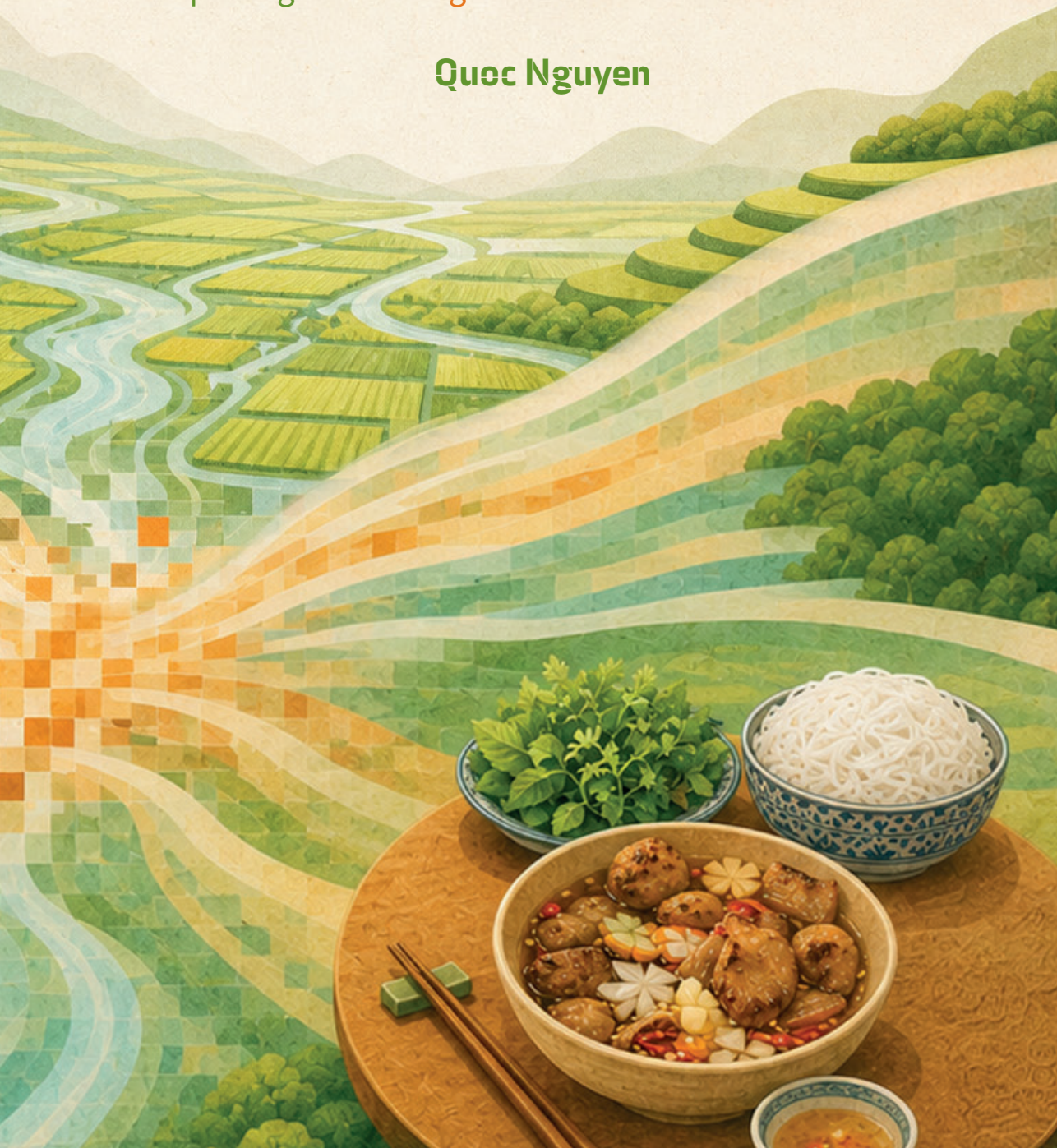
Food system transitions

in low- and middle-income countries:

Exploring the Missing Middle in the case of Vietnam

Quoc Nguyen



Food system transitions in low- and middle-income countries: exploring the Missing Middle in the case of Vietnam

Quoc Nguyen

Thesis committee

Promotor
Prof. Dr. *ir.* Peter Oosterveer
Professor in Environmental Policy
Wageningen University & Research

Co-promotors
Prof. Dr. *ir.* Inge. D. Brouwer
Director of the CGIAR Better Diets and Nutrition Program
CGIAR System Organisation
Nairobi, Kenya

Dr. Raffaele Vignola
Assistant Professor in Earth Systems and Global Change
Wageningen University & Research

Other members
Dr. Jessica Duncan, Wageningen University & Research
Dr. Bart de Steenhuijsen Piters, Wageningen University & Research
Dr. Pepijn Schreinemacher, World Vegetable Center (WorldVeg), Bangkok, Thailand
Dr. Hung Nguyen-Viet, International Livestock Research Institute (ILRI), Hanoi, Vietnam

This research was conducted under the auspices of the Graduate School Wageningen School of Social Sciences (WASS)

Food system transitions in low- and middle-income countries: exploring the Missing Middle in the case of Vietnam

Quoc Nguyen

Thesis

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Quoc Nguyen

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Abbreviations

A4NH	Agriculture for Nutrition and Health
ADDA	Agricultural Development Denmark Asia
AFTA	ASEAN Free Trade Area
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ASF	African swine fever
BRC	British Retail Consortium
CAC	Codex Alimentarius Commission
CIAT	International Center for Tropical Agriculture
COVID-19	Coronavirus disease 2019
CSA	Community-supported agriculture
Danida	Danish International Development Agency
DARD	Department of Agriculture and Rural Development
FAO	Food and Agriculture Organization
FAOSTAT	FAO Statistics database
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GMP	Good Manufacturing Practice
GFSI	Global Food Safety Initiative
GlobalGAP	Global Good Agricultural Practices
GSO	General Statistics Office
HACCP	Hazard and Critical Control Points
HLPE	High Level Panel of Experts on Food Security and Nutrition
ICT	Information and communication technology
IFOAM	International Federation of Organic Agriculture Movements
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
IPM	Integrated Pest Management
LIFSAP	Livestock Competitiveness and Food Safety Project
LMICs	Low- and middle-income countries
MAE	Ministry of Agriculture and Environment
MARD	Ministry of Agriculture and Rural Development
MLP	Multi-Level Perspetive
MOH	Ministry of Health
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MPA	Multi-Pattern Approach
MM	Missing Middle
MRD	Mekong River Delta
NAP-FST	National Action Plan on Food Systems Transformation in Vietnam towards Transparency, Responsibility, and Sustainability by 2030
NGOs	Non-governmental organisations
Norad	The Norwegian Agency for Development Cooperation
OECD	Organisation for Economic Co-operation and Development
PGS	Participatory Guarantee Systems
PPD	Plant Protection Department

PRISMA-Scr	Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews
RAT	Rau an toàn (*safe vegetables*)
RRD	Red River Delta
SDGs	Sustainable Development Goals
SDG2	Sustainable Development Goal 2: Zero Hunger
SMEs	Small and medium-sized enterprises
SNM	Strategic Niche Management
SPS Agreement	Agreement on the Application of Sanitary and Phytosanitary Measures
SPT	Social practice theory
UN	United Nations
UNFSS	United Nations Food Systems Summit
VFA	Vietnam Food Administration
VietGAHP	Vietnamese Good Animal Husbandry Practices
VietGAP	Vietnamese Good Agricultural Practices
VOAA	Vietnam Organic Agriculture Association
WHO	World Health Organization
WTO	World Trade Organisation

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1

Introduction

1.1. Food system changes and sustainability challenges

The changes of global food systems have been driven by a complex interplay of biophysical, demographic, technological, market, and institutional factors (IPES-Food, 2016). As defined by the well-cited report of High-Level Panel of Experts (HLPE, 2017), food systems encompasses all elements and activities related to food production, processing, distribution, preparation, and consumption, along with their drivers and outcomes. Over the past five decades, global food systems have shifted from predominantly rural and traditional models to industrialized and consolidated systems (Ambikapathi et al., 2022). Those transformations have been particularly pronounced in low- and middle-income countries (LMICs) across Asia, Africa, and Latin America, yielding both positive and negative impacts on nutrition, health, socio-economic, and environmental sustainability (Reardon et al., 2019).

While the global food system transformation has delivered substantial benefits, it has also introduced significant challenges. Food security has improved, with hunger and malnutrition declining in historically vulnerable regions (Pingali & Abraham, 2022; Tschirley et al., 2014). However, approximately 733 million people remain undernourished (FAO, 2024), and over 2 billion people suffer from micronutrient deficiencies - also termed the “hidden hunger” (Willett et al., 2019). Simultaneously, more than 2.5 billion individuals are now overweight or obese, contributing to surging diet-related non-communicable diseases (NCDs) (Branca et al., 2019; WHO, 2024). Foodborne diseases (FBDs), caused by microbial or chemical contamination, remain a pressing issue, claiming billions of annual illnesses (Pires et al., 2021). Environmental sustainability is another critical concern: food systems contribute approximately 34% of anthropogenic greenhouse gas emissions (Crippa et al., 2021). Agriculture accounts for 90% of tropical deforestration (Pendrill et al., 2022) and 70% of global water withdrawal (FAO, 2020). Social equity issues persist, including disparities in healthy food access and risks of excluding over half a billion smallholder farmers from increasingly standardized supply chains (Marrero et al., 2024; Swinnen, 2007).

These challenges have prompted widespread narratives that "food systems are failing us" (Béné, Oosterveer, et al., 2019; Global Panel, 2016), fueling calls for sustainable "transitions" or "transformations" of food systems (McDermid et al., 2023; Pereira et al., 2020; Webb et al., 2020). While the narratives were initially prevalent in discussions about food systems in the Global North, they are increasingly echoed in assessments of food system trajectories in many LMICs. Although the terms "transition" and "transformation" carry nuanced differences,[1] both indicate long-term, fundamental changes that guide food systems. Such changes should ensure access to sufficient, safe, nutritious, and healthy diets while minimizing environmental footprints and promoting equity for both consumers and suppliers. These goals are emphasized in global agendas, especially the second Sustainable Development Goal (SGD2, 'Zero Hunger'), which targets eliminating hunger, enhancing food and nutrition security, and promoting sustainable agriculture (United Nations, 2016). The calls for food system transformation are further underscored by many high-profile reports (Global Panel, 2016; HLPE, 2017; IPES-Food, 2016; Willett et al., 2019) and by the United Nations Food Systems Summit (UNFSS, 2021), which outlined roadmaps for food system transformation in many signatory nations (Candel et al., 2025).

Implementing SDG2 and those transformation agendas at the local level faces critical obstacles. Among that is the complex and multidisciplinary nature of food systems, which requires not just simplistic, single-issue solutions but more holistic approaches (Foran et al., 2014; Marshall et al., 2021; Ng'endo & Connor, 2022). There is a pressing need to shift focus from analyzing isolated components to understanding stakeholder interactions and underlying mechanisms (Brouwer et al., 2020; Fourat et al., 2024). Addressing trade-offs among sustainability goals, such as balancing nutritional needs with environmental sustainability and social equity, is also crucial (Balié, 2020; Davis et al., 2022; Mausch et al., 2020). Lastly, implementation must overcome structural

[1] The terms "transition" and "transformation" both refer to systemic changes but differ in scope and focus. Transition focuses on shifts within societal sub-systems, emphasizing how change occurs, while transformation involves broader, systemic changes, highlighting what changes and its impacts (Hölscher et al., 2018).

barriers stemming from institutional inertia, technological limitations, or 'lock-ins', caused by entrenched interests and societal norms (Conti et al., 2021; Even, Thai, et al., 2024).

The Missing Middle (MM) is a promising concept that helps illuminate these obstacles. Proposed by researchers from Wageningen University, the MM highlights the lack of coordinated actions across food systems, from production to consumption, which hinders progress toward SDG2 (Veldhuizen et al., 2020). The concept encompasses both horizontal and vertical dimensions. The horizontal axis refers to gaps between production and consumption, as well as disconnects between government policies, private sector initiatives, research priorities, and everyday practices of food suppliers and consumers. The vertical axis captures the global-local gap in translating policies into localized practices.

The thesis is rooted in the argument that the Missing Middle is neither fixed nor uniform. The gaps in food systems, either vertical or horizontal, are highly dynamic and ever-evolving, shaped by constant developments at multiple levels. The MM concept should be further developed to reflect this dynamic nature and adapted to illustrate situations in LMICs, where food system transitions have followed complex and diverse pathways. Case studies from developing countries can provide deeper insights into how the concept could be understood and applied in practice.

Building on this premise, this thesis explores the Missing Middle within food system transitions in LMICs, using case studies from Vietnam. The research scrutinizes the underlying interactions and contextual factors shaping these dynamics, as well as the misalignments and mismatches that hinder efforts to address food system challenges.

The introductory chapter is structured as follows. Section 1.2 presents the theoretical foundations of the Missing Middle concept. Section 1.3 provides an overview of agri-food system transitions in LMICs and introduces Vietnamese food systems. Section 1.4 details the research objectives and questions. The analytical frameworks are described in Section 1.5 and research methods in Section 1.6. Section 1.7 outlines the thesis structure.

1.2. Theoretical developments of the Missing Middle

The term ‘Missing Middle’ (MM) can be found in various research domains, including economics, education, urban planning or youth studies (Perry & May, 2006; Roberts, 2013; Wegmann, 2020). Generally, it indicates the absence or underrepresentation of entities that are middle-sized or middle-positioned. In development economics, MM refers to situations where numerous micro-enterprises and a few large firms dominate, while medium-sized businesses struggle to emerge or survive (Tybout, 2014). MM is also used to describe the weak presence of a robust middle class in particular sub-Saharan African nations (Birdsall, 2007), attributed to weak institutions that fail to deliver inclusive economic growth, quality education and broad employment opportunities, in addition to foreign aid that distorts incentives and undermines state accountability. Some studies also apply the term in the context of developed countries, for example, the lack of incentives to support middle-scale industries that contribute to the shrinking middle-class in the United States (Patrick & Stephens, 2020).

