northwest Mountain*	1,837,431	1,813,564	1,905,943	1,901,369
- *Central Coast*	2,605,396	2,669,079	2,629,422	2,297,523
- *Central Highlands*	695,878	751,647	864,810	932,378
- *SouthEast*	890,375	616,638	602,426	529,911
- *Mekong River Delta*	2,412,116	2,363,413	2,366,020	2,101,305
Total rural households	**13,065,756**	**13,768,472**	**15,343,852**	**15,988,375**
Agricultural HHs	10,573,597	9,783,644	9,535,548	8,610,269
- *Agricultural HHs (crops and livestock)*	10,106,615	9,149,118	8,866,510	7,864,788
- *Forestry households*	24,343	31,566	51,862	108,509
- *Aquaculture households*	442,639	602,960	617,176	636,972
Industrial households	752,204	1,401,943	2,305,794	3,218,468
Services households	1,381,251	2,054,193	2,825,423	3,105,066
Others	358,704	528,692	677,087	1,054,572

Source: AgroCensus (GSO)

Appendix 3: Landscape Map of Ba Vi district





Source: Cesaro, 2015