The Missing Middle in agri-food research

The Missing Middle and relevant terms have been also adopted in agri-food research. The 'hidden middle', suggested by Reardon (2015), refers to overlooked midstream actors - processors, wholesalers, and logistics providers. While policy debates focus on small farmers (upstream) and retailers or consumers (downstream), they often neglect the midstream, which accounts for 30–40% of value addition in LMIC food value chains. The midstream is rapidly evolving and increasingly playing critical roles in connecting producers and translating sustainability demands from consumers (Grabs et al., 2024), , yet the lack of policies engaging this 'hidden middle' undermines efforts to achieve food loss reduction, price stability, and access to safe foods (Mekonnen et al., 2022).

In local and alternative food networks research, the MM refers to the lack of intermediary mechanisms enabling smallholder producers to aggregate products and reach large markets (Morley et al., 2008). The absence of such infrastructures creates fragmented markets that undermine local food production's viability, reinforcing

conventional supply chains that favours large-scale, centralized producers. Similarly, Luoni (2021) used the term to describe the disappearing intermediary market structures, comprising local food aggregators, processors and wholesalers, that once supported diverse local food systems. Those infrastuctures are being replaced by large-scale, centralized, vertically integrated industrial food supply chains led by supermarkets and agri-food corporations. In agricultural finance, the MM denotes the lack of services for small and medium enterprises (SMEs), whose capital needs are too large for microfinance yet too small for commercial banks (Doran et al., 2009).

These examples show that previous uses of MM often focus on midstream or intermediary structures. Veldhuizen et al. (2020), in their paper emphasizing the collective actions needed to achieve SDG2 at various levels, suggest the expansion of the term's usage to cover both horizontal and vertical aspects.

Horizontal and vertical dimensions

As conceptualized by Veldhuizen et al. (2020), the Missing Middle encompasses both horizontal and vertical dimensions (***Figure 1.1***). The *horizontal dimension* is seen as the gaps between food production and consumption or between agriculture and nutrition. This can refer to missing value chains connecting supply to consumers, similar to Reardon (2015)'s hidden middle' or Morley et al. (2008)'s diminishing intermediary mechanisms. These production-consumption gaps, however, can also be understood as the misalignments between the different priorities of policies, investments or research on agricultural development and on nutrition and health. From the global perspectives, this exemplifies a type of trade-off not only found between SDG2 and other goals but also among SGD2's own targets and mechanisms (ICSU, 2017).

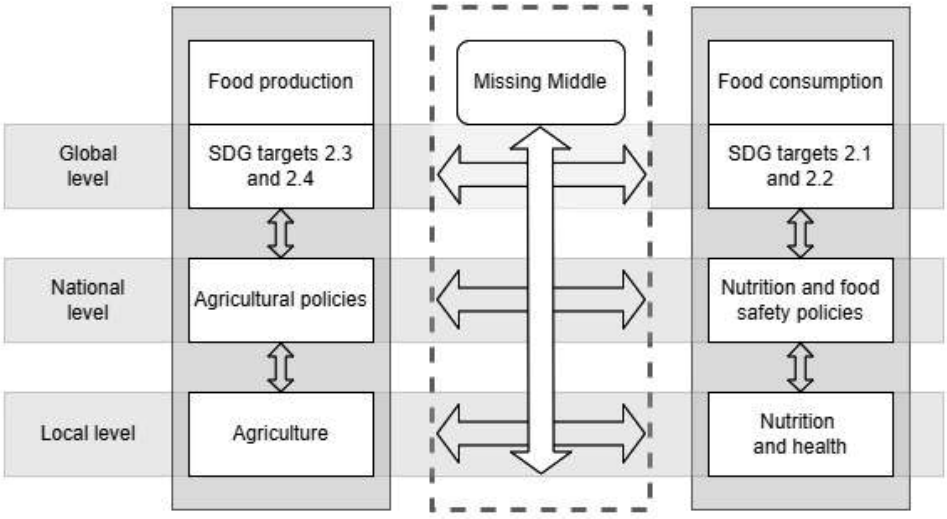


Figure 1.1 *Horizontal and vertical dimensions of the Missing Middle for implementing SDG2*

Source: Adapted from Veldhuizen et al. (2020)

The production-consumption disconnect aligns with concepts of *distance* (and its antonym, *proximity*) in studies on food relocalization/reconnection and alternative food networks. The distance/proximity is not only physical but also operational and cognitive (Eden et al., 2008). Studies on industrializing food systems describe how consumers - living in urban areas and surrounded by modern food environments – have little sense of connection to where foods are sourced. The growing differences in geographical locations, socio-economic environments and cultural backgrounds lead to the increasing cognitive and social alienation among producers and consumers (Mundler, 2022). Food production is no longer part of consumers' everyday practices and knowledge, nor do they have any kinship to the people who produce food. This results in the erosion of consumer trust (Dixon & Banwell, 2004) and limited consumer awareness of the negative impacts of industrial food systems on health, rural development, and the environment (Wiskerke, 2009).

The *vertical dimension* of the Missing Middle represents the distance between global agendas and local implementation. As Veldhuizen et al.'s (2020) framework focuses on

SDG2, this manifests as the challenge of translating globally defined targets into context-specific actions through national and sub-national pathways. Following the 2021 UNFSS, countries developed national pathways for food system transformation. However, analysis of these national documents reveals they remain limited in scope and ambition, often prioritizing dominant productionist paradigms and global agendas over context-specific challenges (Candel et al., 2025). The adoption of "one size fits all" approaches frequently fail due to varying regional priorities and diverging interpretations among agri-food actors regarding the most urgent challenges (Dengerink et al., 2021).

The global-local axis of the MM indicates the long-term debate between globalism and localism in food system research (Wilhelmina et al., 2010; Wood et al., 2023). This encompasses the dilemma between two competing narratives: that food systems should be relocalized - advocating for more localized systems - and that they should be coordinated to align with global standards and goals. This tension has been emphasized in food sovereignty movements calling for renunciation of corporate-led global food regimes and prioritizing local food supply systems to ensure food security and access (Huey, 2005; Wittman, 2011). It also appears in global food governance studies examining how local smallholder producers are excluded from global quality standards and certifications due to high entry requirements and private companies' procurement strategies (Meemken et al., 2021; Oosterveer, 2005; Schleifer & Sun, 2020).

Overall, the global-local and production-consumption gaps are compounded by varying agencies and capacities across governance levels (individual to global) and sectors (agriculture, nutrition, health, trade, environment). This frequently results in institutional fragmentation, with responsibilities divided among actors operating in silos without adequate coordination mechanisms, leading to policy incoherence and barriers to multisectoral and multi-level coordination (Farmery et al., 2025; Patay et al., 2025).

1.3. Agri-food system transitions in LMICs and Vietnam

The theoretical developments of the Missing Middle highlighted key viewpoints and dimensions of the concept. However, to position the MM to address food system challenges in diverse contexts, it is essential to gain an understanding on the distinct patterns and dynamics of food system transitions in LMICs, with Vietnam serving as a key case study.

1.3.1. Characterizing agri-food system transitions of LMICs

Drivers

LMICs are undergoing profound agri-food system transitions driven by a confluence of *global and local drivers*, also referred to as 'landscape factors' or 'meta-conditioners' (Reardon et al., 2019; Spaargaren et al., 2012). The most recognized drivers are income growth, urbanization, demographic transitions, infrastructure expansion, technological innovation, and global trade integration (Béné et al., 2020; Bishwajit, 2014; Gómez & Ricketts, 2013; Hazell & Wood, 2008; Reardon et al., 2019).

Agri-food and nutrition policies in LMICs have evolved significantly. During the Green Revolution, policies were narrowly focused on boosting staple crop yields and ensuring calorie sufficiency. Over time, the agri-food agenda increasingly emphasize nutritional adequacy, dietary diversity, food safety, digitization, and resilience to climate shocks (Gómez et al., 2013; Hidayati et al., 2021; Maxwell & Slater, 2003). Following the end of the Cold War, many former socialist and non-aligned economies have embraced trade liberalization, land tenure privatization, private investment incentives, and food supply chain modernization (Giraldo & McCune, 2019; Hidayati et al., 2021; Pingali & Abraham, 2022).

The role of institutions—both formal (government agencies, firms) and informal (cultural norms, traditions)—has been equally crucial. Institutional strength often determines whether food system reforms succeed or falter in delivering food and nutrition security interventions (Barrett, 2010; Wehrheim & Wiesmann, 2006) and enforing food quality controls (Kim & Reinert, 2009). Many LMICs, however, are

characterized by high levels of instability and mixed institutional performance (Wieczorek, 2018), with insufficient governance capacity, political tensions, and considerable levels of corruption (Mimba et al., 2007). Informal institutions (norms and cultures) remain pervasive in LMIC food markets, shaping how food is grown, exchanged, prepared and consumed (Alonso, 2015; Vorley, 2023).

Smallholders and shifting food production

Smallholder and family farms are the backbone of agri-food production in LMICs. Most farms in Asia and Africa are smaller than two hectares (Collier & Dercon, 2014; Otsuka et al., 2016), while in Latin America, small farms coexist with medium and large operations (Berdegué & Fuentealba, 2014). A notable trend across LMICs is the continued decline in average farm size, largely driven by population growth and land fragmentation. While land consolidation policies have been promoted under neoliberal agendas, smallholders continue to persist in most regions, except several observed cases of farm expansion like Thailand, Argentina or the Mekong Delta of Vietnam (Carlson, 2018; Dawe, 2015).

While small-scale farms persists, agricultural output in the Global South has grown significantly. Between 1961 and 2020, its share of global production surged from 44% to 73% (Fuglie et al., 2024) (***Figure 1.2***). This growth has been driven primarily by productivity gains through mechanization, improved seed varieties, chemical inputs, and irrigation, rather than farmland expansion (Pellegrini & Fernández, 2018). Production patterns are also shifting. While staple crops remain vital, producers are increasingly cultivating high-value and nutrient-rich products such as fruits, vegetables, industrial crops, responding to rising demand from urbanizing populations (Dawe, 2015). The “livestock revolution” and “blue revolution”, referring to the boom in livestock and aquaculture production and supply chains, respond to the growing demand for protein-rich foods. Yet, growth in these sectors remains concentrated in particular regions rather than evenly spread across all LMICs (Garlock et al., 2020; Pica-Ciamarra & Otte, 2011).

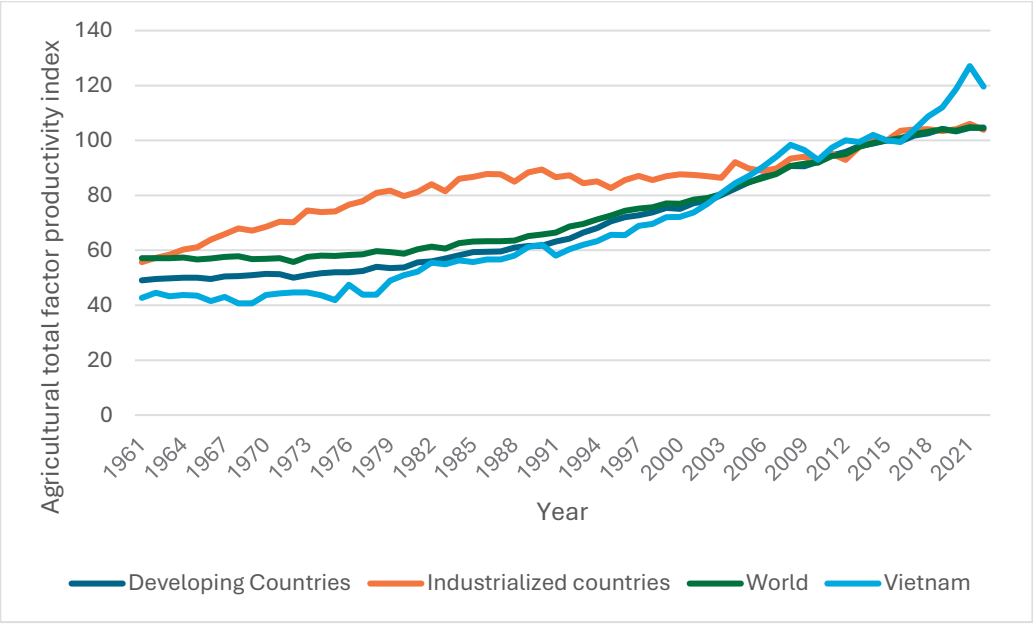


Figure 1.2 *Agricultural total factor productivity (TFP) index of developing and industrialized countries and Vietnam*

Source: Data of AG TFP index[2] from Fuglie et al. (2024). "International Agricultural Productivity, USDA." Economic Research Service. Accessed on December 12, 2024. https://www. ers. usda. gov/data-products/international-agricultural-productivity

Food supply chains: the midstream and downstream revolutions

Significant transformations are occurring in both midstream and downstream segments. Reardon and colleagues (2006, 2009, 2012, 2015) describe three 'revolutions which are reshaping LMIC food supply chains: the rise of modern retail (*supermarketization*), the growth of food services, and the "quiet revolution" in midstream intermediation (processing, logistics, wholesale). The downstream

[2] Total Factor Productivity (TFP) is the ratio of aggregate output to aggregate Input. The index AG TFP by Fuglie et al. (2024) and USDA is calculated using the difference between the growth rates of total agricultural outputs ((crop, animal, aquaculture) and Inputs (land, labour, capital and materials), and applying that growth rate to the 2015 base year of the AG TFP index.

revolution involves the rapid spread of supermarkets and other forms of food services, driven by urbanization, rising incomes, infrastructure improvements, and foreign direct investment (Barrett et al., 2022; Reardon & Hopkins, 2006). Midstream sectors—processing, packaging, storage, and distribution—are witnessing transformative changes, typically following an initial elongation of supply chains with specialized intermediaries, then modernization with integrated logistics and cold chains (Reardon, 2015). These shifts also bring changes in food procurement structures and practices, with the gradual replacement of spot markets with contractual relationships. Food safety, quality control, and standardization are gaining prominence, supported by both public regulations and private certifications, in responding to growing public concerns about food quality and safety (Jaffee et al., 2019).

Food supply chains across LMICs now span a spectrum of food system types[3] from traditional to mixed/transitional to modern (HLPE, 2017; Jaffee et al., 2019). Traditional systems rely heavily on informal markets, short value chains, and small-scale processing. Transitional systems exhibit a blend of traditional and modern traits, while modern systems feature industrial-scale production, long-distance logistics, and extensive formal retail. Most LMICs occupy the transitional space, but often different systems coexist within the same country due to regional inequalities and socio-economic diversity.

Food environment and consumer patterns

These supply chain evolutions are also reshaping the food environment, defined as the interface where consumers acquire food from wider food systems (Turner et al., 2019). Urbanization, rising incomes, and modern retail have expanded access to diverse and off-season foods, including animal-sourced and processed products. Formal retail

[3] There have been different typologies of food systems. Gómez & Ricketts (2013) proposes four types of food value chains: traditional, modern, modern-to-traditional, traditional-to-modern. Marshall et al. (2021) uses indicators on agriculture value added, dietary share of stapples, supermarket density, and urbanization rates to propose five exclusive types: rural and traditional, informal and expanding, emerging and diversifying, modernizing and formalizing, industrial and consolidated.

formats are becoming more accessible, although informal markets still dominate in many areas. Nutritional labeling, food marketing, and safety regulations are also increasing, albeit their diffusion are uneven across countries and regions (HLPE, 2017).

This evolving environment is accompanied by a “nutrition transition” across LMICs. A vast body of literature has emphasized the global ‘nutrition transition’, driven by urbanization, globalization, economic development, and technological advancements (Gómez et al., 2013; Popkin, 2017). The transition is marked by the convergence and Westernization of diets, whereby various traditional diets have been shifting towards reduced intakes of staples and vegetables and increased consumption of animal-sourced foods such as meat and dairy, alongside oils, fats, sugars, and salts. Also, there is a growing consumption of (ultra)processed and convenience foods (Belahsen, 2014; Brunelle et al., 2014; Kearney, 2010).

Outcomes and cross-cutting challenges

Food system transformations have profound consequences for nutrition, health, socio-economic conditions, and the environment. Dietary shifts toward higher-calorie, ultra-processed foods alongside reduced physical activity have driven sharp increases in obesity and non-communicable diseases (NCDs) (Hashad et al., 2024; Westbury et al., 2021). These trends create the simultaneous presence of undernutrition and overnutrition within populations—the "double burden of malnutrition"—now observed in at least one-third of LMICs (Popkin et al., 2020). When including micronutrient deficiencies, this refers to the triple burden widely recognized as the prevailing issue across Southern countries (Development Initiatives, 2018; Global Panel, 2016; HLPE, 2017).

Equity is central to achieving food and nutrition security. This requires ensuring that affordable, safe, and nutritious foods are accessible to all, including vulnerable groups (Davis et al., 2022; Marrero et al., 2024). This is particularly pressing in LMICs where significant disparities exist among communities, families, and individuals across geographic and socio-economic backgrounds. As LMIC food supply chains are dominated by traditional, small-scale producers and distributors, a critical concern

involves relationships between traditional actors and emerging modern chains (Reardon & Hopkins, 2006). Key research questions address how smallholders can be included in and benefit from modern supply chains and standards, and how to overcome barriers that prevent their participation (Glasbergen, 2018; Kulke et al., 2016; Meemken, 2020; Swinnen, 2007).

Food systems in LMICs contribute significantly to global environmental challenges including climate change, deforestation, biodiversity loss, and resource depletion (Crippa et al., 2021; Springmann et al., 2018). The impacts of food systems on local environments are frequently highlighted, yet comprehensive reviews of these impacts remain limited. Studies on LMIC food systems also focus on the cross-cutting issues of food safety and disease risks (Ortega & Tschirley, 2017; Unnevehr, 2015). Recent studies highlight health and socio-economic shocks from disease outbreaks originating in informal animal-sourced food supply chains - concerns amplified during COVID-19 - raising urgent questions about biosecurity, antimicrobial resistance in livestock production, and the sustainability of traditional wet markets and informal chains (Bardosh et al., 2023; Pires et al., 2021; Waage et al., 2022).

1.3.2. Vietnamese food systems as the case studies

The previous subsection provided an overview of agri-food system transitions in LMICs. This subsection introduces Vietnam as the primary case study, examining how its food systems exemplify broader LMIC transition patterns while presenting unique features that necessiate further investigation.

A brief introduction on Vietnamese food systems

Vietnam is a tropical country in mainland Southeast Asia with diverse terrain including extensive mountains and hills (covering two-thirds of its 330,000 km^2 land area), fertile river deltas (the Red River Delta in the North and Mekong Delta in the South), and narrow coastal lowlands in the Central region (***Figure 1.3***). Its humid, monsoonal climate varies considerably between the subtropical North (with four distinct seasons including a cold, dry winter) and the tropical South (with year-round high temperatures and distinct

wet and dry seasons). This varied geography, abundant water resources, and fertile soils support Vietnam's robust and diverse agri-food systems.



Figure 1.3 *Map of Vietnam*

Source: Author using QGis

Politically, Vietnam is a socialist republic with a centralized political structure, yet it has undergone significant market-oriented reforms - known as *Đổi mới* - since the late 1980s. These reforms have driven rapid economic growth, urbanization, poverty reduction, and deeper integration into global value chains, reshaping both rural livelihoods and the country's food systems. As of 2025, Vietnam is a middle-income

economy with a GDP per capita of nearly $5000 and an annual growth rate of approximately 5.6% (IMF, 2025). Of its population of 100 million, about 39% now live in urban areas, a gradual increase from 20% in 1990 (World Bank, 2024).

Vietnam's agri-food systems reflect key LMIC transition patterns: accelerated urbanization and economic development, significant agricultural output growth (see ***Figure 1.2***), rapid supermarketization, and changing consumption patterns. Thanks to production intensification and extensification, the country is a world leading producer and exporter of many agri-food products, from rice – the traditional and dominant staple – to fruits, vegetables, and cash crops (coffee, tea, pepper, cashew) (Dao & Nguyen, 2022). Vietnam also experienced significant growth in aquaculture (especially shrimp and catfish in the Mekong Delta) and livestock production in the last several decades (Hanh, 2022; Tri et al., 2022), in response to increasing domestic demands for animal-sourced foods and exports (Hansen, 2018).

Simultaneously, the midstream and downstream segments of Vietnam's food systems[4] have undergone modernization, marked by the proliferation of supermarkets, hypermarkets, and convenience stores, spurred by both foreign and domestic investment and often supported by proactive retail modernization policies (Maruyama & Trung, 2012; Nguyen et al., 2013). Yet, like many LMICs, Vietnam's agri-food transition is not linear nor complete. Traditional small-scale actors such as wholsalers, traders, wet markets, and street vendors remain predominant in food distribution, especially for fresh produce (Wertheim-Heck et al., 2019). This persistence of informality exists alongside the growing standardization and formalization, creating a mixed system that reflects both modernization pressures and deeply embedded socio-cultural practices.

[4] Throughout this thesis, Vietnam's food systems are referred to in the plural to reflect the co-existence of modern, mixed, and traditional systems within the country.

Why Vietnam offers critical case studies

Vietnamese food systems showcase globally shared characteristics exemplifying LMIC agri-food transitions. However, Vietnam also presents distinctive features making it particularly compelling for investigating the Missing Middle.

First, traditional diets remain resilient: while diets in many countries are gradually shifting ('Westernization' and 'meatification), Vietnamese diets are still dominated by traditional rice-based meals with high quantities of fresh vegetables, herbs and healthy protein-rich foods like fish and lean pork. Vietnamese consumers have continued preferences for freshness in perishable foods (Wertheim-Heck, Vellema, et al., 2014), distinguishing Vietnam from LMICs where dietary transitions have proceeded more rapidly.

Second, smallholders and informal markets persist as dominant forces. Much output from Vietnam's robust food supply chains is delivered by small-scale producers and processors. Wet markets and local vendors remain central for food access, especially for fresh foods. Daily shopping at wet markets remains common practice despite emerging supermarkets and internet shopping, reflecting the horizontal dimension of the Missing Middle where traditional and modern systems coexist with limited integration.

Third, Vietnam exhibits complex institutional and governance arrangements. The country has distinct governance models combining strong central government with decentralized implementation and considerable room for private sector coordination. This creates unique dynamics in how food system reforms are introduced, enforced, and adapted locally to address national and local challenges, directly relevant to understanding the vertical dimension of the Missing Middle.

Beyond these distinctive features, Vietnam faces multiple challenges similarly highlighted in other LMICs. Despite progress in food security and nutrition, the country confronts the triple burden of malnutrition: persisting undernutrition in remote and ethnic minority regions alongside rising obesity, overweight, and NCDs (Raneri et al.,

2019). Persistent food safety issues remain despite significant efforts to manage pesticide use (Hoi et al., 2016) and re-enforced food safety controls (Nguyen-Viet et al., 2017). The development of domestic and imported animal-sourced food supply chains with insufficient biosecurity management has made food systems vulnerable to disease outbreaks. Livestock diseases including Avian influenza and African swine fever, along with zoonotic pandemics like COVID-19, have caused critical shocks to supply chains, threatening food security, health, and rural development (Dao & Nguyen, 2022).

Vietnam has demonstrated commitment to addressing these challenges. SDG2 targets and global visions for sustainable food system transformation are enshrined in recent policies, including the Zero Hunger programme (2018-2025)[5], and the National Action Plan on Food Systems Transformation towards Transparency, Responsibility and Sustainability until 2030 (NAP-FST).[6] The latter, approved in 2023 as Vietnam's national effort to translate the UNFSS food system transformation roadmap into concrete action, explicitly highlights the need to explore the status of Vietnam food systems and the challenge of local implementation.

It is necessary to emphasize how the research landscape of Vietnamese food systems has developed rapidly in recent years. Traditional research has concentrated on agri-food production and supply chains, examining smallholder farming practices, agricultural intensification, value chain integration, and market access challenges (Cadilhon et al., 2006; Everaarts et al., 2008; Hoi et al., 2016; Huong et al., 2013a; Lemke & Valle Zárate, 2008; Tisdell, 2009). Other studies have focused on dietary patterns and health outcomes, analyzing the nutrition transition, the triple burden of malnutrition, non-communicable diseases, and socio-economic determinants of food and nutrition security (T. V. Bui et al., 2016; Raneri et al., 2019; Thang & Popkin, 2004;

[5] Decision No. 712/QD-TTg dated 12 June 2018 promulgating the National Programme of Action for "Zero hunger" in Vietnam until 2025.
[6] Decision No.300/QD-TTg dated 28 March 2023 on Approval of the National Action Plan to Transform a Transparent, Responsible and Sustainable Food System in Vietnam by 2030

Trinh et al., 2019). Some other work has examined consumer behaviors and preferences, exploring how food safety and nutrition are embedded in daily consumer practices and broader contexts (Tran & Sirieix, 2020; Wertheim-Heck et al., 2019; Wertheim-Heck & Spaargaren, 2016), exploring the factors affecting the consumption of nutritious, safe and sustainable products (De Filippo et al., 2021; Hai et al., 2013; My et al., 2017; H. V. Nguyen et al., 2019; Truong et al., 2021). A small but growing body of research focuses on food environments, examining how retail modernization and traditional markets shape food access and dietary choices (Even, Crawford, et al., 2024; Even et al., 2025; Nguyen et al., 2021). Notably, an increasing number of studies have adopted holistic food system approaches to assess dynamics across urban and rural contexts, in connecting changes in supply chains, consumption, policy contexts and food system outcomes (Bairagi et al., 2020; Hansen, 2018; Hoang et al., 2025; Vuong et al., 2023).

However, critical knowledge gaps remain regarding the Missing Middle. Food research remains primarily fragmented across disciplinary boundaries, while linkages between supply and consumption and other food system elements are understudied. There is also a lack of research connecting dynamics across levels in understanding how global and national agri-food agendas affect local food practices. Emerging dynamics within existing Vietnamese food systems, including sustainable and alternative food networks, are still underexplored, with little understanding of their scaling pathways and potentials. Addressing those gaps, through exploring the Missing Middle concept, is valuable for identifying interventions that tackle actual barriers - rather than isolated symptoms - within Vietnam's complex food systems, and informing strategies of engaging with existing socio-cultural and institutional realities to support transformation goals.

1.4. Analytical frameworks

To investigate the Missing Middle in Vietnamese agri-food system transitions, this thesis integrates two complementary middle-range theories: transition theory and practice theory. Transition theory, specifically Multi-Level Perspective (MLP) and Strategic Niche

Management (SNM), analyzes systemic transformations by examining interactions across scales. Practice theory provides micro-level perspective on everyday routinized behaviors of individuals. Together, these frameworks illuminate complex interactions between dynamics and actors at different food system segments and levels, revealing the Missing Middle.

1.4.1. Transition theory

Transition theory offers frameworks to analyze fundamental shifts (transitions) in socio-technical systems. According to the Multi-Level Perspectives (MLP), socio-technical systems include dynamics at three analytical levels: socio-technical landscape (macro-level), regimes (meso-level), and niches (micro-level). Landscapes represent broad contextual factors, such as urbanization, demographic changes, and macroeconomic policies. Regimes are stable, dominant systems characterized by established practices, regulations, and norms that are self-reinforcing and resistant to radical changes through path dependency and lock-in mechanisms. Niches refers to spaces where novel innovations and alternative practices are protected against the regime competition, enabling them to grow and emerge. In the thesis, the three levels of landscapes, regime and niches will be employed to assess food systems (considered as socio-technical systems), integrated with the components of the food system concept.

MLP facilitates understanding transitions by examining how cross-level interactions lead to regime shifts. Landscape pressures, including shocks, can disrupt regime functions, forcing adaptation or reorganization. Niches, if sufficiently supported, can leverage 'windows of opportunity' to challenge regimes, initiating fundamental system changes. Analyzing historical and ongoing transitions of Vietnamese food sectors (vegetables and pork) provides essential insights into enablers or barriers supporting or hindering food system change (Chapter 2).

Strategic Niche Management (SNM) explains mechanisms through which niches diffuse into mainstream regimes. SNM emphasizes three internal processes, articulating shared expectations, building networks, and reflective learning, as critical

for niche growth. SNM also considers diffusion pathways through growth, replication, accumulation, and translation into broader systemic changes. The thesis examines two cases of Vietnamese agri-food niches including VietGAHP certifications for safe pork and PGS for organic vegetables (Chapter 5), highlighting their development processes, strategies, and challenges influencing integration into mainstream regimes.

1.4.2. Practice theory

While transition theory addresses cross-level dynamics of food system components, practice theory focuses on the everyday practices performed by food actors. Practice theory considers routinized behavours (practices) as the main unit of analysis instead of indvidual actors, assuming that everyday actions of such actors often follow a shared, habitual, taken-for-granted manner (Reckwitz, 2002).

Practices comprise three interconnected elements: materials (physical objects, infrastructure, technology), competences (skills, knowledge, practical understanding), and meanings (symbols, norms, motivations) (Shove et al., 2012). The thesis examines how agri-food actors adopt, sustain, or alter specific practices, focusing on practice changes such as adopting food safety, biosecurity, or agroecological measures, and how these dynamics are shaped by interactions. Chapter 3 examines practices toward safer vegetable production; Chapter 4 analyzes practice interactions among pork producers and distributors in the context of African swine fever biosecurity threats.

Both Chapters 3 and 4 combine practice theory with transition theory to explain agri-food system dynamics at multiple levels—from shifts in structures and networks to changes in daily realities of individual and collective actors. Both theories highlight how new solutions or practice adjustments are introduced, reproduced, diffused, normalized, resisted, or replaced over time. By intersecting practice changes and the dynamics of food system components across levels, the thesis illuminates key points of conflicts and misalignments among the dynamics that characterize the Missing Middle.

1.5. Research objectives and questions

As introduced above, the thesis aims to explore the Missing Middle in the contexts of food system transitions in LMICs, especially in the case studies in Vietnam. It seeks to characterize different aspects of MM, including its production-consumption and global-local axis, in order to gain critical understandings of the systems lock-ins and barriers that hinder the adoption of solutions that address food system sustainability challenges. By doing this, the research will help propose coordination mechanisms that address the lock-ins, as well as potential conflicts and misalignments, in order to foster collective actions that support the implementation of sustainability goals.

The primary research question of the thesis is:

How can the Missing Middle be understood, analyzed, and addressed to support sustainability transitions of food systems in LMIC contexts?

Applying the lenses of transition and practice theories in the case studies, the question is further explored through three sub-questions:

1) What patterns, drivers, and issues have been shaping the historical and ongoing transitions of LMIC food systems? (Chapter 2)
2) How have practices among various regime actors - producers, distributors and consumers –shifted and interacted to influence food system outcomes? (Chapter 3 and Chapter 4)
3) What are the strategies of niche networks that help connect sustainable food production with consumption to address system barriers and support sustainability transitions? (Chapter 5)

The research sub-questions are addressed through four empirical chapters. Using the cases of pork and fresh vegetable networks in Vietnamese food systems and drawing on practice theory and transition theory, each chapter targets a specific dimension of the Missing Middle across the production-consumption and global-local axes (***Figure***

1.4). Chapter 2 sets the foundation by analyzing Vietnam's historical and ongoing food systems, in connecting the broader socio-economic and policy landscapes with dynamics of food system components. This chapter focuses on the (missing) interactions between landscape-level and regime-level dynamics.

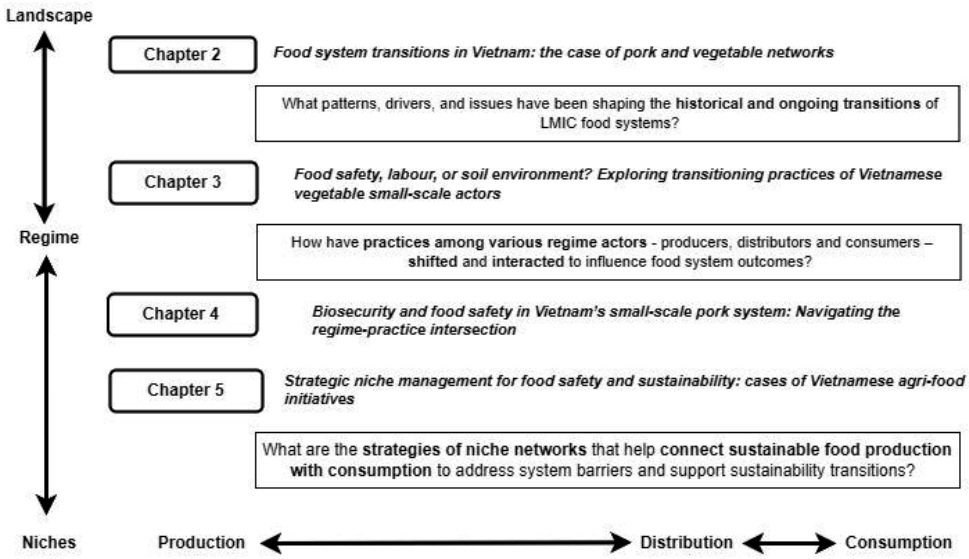


Figure 1.4 *Overview of the chapters and reseach questions*

Chapters 3 and 4 delve into the dynamics at the regime level. Focusing on practices of vegetable smallholders, Chapter 3 explores how practices of different actors – particularly small-scale vegetable producers and distributors – have shifted for navigating issues of food safety, labor, and environmental sustainability. Chapter 4 examines the intersection of regime practices within smallholder pork systems, highlighting how evolving practices across production, distribution, and consumption shape biosecurity and food safety outcomes. These chapters collectively respond to the second sub-question, highlighting the regime-regime interactions in responding to emerging sustainability needs.

Lastly, Chapter 5 moves toward the niche level, analyzing how innovative agri-food initiatives such as certification schemes have developed and diffused into mainstream food systems. It responds to the third sub-question by examining the strategic

development of niche networks that connect sustainable production to consumer engagement, highlighting the regime-niche interactions.

Each chapter will further highlight potential missing linkages, mislignments, or lock-in mechanisms that could further illustrate the Missing Middle.

1.6. Methods

1.6.1. Selecting case studies

This research adopts a qualitative case study approach to explore agri-food system transitions and the Missing Middle in Vietnam. The study focuses on two essential food commodity systems – pork and vegetables – which have significant dietary and socio-economic relevance, while facing prevailing challenges of food safety that affects health of producers, consumers, animals and the environment.

Within such food commodity systems, the research explores different networks, both mainstream and alternative, across rural, peri-urban and urban settings. For pork production, I select the smallholder pork system in Hung Yen Province, which includes both mainstream and niche (safe) production. For vegetable production, the reseach explores the networks in Dong Anh and Soc Son districts, both located in Hanoi, to represent the mainstream and alternative production systems (organic production). For distribution and consumption, the research scrutizes Tien Lu (Hung Yen), Dong Anh, and Cau Giay (both in Hanoi), representing rural, peri-urban, and urban areas. All the cases are located in Northern Vietnam. The selection of cases was done with the support of local partners of the Missing Middle project and the CGIAR Agriculture for Nutrition and Health (A4NH) programme.

1.6.2. Data collection and analysis

Table 1.1 *Overview of research methods deployed in the thesis*

Research method	Research subjects	Chapters
Scoping literature review	Dynamics in pork and vegetable systems (production, distribution, consumption, policy and support structures)	2

Desk review	Background information on pork and vegetable systems & agri-food niche initiatives	3, 4, 5
Semi-structured interviews	Changing practices & performances of pork and vegetable actors; Strategies and challenges of agri-food niches	2, 3, 4, 5
Survey	Changing practices of pork and vegetable actors	3, 4
Observation	Practices of pork and vegetable actors	3, 4
Thematic media analysis	Reflections on strategies and challenges of agri-food niches	5

The research is primarily qualitative, using methods such as desk review, scoping literature review, semi-structured interviews, observation, surveys, and thematic media analysis (***Table 1.1***). Fieldwork was conducted between 2020 and 2022. Interviewees included smallholder producers, traders, retailers, cooperative leaders, government officials, and members of niche initiatives.

Chapter 2 employs a scoping literature review utilizing academic, policy, and grey literature about dynamics of pork and vegetable production, distribution, consumption, and related policies and support structures. Combined with ten in-depth interviews with experts and key informants, the review provides contextual insights on historical and ongoing transitions in the pork and vegetable sectors.

Chapter 3 and 4 combine desk research, qualitative interviews, participant observation, and a structured survey to investigate small-scale vegetable and pork practices. Among them, semi-structured interviews are used as the main method, as it enables the interviewees to provide detailed information on how practices are excerised and articulated, and track down practice dynamics over time. The respondents were selected using different sampling methods, with producers selected using purposive snowball sampling with support from local authorities, while distributors and consumers are selected via convenience sampling at market sites. In addition to interviews, surveys and participant observation were also conducted. Surveys comprise simpler questions about the performances of practices and the interviewee's self-awareness of practice dynamics. Interviews and surveys were

supported by observation, yet this is limited for pork practices due to COVID-19 restrictions and biosecurity concerns.

Chapter 5 uses a qualitative case study design to explore two sustainability-oriented initiatives: PGS (for vegetables) and VietGAHP (for pork). Data sources include a desk review, 20 semi-structured interviews with diverse stakeholders (farmers, initiative staff, retailers, government officials), and social media contents (e.g., YouTube seminars).

All qualitative data, including interviews, documents, and media, were transcribed and analyzed using Atlas.ti. A combination of deductive and inductive coding was applied, guided by conceptual frameworks presented in each chapter. In Chapter 3 and 4, the analysis followed a 'zoom in' and 'zoom out' strategy - zooming in on practices and their constituent elements, and zooming out to connect these dynamics to broader structural and institutional transitions. Validation was supported through stakeholder consultation meetings and the triangulation of different data sources.

1.7. Thesis outline

The remainder of this thesis is structured as follows. Chapter 2 provides a contextual overview of agri-food system transitions in Vietnam, identifying key drivers and patterns in the pork and vegetable sectors. Chapter 3 examines transitioning practices of small-scale actors in vegetable supply chains, focusing on how food safety concerns are embedded in everyday routines. Chapter 4 explores transitions in smallholder pork systems, with attention to how biosecurity and food safety are embedded in practice dynamics among producers and distributors. Chapter 5 analyzes two niche initiatives - PGS for organic vegetables and VietGAHP for safe pork - to understand how they internally develop and externally interact with regime components, and what systemic barriers they face. Chapter 6 synthesizes findings to address the overarching research question about the Missing Middle, while discussing theoretical and practical implications and directions for future research.

2

Food system transitions in Vietnam: the case of pork and vegetables networks

Abstract

Vietnamese food systems have experienced a transition process since the late 1980s *Đổi mới* reforms. This chapter examines the historical and ongoing transitions of pork and vegetable networks, using the Multi-Level Perspective (MLP), the Multi-Pattern Approach (MPA) and insights from food systems research. Our findings show that there was a shift from collective and self-subsistent farming to commercial small-scale farming in the late 1980s, and a rapid institutionalization of smallholders and wet markets in the early 1990s. We argue that the current slow transition of the smallholder food regime towards improved food safety and standardisation has been locked in by the strong alignments of actors, practices and cultural values that support small-scale, fragmented production and distribution. The study suggests that those practices, values, and the needs and interests of smallholder producers and food consumers should be carefully considered when implementing transition agendas toward food safety, security, and sustainability.

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2.1. Introduction

Vietnamese food systems have changed significantly over the last fifty years. After the reunification of North and South Vietnam in 1975, a period of more than ten years of centrally planned economic policies followed. In 1986, the country momentously embraced a market and trade liberalisation policy. These economic reforms of the late-1980s (known as *Đổi mới*) initiated a long-term transition process concerning food production and consumption as well as their drivers and outcomes. Today, Vietnamese food systems are faced with a critical challenge: they need to produce sufficient and healthy food for a growing and increasingly wealthy and urbanized population while mitigating adverse environmental impacts and addressing food safety concerns. This is especially important since Vietnam signed the Sustainable Development Goals (SDGs) in 2015, including SDG2 which calls to improve food and nutrition security and promote sustainable agriculture. Lessons from previous transition experiences may inform this transformation process.

Historical transitions of food systems in Vietnam have received considerable academic attention, concerning the trends in specific food commodities (Hoi, A. P. J. J. Mol, et al., 2009; Lebel et al., 2002; Niimi et al., 2004), and the impacts of retail modernisation on smallholder farmers and urban consumers (Cadilhon et al., 2006; Wertheim-Heck et al., 2015). Such studies have connected the dynamics of specific food system components with macro-level global or national settings and micro-level everyday situations. However, there are currently no studies analysing the cross-level transition dynamics in food systems.

Hence, this study aims to document, characterise and discuss the multi-level transition dynamics of Vietnamese food systems. It builds on the conceptual framework of *socio-technical transition* (Markard et al., 2012) combining historical accounts of completed transitions and an analysis of the patterns, drivers, and lock-ins of ongoing transitions to learn what may shape the directionality of future transitions (Arapostathis & Pearson, 2019; Arranz, 2017). In food systems research, such a combined approach helps comprehend alternative scenarios for future food systems

and propose coordinated actions to navigate transition pathways towards enhanced food security, safety, and sustainability (Brooks & Place, 2019).

Food systems refer to all elements and activities related to the production, storage, processing, distribution, consumption, and disposal of food and the socio-economic, health, and environmental outcomes (Ericksen, 2008; HLPE, 2017). In the current study, this framework is applied to study two important fresh food supply chains: pork and vegetables. This selection is based on the Vietnamese people's preference for these fresh products, as well as their significant nutritional and food safety implications. Both the pork and vegetable sectors have experienced rapid growth since the 1990s (Johnson et al., 2008; Lapar, 2014) but are still struggling with food safety risks, including pesticide overuse for vegetables and microbial contamination for pork (Dang-Xuan et al., 2016; Hoi et al., 2016).

This chapter seeks to answer the question: *"What are the key drivers and issues that characterise the historical and ongoing transitions of fresh pork and vegetables in Vietnamese food systems?"* In answering this question, we start by elaborating on the theoretical background (Section 2), continuing in section 3 by presenting the methodology used in this study. In section 4, we show the dynamics of food system components across multiple levels in different periods in order to examine the drivers and patterns of these transitions. We then reflect in section 5 on several key characteristics of the transition process of Vietnamese food systems and the prospects of steering their transitions towards sustainability goals.

2.2. Theoretical background

2.2.1. The Multi-Level Perspective in food system transitions

This study utilises the transition theory and in particular the Multi-Level Perspective (MLP) framework to analyse food system changes and their drivers. Transition theories utilise interpretations and learning when addressing the compound, interrelated dynamics of socio-technical systems (STS). Originally used to denote the interactions between people and technologies in workplace settings, the concept of STS is expanded to refer to all interlinked elements - social-economic, physical, technical,

cultural and cognitive – to fulfil certain societal functions like transport, energy, and food supply (Geels, 2004; Hinrichs, 2014). The MLP framework states that transitions in socio-technical systems occur as a result of complex dynamics within and between niches, regimes, and socio-technical landscapes (Geels, 2011).

A *regime* is the dominant and incumbent part of the STS - a coherent and dynamically stable configuration of elements that fulfil most related societal functions. *Niches* are less stable and coherent, unable to play a major role, and led by smaller networks of actors, but they have the potential to innovate, develop and transform a system (Holtz et al., 2008; Smith & Raven, 2012). Nonetheless, in many socio-technical systems including food systems, there is no clear separation between the two levels (Karanikolas et al., 2014). Some authors thus propose a hybrid category – *niche-regimes* – to denote empowered niches which contribute significantly to fulfilling societal functioning but cannot replace the dominant regime yet (Grin et al., 2010). Still, regime, niche-regimes and niches are embedded in broader, macro-level *socio-technical landscapes*, referring to the 'exogenous' factors and trends that are beyond the direct control of the regime and niche actors.

A regime is characterised by lock-ins and path-dependence, as mainstream actors prefer existing patterns in production and consumption and resist radical novelties (Geels, 2004). Transitions only arise when the regime is destabilised by internal tensions within the regime, through external pressure from landscape movements and niche activities, or a combination of the two (Frantzeskaki & de Haan, 2009). These situations of instability create 'windows of opportunity' for niches to gain power, making them competitive enough to rival or even replace the regime (*fit-and-conform*) or diffuse and facilitate the restructuring of the regime in favour of the niche (*stretch-and-transform*) (Smith & Raven, 2012).

Four pathways that a transition process can follow based on the timing and nature of interactions among various dynamics across levels are described ((Geels & Schot, 2007)): transformation, de-alignment and re-alignment, technological substitution, and reconfiguration. However, this classification requires a clear temporal demarcation

of transitions, i.e. to specify when a transition begins and ends; and not every transition can fit into a certain type of pathway. (Geels et al., 2016) note that pathways are only 'ideal types' and 'not deterministic', so transitions can shift between pathways depending on how regime actors perceive and respond to local problems.

Therefore, we adopt the Multi-Pattern Approach (MPA) to analyse the transition process. The MPA, proposed by de Haan & Rogers (2019), is not separate from the MLP but a complementary approach to analysing transition pathways. It provides a tool to break down pathways into (sequences of) *patterns*, defined as ideal-typical types of system change. Patterns can be used to characterize changes in regimes, niches, and niche-regimes, which the MPA mutually regards as 'constellations' (de Haan & Rotmans, 2011). Under the specific local *conditions* of societal needs and constraints, constellations can follow three patterns: (i) *adaptation*: adjust its functioning through adoption, re-organising or phasing out, (ii) *empowerment*: emerge, gain power, and proliferate, (iii) *intervention*: adapt or empower due to the interference of external agents outside of the system (e.g. supranational or national policies). The usage of MPA is justified by its flexibility to systematically unfold the complex, interrelated transition dynamics and the driving societal conditions, without the obligation to temporally demarcate and classify the whole transition process. Nonetheless, the pathways can still be delineated if a confluence of patterns is found when mapping the storylines (de Haan & Rogers, 2019).

In applying the MLP in food system research, one of the major challenges is how to unpack the components of food system regimes in the context of transitions, given the complexity of the structure and the multiplicity of functions of food systems (Karanikolas et al., 2014). Here we apply Gaitán-Cremaschi et al. (2019), who distinguish three regime/niche components: (i) agricultural production systems, (ii) value chain systems, and (iii) support structures. We find this framework valuable for its systemic categorisation of food production and supply chains; however, it lacks an adequate consideration of consumer behaviours and diets which play an essential role in shaping downstream food systems (Spaargaren et al., 2012).

2.2.2. Analytical framework

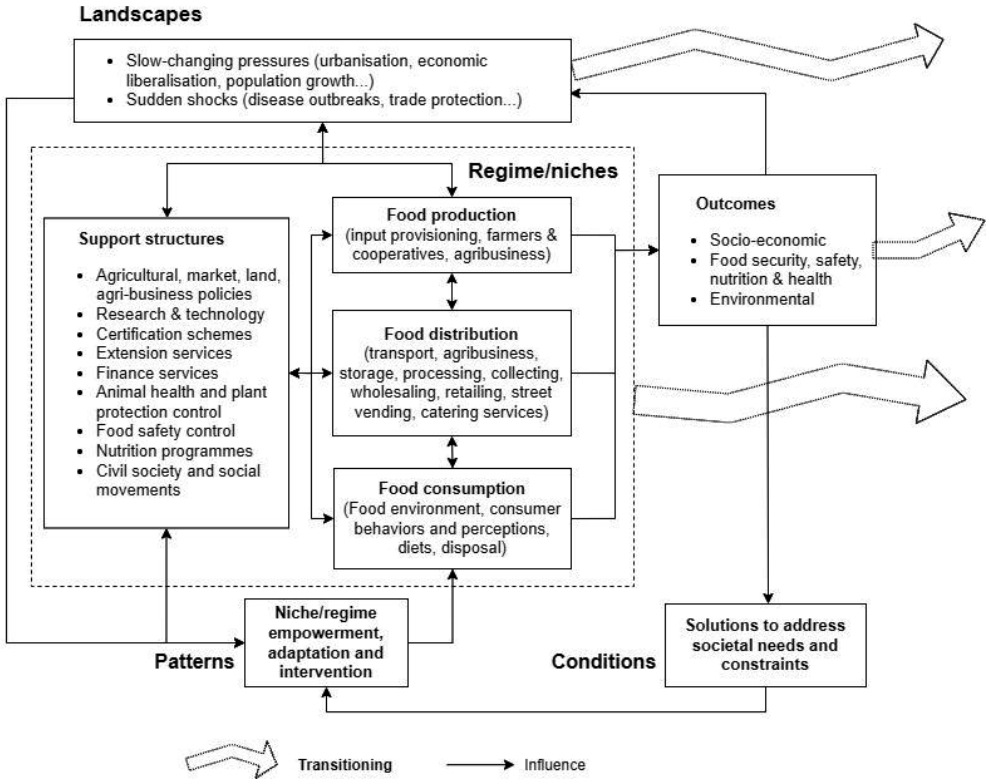


Figure 2.1 *Analytical framework*

For our analytical framework (***Figure 2.1***), we combine MLP and MPA with the conceptual framework of food systems, inspired by HLPE (2017) and Gaitán-Cremaschi et al. (2019). We used the term 'food networks' to denote the regime/niche part as the main unit of analysis, which constitute the entire food systems but can only be responsible for parts of their functions. Food networks[7] are composed of four major components: (i) food production, (ii) food distribution, (iii) food consumption, and (iv) support structures, although not all niches and niche-regimes comprise all four

[7] 'Food network' was used instead of the MPA term 'constellation', which is not familiar to food studies. In using the term 'food network' to denote niches or regimes, we do not specifically refer to "alternative food networks" studies but to the broader agri-food literature that also uses the term like 'urban/rural food networks' or 'local food networks'.

components. Even being placed in the same position, niches differ from the dominant regime, depending on the stability and size of the food network, and on whether their key role is to satisfy the majority of societal demands (regime) or to nurture innovations (niches).

Support structures encompass institutions, organizations, and programmes that underpin domestic food activities but sometimes they overlap with landscape factors (e.g. authorities and governance) (Schot & Kanger, 2018). The framework also integrates the *conditions* for change (drivers), *patterns* of change and food system *outcomes*, as proposed by MPA, to explain the trajectories that food systems go through. This is based on the assumption that change and stability in regimes/niches always involve the agency of actors (Grin et al., 2011), and that their dynamics increase when incumbent regimes lose their capabilities to fulfil societal needs and overcome constraints. Conditions for change are influenced by feedback from food system outcomes through changes in socio-cultural, economic and environmental landscapes, as well as political and institutional responses (Ericksen, 2008; HLPE, 2017). To address societal needs and constraints, the regime/niche dynamics can unfold along with three possible and mutually exclusive patterns, namely: *adaptation*, *empowerment*, and *intervention*. Lastly, the study briefly examines evidence of changes in food system outcomes, e.g., food/nutrition security and health (including food safety), socio-economic welfare (smallholder inclusion) and environmental wellbeing, through the lens of achieving the SDG2 goals, to further understand societal conditions for transitions.

2.3. Methodology

Our research is qualitative as we document and synthesise how the dynamics of Vietnamese food system components, landscapes, and outcomes, are interpreted by experts, key informants, and scientific literature. We use the conceptual framework, presented in Section 2.2.2, to conduct data collection and analysis, which consists of several steps as presented in ***Figure 2.2***.

A scoping literature review was carried out on multiple aspects of agri-food transitions, using PRISMA-ScR (Tricco et al., 2018). We also included grey literature and non-

academic sources using Google Search. Statistical information on food production, export and import, was retrieved from the databases of FAOSTAT (2020), GSO (2020) and MARD (2020) (accessed in May 2020). Legislative and normative documents were searched in the Ministry of Justice database (vbpl.vn), based on the references from the included studies.

We included only documents in English or Vietnamese that contain references to dynamics in (pork and vegetable) food system components with broader discussions of socio-economic, political, and technological settings (i.e., excluding those focussing only on technical aspects). Two authors independently conducted the steps of screening and data charting.

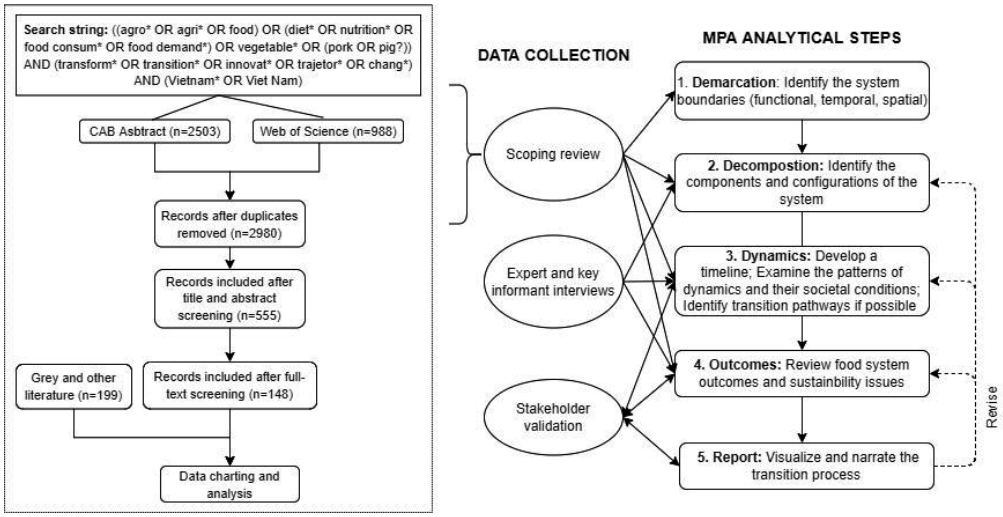


Figure 2.2 *Steps of data collection and analysis*

In addition to the scoping review, the study also included in-depth interviews with four experts and six key informants to collect further qualitative data about the food system dynamics. Experts include those with at least ten years of direct experience in the pork and vegetable supply chains. The key informants comprised cooperative leaders, wholesalers, and farmers. CIAT and ILRI's networks in Vietnam supported the selection of interviewees (See ***Appendix 2.1*****).**

After the data collection, the study followed the steps of MPA analysis shown in ***Figure 2.2***. Firstly, the boundaries of the studied system were delineated and its components were identified and characterized. Next, the charting form and interview transcripts were analysed to identify the dynamics of the food networks and their associated landscapes. Some key trends, as referenced in the literature (Béné, Prager, et al., 2019; Kearney, 2010; Swinnen & Maertens, 2007) characterise these dynamics, which we also mapped in a timeline to identify the major phases of the transition process. We hence reflected on the conditions and patterns of change in each phase. Finally, we discussed the pathways of food systems transitions in Vietnam and the implications for sustainability. The results were validated through discussion with our local partners (CIAT & ILRI) as well as three stakeholder workshops, comprising experts and practitioners in agri-food, retailing and nutrition in Vietnam (see

Appendix 2.2). We revised our findings based on the comments from the participants.

2.4. Results: Vietnamese food system transitions (1975-2019)

Demarcation

The study analyses the two separate yet overlapping systems of fresh pork and vegetables in Vietnam. The temporal boundary is from the reunification of Vietnam in 1975 to the present (2019). The spatial limitation is the territory of Vietnam, although the focus is on major production and consumption areas in large deltas rather than the non-representative areas like remote mountains or islands. Functionally, the two systems include all actors, infrastructures, institutions, and organizations related to the provisioning of pork and vegetables. The two systems are separate in terms of production networks (with farmers being increasingly professionalised to produce single commodity type), but overlap in components like distribution networks (e.g. wet markets and supermarkets) or support structures (e.g. extension agencies).

Decomposition

Based on the scoping reviews and expert interviews, we identified several food networks that constitute the pork and vegetable systems and characterized their

institutional arrangements (***Table 2.1***). In each network, the actors can adopt a variety of solutions – technological or institutional measures – to address societal needs and constraints. Improvements in the technology of breeding, feeding, disease prevention, and waste management (for pork), or seeding, fertilization, plant protection, or soil restoration (for vegetables) could be introduced and implemented in many networks to different extents. Innovations can also involve shifts in organizational and cultural aspects, for example, the Integrated Pest Management (IPM) approach in vegetable production or all-in/all-out pig production. The information from ***Table 2.2*** can be used to illustrate the emergence and change of those networks over time, as elaborated in the next section.

Table 2.1 *Food networks in transitioning Vietnamese pork and vegetable systems*

Networks	Composition	Institutional characteristics & aims	Solutions
Pre-1993 systems			
Collective systems	Agricultural cooperatives, supply/marketing cooperatives, state farms, state trading agencies	A network of state-controlled agencies and farmer organizations that nearly monopolize the production and trade of some agri-food products, to modernize agricultural production.	Large-scale farms; Central planning; Mechanization
Small-scale private systems	Household farms (5% of total cooperative land); informal and formal markets; Local experiments of 'household contracts'	Family farming and private trading with the aim to improve food quantity and income (after fulfilling state quotas);	
Support structures			
Public	Extension services; Credit services; Research institutes and universities; Food safety, animal health and plant health management departments;	A network of state-controlled institutions, providing a wide range of agricultural services yet focusing more on food production technology transfer.	Enhanced breeds and seed varieties; Improved food safety, plant protection and veterinarian measures; IPM protocol;
Private	Informal and private credit networks;	Agricultural services provided by private sector,	Rural microcredit; Improved fertilization and

	Private extension services; Non-government organizations;	focusing more on marketing information, microcredit and animal nutrition; NGO works in cooperation with the government;	feeding technologies; IPM protocol;
Production systems			
Conventional vegetable	Smallholder farmers	Farmers with small landholdings, producing uncertified vegetables for both subsistence and commercial purposes	Enhanced seed varieties; Improved fertilization and feeding technologies; Soil remediation; Crop rotation; Mechanization;
Safe vegetable	Smallholder farmers; Safe vegetable cooperatives;	Small-scale farmers located in designated safe production zones in peri-urban areas, organized into safe vegetable cooperatives; Some have contracts with supermarkets, catering services and specialty shops	Safe production zones; Safe certification schemes (RAT, VietGAP); IPM class; Bio-pesticides; Soil remediation; Crop rotation;
Organic vegetable	Organic vegetable farmers and cooperatives; Private organic farms;	Vegetable producers focusing on producing organic products with assistance from NGOs like ADDA & VOAA, some have contracts with speciality shop chains; Export-oriented enterprise-owned farms;	Biological pest control; Organic manure; Organic certification schemes (PGS)
Small & medium-scale pork	Small farms; Semi-commercial private farms;	Pig producers with small to medium-size herds (less than 100 fatteners); very few have contracts;	Enhanced breeds; Improved veterinarian measures; Improved housing & feeding facilities; Biosecurity measures; Biogas tanks; VAC system;
Large-scale pork	Commercial private farms;	Large-scale farms (> 100 fatteners), some having supplying contracts with supermarkets and intermediaries;	Mechanized facilities; Industrial housing & feeding; Strict biosecurity protocols (all-in, all-out); Enhanced breeds; Waste management system;
Distribution systems			
Small-scale processing	Small-scale slaughterers	Providing products to mostly rural markets, with little or no regulations on food safety	

Medium & large-scale processing	Concentrated medium & large-scale slaughterhouses; export companies;	Providing products to urban markets, with stricter controls on food safety, disease prevention, and waste management;	Mechanization; Disease-preventing facilities and protocols; Hygiene system; Waste management; HACCP;
Traditional supplying	Collectors; Traders; Wholesalers; Wet market retailers; Street vendors;	Networks of distributors that provide products to traditional markets throughout the country	Improved food safety control;
Modern supplying	Supermarkets; Convenience stores;	Modern retail formats, including both foreign-owned and domestic chains, located in mainly urban and peri-urban areas	Domestic and international food safety certification; Vertically integrated farms; Distribution centres; Cold storage; Online marketing;
Speciality supplying	Safe or organic specialty shops, including online shops	Chains of shops focusing on safe or organic food, mostly in urban areas	Safe & organic certification schemes; Online marketing;

Transition dynamics

In this part, we explain the main dynamics in food system components that took place between 1975 and 2019. Based on significant landscape and policy developments, we roughly split the transitions into three major phases: 1975-1992, 1993-2008, and 2009-2019. However, the distinction between the phases is not clear-cut, owing to the delayed effects of policy implementation and the gradual co-evolution of socio-economic and technological institutions.

Overall, both systems experience a continuous increase in production (except pork production in 2019). However, there are fluctuations in growth rates: vegetable production increased by 3.2% in phase one, 8% in phase two, and 4.2% in phase three. Average annual growth figures for pork are around 7.1%, 7.6% and 2.6% over the three phases, respectively (FAOSTAT, 2022; MARD, 2020). The development of both systems is associated with structural changes in production and distribution networks shown in ***Table 2.1***, under the influences of major landscape changes. We present further details of these dynamics below.

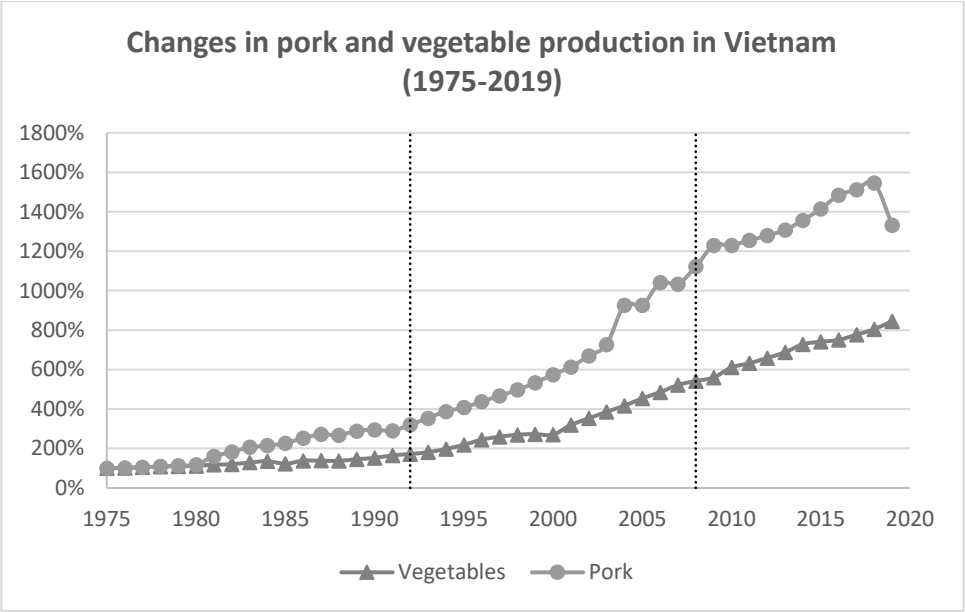


Figure 2.3 *Changes in pork and vegetable production in Vietnam*

Source: FAOSTAT (2022), GSO (2020a), MARD (2020). The dotted lines represent the demarcation between the three transition phases, i.e., 1975-1992, 1993-2008, and 2009-2019.

2.4.1. 1975-1992: From collective to small-scale farming

2.4.1.1. Landscape policies of collectivisation and de-collectivisation

Following the reunification of Vietnam, the government enacted a five-year economic plan to expand the centrally planned economy (Kerkvliet & Selden, 1998; Watts, 1998) (Figure 4). This led to the process of agricultural ***collectivisation*** when cooperatives were amalgamated and enlarged in the North and established step-by-step in the South, evolving from solidary teams to full cooperatives. The government supported the transformation of agri-food systems from small-scale to large-scale, mechanized farms while monopolizing food distribution and trade. However, the collectivisation and mechanization strategy did not succeed, mainly because of resistance and reluctance in the Southern provinces (Dang, 2018) and the decline of imported agri-inputs from the Soviet Union (Takeshima et al., 2018).

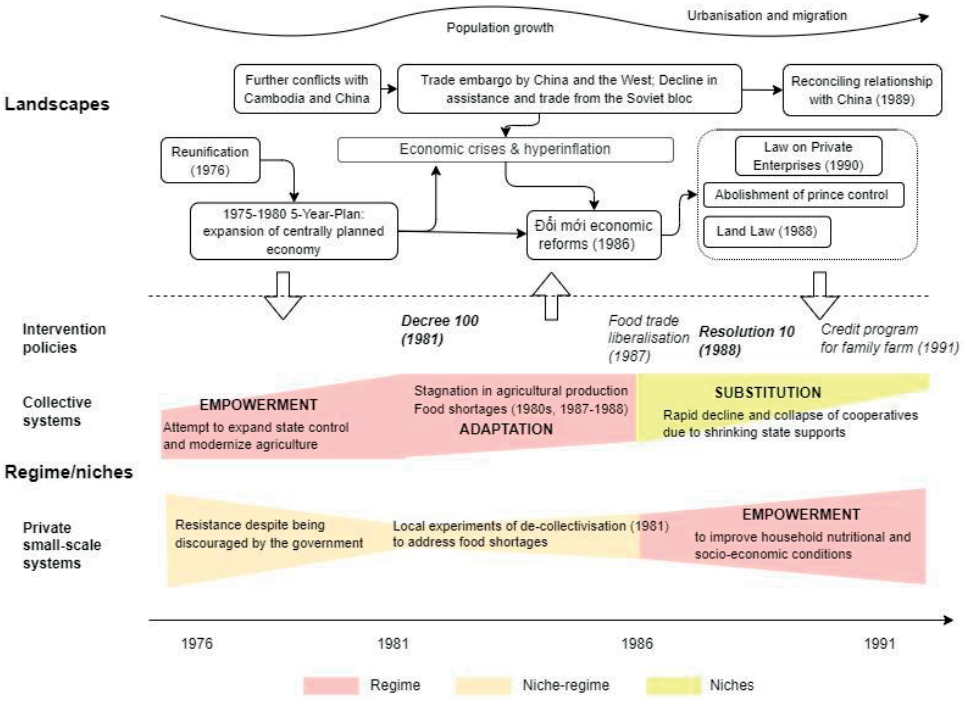


Figure 2.4 *The transition process of Vietnamese food systems in 1975-1992.*

Each block represents a food network; the change in size denotes its decrease or increase in market share. Patterns of change are capitalized with explanations of the conditions that the patterns address.

Local experiments of ***de-collectivisation*** occurred in the North long before the reunification, with cooperatives sub-contracting pig or rice farming to households in the 1960s and 1970s (mostly without government approvals). In the early 1980s, the poor performance of collectives contributed to widespread food shortages, compelling the government to support liberalisation (Sepehri & Akram-Lodhi, 2006). This led to the introduction of 'household production contracts' in 1981, partly devolving production responsibilities to individual households (Kerkvliet, 1995). In the late 1980s, more comprehensive reforms were launched, including a new land policy (Resolution 10) in 1988 that eventually allowed land allocation for household uses. The weakening of state procurement and pricing policies in 1987 and its final abolition in 1989 boosted

the commoditisation of food. These were accompanied by a series of broader reforms on domestic and foreign investment, private enterprises, taxes and finance (Van Arkadie, 2003), the resumption of diplomatic relations with China and Western countries, and the collapse of the Soviet bloc (***Figure 2.4***).

2.4.1.2. Collective and small-scale systems: seeds of change

Under the two macro-policies of collectivisation and de-collectivisation, this phase witnessed the evolution of two main systems – the ***collective system*** and the ***small-scale private system*** – in opposing directions (***Figure 2.4***). The collective systems expanded between 1975-1981, yet underwent significant adjustments in 1981 and 1988, and finally collapsed around 1992. Meanwhile, small-scale *private systems* were discouraged between 1975 and 1981, then steadily gained power and ended up dominating the agri-food sector in the early 1990s. In the early 1990s, ***there was a (technological) substitution from collective to individual farming***, owing to the rapid decline and collapse of agricultural cooperative networks.

For pork and vegetables, the small-scale private production system remained firmly despite the government unfavourable policies (Lemke & Valle Zárate, 2008). Since vegetables accounted for a large part of the daily food consumption; they were grown in home gardens or on special plots for household use (less than 5% of cooperative land), mostly for self-sufficiency (Raymond, 2008). Numerous households also raised pigs at home for private use, but under obligatory state procurement quota (reportedly 50 kg pig live weight per capita) (Lemke & Valle Zárate, 2008). Due to the erosion in the role of state trading agencies, many farmers preferred to sell higher-quality pigs through the informal market, while retaining only inferior-quality pigs for compulsory state procurement (Vu, 2003). The remarkable continued small-scale household production of pork and vegetables facilitated a rapid expansion of the market for these products in the late-1980s (Sikor & Vi, 2005).

2.4.2. 1993-2008: Institutionalisation and dominance of smallholders

2.4.2.1. Landscapes and support structures for the new regime

With the collapse of numerous cooperatives in the early 1990s, small-scale farming and its associated distribution networks (see ***Table 2.1***) quickly emerged to become the regime. Their emergence was reinforced by landscape movements, macroeconomic policies and state support structures.

Landscapes

Population growth, economic development and urbanization significantly boosted the production of pork and vegetables (***Figure 2.5***). With the rising living standards, urban consumers not only bought more pork and vegetable products (rather than producing by themselves) but also demanded higher-quality food with year-round availability (Ho et al., 2003). Urbanisation also prompted the consolidation of production areas, especially for vegetables. To provide vegetables to the growing urban population, the state endorsed the establishment of 'vegetable belts' in peri-urban zones near large cities (van den Berg et al., 2003).

Land and trade liberalisation policies

New state policies and institutions supported agricultural commoditisation in the 1990s (Figure 5). Particularly, the 1993 Land Law effectively finalised the shift from collective to smallholder dominance by redistributing arable lands equally to rural households and granting them long-term use rights (Do & Iyer, 2008). However, to restrict land accumulation, region-specific ceilings were placed on individual landholdings, e.g., a maximum of 3 ha per farm in the Red River Delta. This ideal of equitable land distribution led to problems of land fragmentation, limiting prospects for enhancing productivity and efficiency (To et al., 2019).

Trade liberalisation enabled the rise of inputs used for intensification purposes. From 1997 to 2001, the country gradually abolished fertiliser import quotas and removed tariffs for most agricultural inputs, especially when joining the ASEAN Free Trade Area in 1995 and the WTO in 2007 (OECD, 2015).

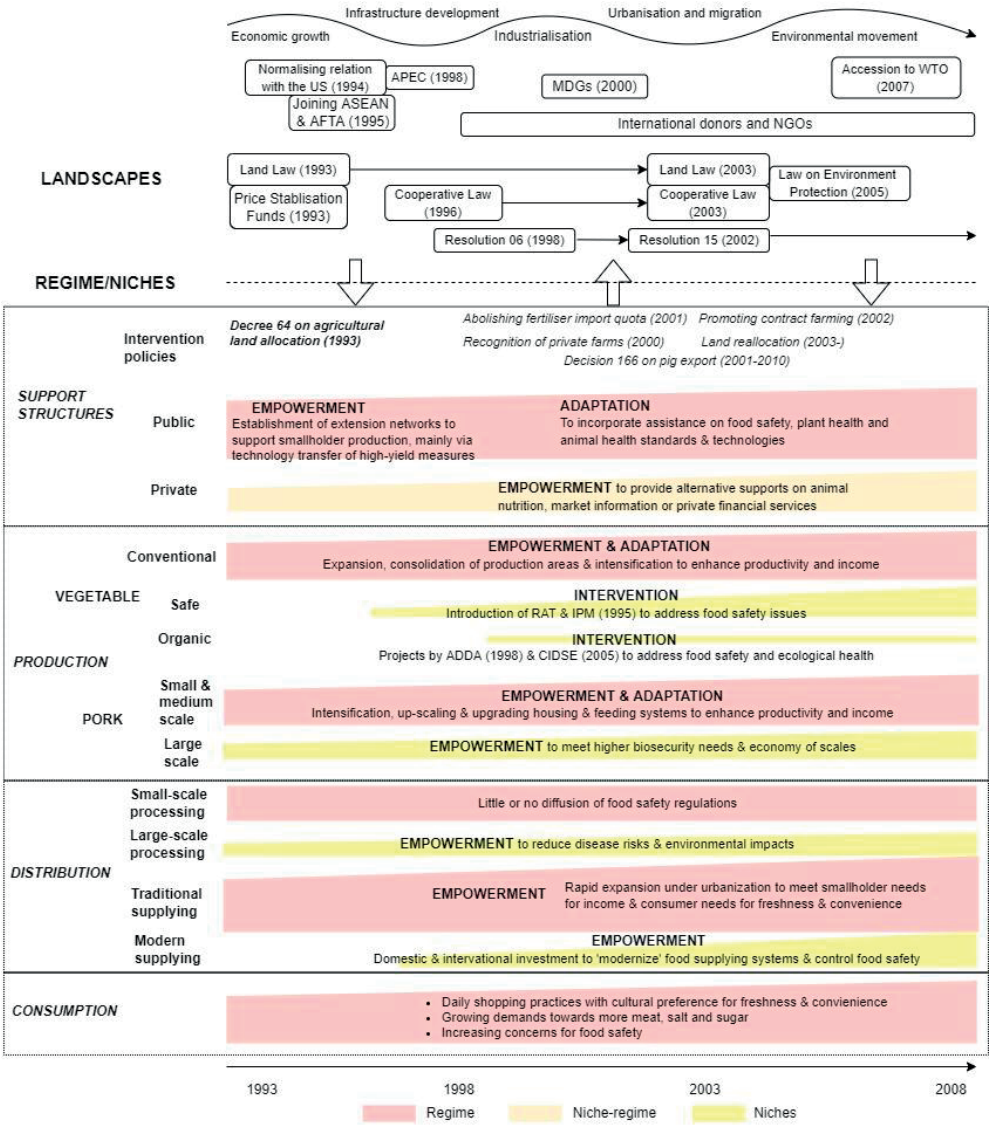


Figure 2.5 *The transition process of Vietnamese pork and vegetable systems in 1993-2008. Each block represents a food network; the change in the size denotes its decrease or increase in market share. Patterns of change are capitalized with explanations of the conditions that the patterns address.*

Public and private support structures

State support structures for extension, research, credit, animal health and plant protection services were established or restructured at the beginning of this phase. Notably, vegetable and pork farmers benefited from programmes for improving genetic sources of seeds and livestock breeds, which were provided at subsidised rates (Nga et al., 2014; OECD, 2015). The state programmes focused on demonstrating and transferring high-yield technologies while paying insufficient attention to market linkages and communication (Moustier et al., 2003). This top-down approach to technology transfer is supply-driven, relying on the monolithic structure of the public system and has limited outreach among underprivileged households (Dalsgaard et al., 2005; Linh, 2001).

Although state agencies dominated the support structure, the ***informal and private support structures*** played an increasing role in providing services. Private and civil actors like international NGOs, enterprises, and informal local groups, offered services and assistance in marketing information, microcredit, and animal nutrition, which public extension agencies often disregarded (Moustier et al., 2003).

2.4.2.2. Food production: accelerating intensification

The empowerment of small-scale, conventional vegetable and pork production (***Figure 2.5***) was accompanied by accelerating intensification. With the growing market demands and enhanced access to technologies, producers switched from subsistence to commercial farming, expanding cultivated areas and pig quantity (FAOSTAT, 2022), as well as employing measures to maximise productivity.

Conventional vegetable producers changed their cropping patterns from rice/maize-vegetable crop rotation to year-round vegetable production (Everaarts et al., 2008). Vegetable producers also ramp up the use of fertilizers and pesticides. Pesticide usage in Vietnam increased from 15,000 to 76,000 tonnes between 1991 and 2007, and vegetable production scored the highest in pesticide use: 5.52 kg ha^{-1} compared to 3.34 kg ha^{-1} for rice and 0.88 kg ha^{-1} for other annual crops (Hoi, A. P. J. J. Mol, et al., 2009).

Small-scale pork producers expanded pig herds and adopted advanced breeding, housing and feeding protocols. The limited local availability of raw materials, especially protein-rich ingredients, propelled the increase in using imported industrial feeds, dominantly provided by foreign feed companies (Lemke et al., 2008). Some producers adopted the traditional VAC model, which integrates pig rearing, crop cultivation and fish production to recycle pig manure; or installed biogas tanks. A pork niche of ***large-scale and registered farms*** started to proliferate in the 2000s. This niche received government support not only because of their modern facilities and stricter biosecurity adoption but also their capacity to establish formal contracts with intermediaries and supermarkets (Costales et al., 2006).

2.4.2.3. Food distribution: the dominance of traditional markets

Along with the strong institutionalisation of smallholder producers, their associated distribution networks (***traditional supplying***) have also been empowered (***Figure 2.5***). The number of wet markets in Vietnam doubled from around 4000 in 1993 to 8300 in 2003 (Maruyama & Trung, 2012). The number of mobile vendors also increased (e.g. from 2100 to 5600 in 2004-2006 according to a survey in Hanoi), engaging mostly female migrants from rural/peri-urban areas (Moustier et al., 2008).

Urbanization reinforced such empowerment of traditional markets. New urban settlers did not change their food consumption practices but were attached to their traditional practices of daily shopping for fresh food (van Wijk et al., 2006). Traditional markets not only scored better on prices and convenience but were also able to offer food with better appearance and freshness, seen by many consumers as primary criteria for ensuring food safety (Cadilhon et al., 2006). There was also a nutrition transition towards enhanced meat intake, recognised as the '*meatification*' of food production and consumption (Hansen, 2018).

2.4.2.4. Pressures and interventions for food safety and modernisation

In the late 1990s, multiple food safety scandals erupted, leading to widespread public concerns (Figuié et al., 2019). This compelled interventions by the government and

NGOs. At the national level, the government started to adapt their support structures to also integrate food safety training, especially via the Integrated Pest Management (IPM) programme. Vietnam Food Administration (VFA), the first central agency for food control, was established in 1999 (World Bank, 2006). International standards and protocols such as HACCP, GAP or Sanitary and Phytosanitary measures (SPS), were introduced after Vietnam's entry into CAC (1994) and WTO (Ho & Dao, 2005; McLeod et al., 2004).

This resulted in the establishment of two vegetable niches, namely ***safe production*** and ***organic production***, in the mid-1990s. In 1995, MARD launched the 'safe vegetables' (RAT) programme, which established safe vegetable production areas in peri-urban zones of large cities. Safe vegetable farmers have to comply with specific production protocols based on the IPM approach, requiring controlled use of pesticides and fertilisers, and irrigation from non-polluted water sources. A certification scheme ("safe vegetable" or RAT) was developed, although this certifies all vegetables in designated 'safe zones' rather than farming procedures per se. In addition to safe production, organic vegetable production was introduced by international NGOs like CIDSE (1998) and ADDA (2004).

In addition, the niche of ***modern retail systems*** received government support, by fast-tracking plans for supermarket development, upgrading formal marketplaces, and eliminating informal markets, while prohibiting street vending activities (Gerber et al., 2014). This retail modernisation policy was rooted in the notion that modern retail outlets could more effectively control food safety and facilitate the creation of 'modern' and 'civilised' lifestyles (Wertheim-Heck et al., 2015). Supermarkets rapidly expanded from one in 1993 to over 400 in 2007; yet with the dominance of traditional markets, their share in the fresh food supply remained small, accounting for only 1-2% by 2004 (Figuié & Moustier, 2009).

2.4.3. 2008 to present: Ongoing transition for food safety and modernity

2.4.3.1. Shifting approaches in policies and support structures

A new phase of transition seemed to start in 2008, marked by Vietnam's accession to WTO (2007) and the introduction of VietGAP (2008) and the Food Safety Law (2010) (***Figure 2.6***). They created the legislative foundation for tightening food control and surveillance and induced standardising and formalising production and distribution protocols.

Economic growth, urban development, international integration, and the growing public concerns for food safety and the environment continued to be the main *landscape drivers* in this phase. New factors such as social media and the development of ICT brought new marketing opportunities and stimulate adaptations of both producers and distributors.

Another keystone programme - *Agricultural Restructuring Plan* (ARP) – was promulgated in 2013. The plan outlined a strategic shift in agricultural development approaches from emphasising production to a focus on 'enabling market responsiveness and sustainability' (World Bank, 2016). Following the ARP, new policies were issued (***Figure 2.6***) to encourage private and public cooperation in modernising agri-food supply chains, favouring large-scale and high-tech production by applying contractual arrangements.

Support structures were also adapted to promote functional and fiscal responsibility. For instance, Food Safety Management Authorities are now established to be solely in charge of provincial controls on food safety, and stations of plant protection, animal health and extension services were merged into Agricultural Service Centres. New models of cooperatives and farmer organisations gained state endorsement as key intermediaries for facilitating the transformation by enhancing value addition and building market linkages (Loc & Hang, 2016).

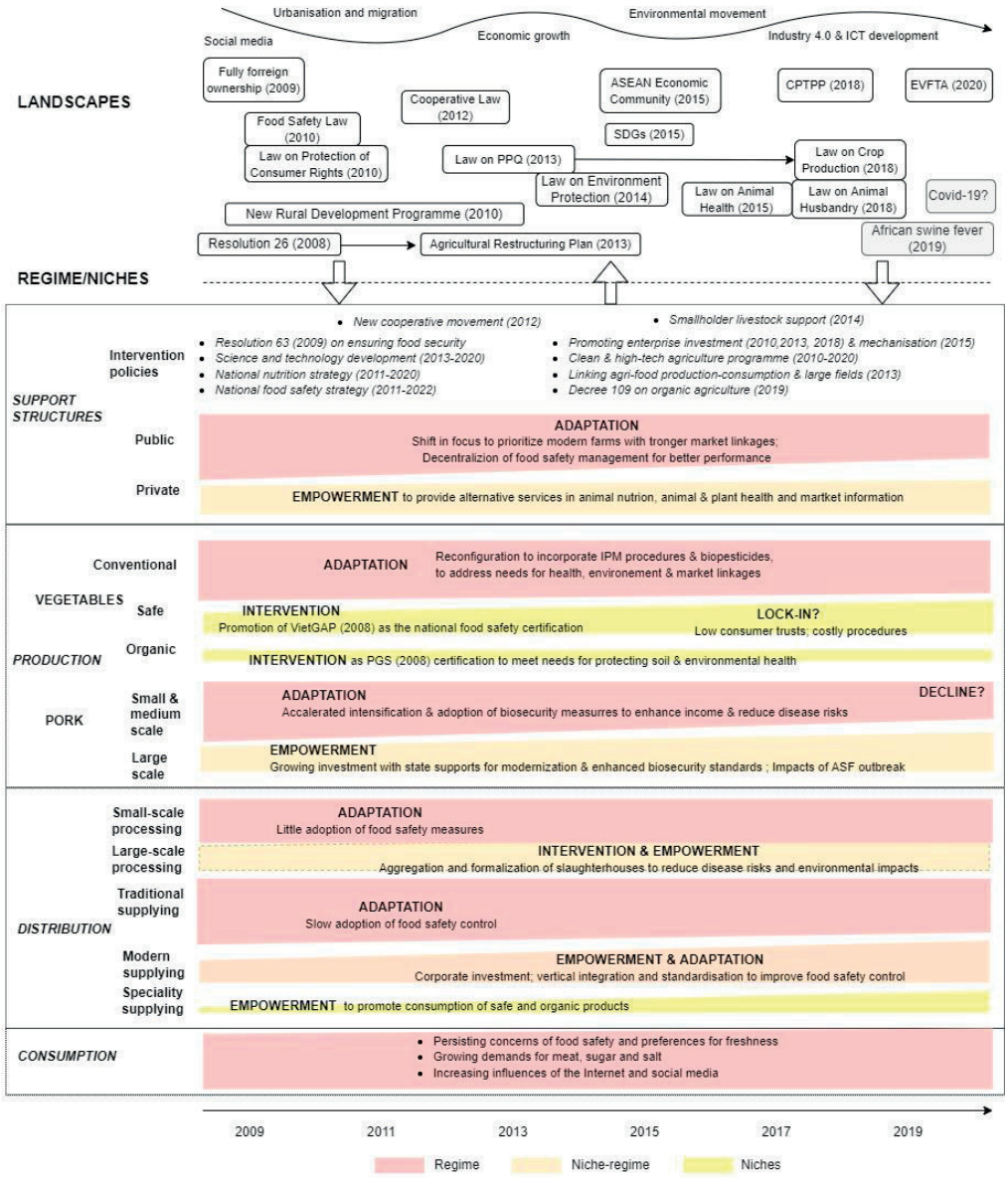


Figure 2.6 *The transition process of Vietnamese pork and vegetable systems from 2008 to the present.*

Each block represents a food network; the change in the size denotes its decrease or increase in market share. Patterns of change are capitalized with explanations of the conditions that the patterns address.

2.4.3.2. Food production: diffusion of food safety and biosecurity measures

As shown in ***Figure 2.6, small-scale & conventional pork and vegetable production*** remained the dominant regimes. Intensification and concentration are still the major trends. *Vegetable production* is more and more agglomerated due to urban and industrial development: 75% of vegetable producers are now concentrated in peri-urban zones (Khue et al., 2016). To adapt to the decreasing farmlands, pesticides continue to be used excessively: a 10-year study shows that pesticide use amplified by 1.9-2.5 times between 2002 and 2012 (Hoi et al., 2016). For *pork production*, intensification accelerates due to thriving demand and technological advances. Pig farm sizes continued to grow significantly, with the share of farms having 20 or more fatteners growing from 1.75% to 23.06% in 2006-2016 (GSO, 2016).

However, some adaptations regarding food safety have also taken root in *vegetable production*. The usage of high-toxicity pesticides is now prohibited and producers are switching to using biological pesticides owing to the increased market availability of bio-pesticide products (Schreinemachers et al., 2017). Our interviews with cooperative leaders and producers reveal that principles and procedures of IPM, which were introduced in the niche of safe vegetable production, are now widely diffused among conventional producers. Even if the products are not certified as 'safe', numerous producers have gradually adopted IPM measures thanks to their concerns for their own health and the environment (Interview P1 & P2, 2019). This suggests a forthcoming ***reconfiguration*** to incorporate food safety practices and standards into the small-scale regime.

The growing acceptance of food safety protocols, nevertheless, did not entail the rapid adoption of domestic and global safety certifications. Since 2008, both niches of ***safe and organic food*** have developed separate certification schemes: the national state-sponsored VietGAP for safe food and the community-based, peer-assessed PGS for organic products (see comparison of the niches in ***Table 2.2)***. Despite the active promotion of the government and NGOs (e.g. VOAA), the two certification niches only

grew slowly: by 2016, only 22ha of vegetables are PGS-certified and less than 1.1% of vegetable inputs are VietGAP-certified (Pham & Dao, 2016).

Table 2.2 *Comparing three niches of safe vegetables (RAT certificate), organic vegetables (PGS) and VietGAP-certified vegetables*

	Safe vegetable (RAT)	**Organic (PGS)**	**VietGAP**
Starting year	1995	2008	2008
Voluntary	Yes	Yes	Yes
Certified by	Third-party sponsored by local governments (Plant Protection Department)	Peer farmers and other stakeholders under the supervision of the PGS Coordination Committee	Third-party sponsored by the government
Initiated by	MARD & Provincial governments	ADDA & Farmers' Union	MARD
Traceability	No	Yes	Yes
HACCP	No	Yes	Yes
IFOAM	No	Yes	No
Type of products	Vegetables, fruits, tea	Agricultural & livestock products	Agricultural, livestock & fishery products
Scale of vegetable production	No nationwide data. 30% of the vegetable area in Hanoi and HCMC.	Only 22 ha in 2015	1.1% of total vegetable output (GSO, 2016).
Distribution network	Wholesale markets, wet markets, safe vegetable shops, catering services	Safe & organic vegetable shops	Supermarkets, safe vegetable shops, catering services

Source: Adapted from (Pham & Dao, 2016) and (GSO, 2016)

In *pork production*, biosecurity measures started to be widely adopted, especially after the ASF pandemic in 2019. To avoid disease transmission, all producers have installed biosecurity facilities and embraced disease-prevention practices. However, with lower technical and financial capacity to adopt strict biosecurity standards, the small-scale producers suffer the largest loss, while the modern, large-scale producers will be less affected, and may even benefit from gaining market shares (Ngoc Que et al., 2020). Empowered by the ASF shock and state policies that favour large-scale modern farms, ***large-scale pork production*** is now a niche-regime. Meanwhile, multiple smallholders

have decided to either downscale or quit production under the competitive pressures of large-scale farms (Interview E4, 2019). One could expect a ***technological institution*** from small-scale to high-biosecurity and high-tech large-scale commercial farms, but this prediction requires further investigation.

2.4.3.3. Food distribution: retail modernisation and standardisation

While traditional supplying still dominates food distribution, the network of ***modern supplying*** has become a niche-regime in the current phase (***Figure 2.6***). After Vietnam entered the WTO, the retailing sector was opened to 100% foreign ownership in 2009, enabling the penetration of international brands in Vietnamese food distribution (Maruyama & Trung, 2012). The amount of supermarkets and department stores doubled, while the number of traditional markets has reduced slightly after peaking in 2015 (***Figure 2.7***). Convenience stores also flourished, growing from around 1,000 in 2013 to more than 4,000 outlets in 2019 (USDA, 2020). Vertical integration also accelerates, for example, conglomerates like Vingroup or Masan Group established new brands of fresh products (USDA, 2020).

Retail modernization has an effect on stimulating small-scale producers to embrace safety and quality certificates. Increasingly they tend to avoid purchasing non-certified products, while still employing modern logistics facilities and internal control systems to reduce safety risks. Nonetheless, new certification schemes with stricter standards (e.g. VietGAP) face challenges from high production costs and cumbersome procedures (Hoang, 2020; Pham, 2017) as well as low consumer familiarity (My et al., 2017; Ngo et al., 2019). There is also the question of smallholder inclusiveness: high requirements and unfair terms hinder small-size producers from building long-term contracts with modern retailers (Moustier & Loc, 2015).

Besides, several niches have ascended to support the distribution of safe food. In the 2000s, safe vegetable cooperatives opened special stalls within formal wet markets, enabling direct sales between producers and consumers. Such stalls declined in the late 2000s due to low trust among traditional consumers (Wertheim-Heck & Spaargaren, 2016). The niche of ***specialty shopping***, however, was revitalized in the

early 2010s with the emergence of many small-sized retail chains focusing on certified safe or organic products (BacTom, Soi Bien, etc.). These chains target younger and more tech-savvy consumers, actively employing online marketing via Facebook and other platforms to expand their niche market (Kim Dang et al., 2018).

Overall, consumers still have limited trust in certificates and standardised retail channels and continue to rely on personalised relations with traditional retailers, reproduced via their daily shopping practices. Despite their concerns for food safety, consumers still prioritize other factors like convenience, affordability, and the diversity of fresh food products (Lapar et al., 2009; Wertheim-Heck, Spaargaren, et al., 2014). However, this can be changed in the future owing to the stronger penetration of large firms into retailing sectors and the growing urban, young and affluent middle-class (Ehlert & Faltmann, 2019).

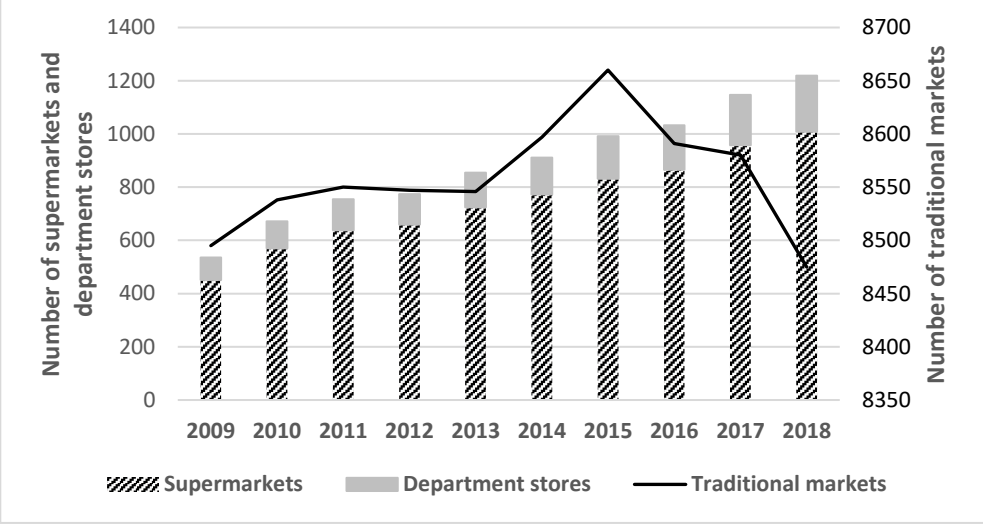


Figure 2.7 *Number of supermarkets, department stores, and traditional markets in Vietnam in 2009-2018*

Source: GSO (2020a)

2.5. Discussion

2.5.1. Use of MPA & MLP in transition pathway analysis

In this paper, we apply the MPA and MLP to examine the transition process of Vietnamese pork and vegetable systems. After the demarcation and decomposition of the system into specific components (food networks), MPA provides a rigorous method to systematically analyse the non-linear dynamics by dissecting time-bound changes of such networks. The emerged patterns of changes were then further explained in detail by connecting with the landscape movements, intervention policies, and socio-technical innovations (see Solutions column in ***Table 2.1***).

The results demonstrate the benefits of the MPA in supporting MLP analysis in short periods without the need for a complete transition from one regime to another. The MPA is instrumental in identifying 'transition pathways' if some indications of such pathways are recognised. In our case study, we identified a *substitution* from collectives to family farms from 1975 to 1993. While there has been no regime shift since the 1990s, one could expect a forthcoming *technological substitution* from small-scale pork farms to high-biosecurity large-scale farms, and a *reconfiguration* of small-scale vegetable systems to integrate food safety innovations.

However, the MPA must be applied with caution. The use of MPA seems not to be necessary for multiple case studies where transition pathways are clear-cut and undisputed. MPA is more appropriate for examining multi-component systems with highly nonlinear transition processes, when the ideal types of transition pathways are not easily identified and proved. However, the MPA assumes the agency of key actors in enacting changes to meet societal needs. This is easier to demonstrate in technology-led systems like water management (de Haan & Rogers, 2019); yet in other systems like food, one cannot neglect diverse informal actors with different interests, expectations, resources and levels of involvement (Grin et al., 2011; Smith et al., 2005). The explanation (and prediction) of transition pathways will have to incorporate different storylines from various actors and components, yet it could lead to difficulties in arranging the 'messy' narratives.

Lastly, we reflect on the applicability of MLP & MPA in studying transitions in the global South, including Vietnam and many low- and middle-income countries (LMICs). Many authors have questioned whether or not the concepts and frameworks of transition theory – mainly developed in Western contexts - can be useful to address nuances in settings of developing countries, for example, the informality of regime or social injustices (Ghosh et al., 2021; Hansen et al., 2018; Ramos-Mejía et al., 2018). Our case study of Vietnamese food transitions can offer insights to enrich this discussion. The utilization of concepts like niches, regime, landscapes, or the 'pathway' terms like technical substitution, as discussed in the next section, did not totally fit the particular institutional and socio-cultural conditions of Vietnam. For instance, the substitution in the early 1990s was not exactly led by technological innovations but mainly by a governance and organizational shift (though there were advances in the adoption of agricultural technology). The presumption about incumbent/regime actors as coherent, dominating and resisting radical change (Holtz et al., 2008; Turnheim & Sovacool, 2019) should be reconsidered in the case of the smallholder-led regime. The regime in our case is heterogeneous and composed of different segments and institutions (mainly informal) with various levels of adaptation to technological changes. In that light, future transition studies should seek to reconceptualize their concepts and frameworks to encompass diverse contexts of LMICs. Nonetheless, our study still considers transition theory and its concepts and ideas invaluable and necessary. While there can be different approaches from other disciplines (e.g. political economy or anthropology) to study changes in Vietnamese agri-food systems, transition theory is a uniquely powerful tool to explore the co-evolutionary and interdependent nature of food actors and institutions across levels.

2.5.2. Characterizing Vietnamese food system transitions

In this part, we return to the research question on the key drivers and issues that characterize the transitions of Vietnamese food systems. We further discuss several points that were highlighted in previous literature on transitions in food systems (Hebinck et al., 2021) and developing countries (Wieczorek, 2018). Three major insights

are drawn from our analysis that help understand the transition process in the case study.

2.5.2.1. Technological and social innovations

The examination of solutions and their connections to the patterns reconfirms the shared importance of both socio-institutional and technological factors in shaping transitions (Smith et al., 2010). Unlike many other studies on historical transitions (Geels, 2005; Karltorp & Sandén, 2012; Turnheim & Geels, 2012), the transition process in this case was not led by the development of some breakthrough technologies. Multiple innovations listed in are cumulative improvements in breeding, seeding, feeding, fertilization, and plant or animal health protection technologies. Some are the rediscovery and diffusion of 'old ideas', e.g., traditional know-how of crop rotation, soil remediation and organic fertilization promoted via the IPM programme. The transition process, furthermore, involves different mechanisms of social innovations (Bock, 2012; Wittmayer et al., 2020), when food actors actively adopt and adapt innovations in social, organizational and cultural aspects to address normative societal concerns. One prominent example of the co-determining roles of both technological and non-technological innovations for food system changes is the case of bio-pesticides in vegetable production. The development of the biopesticide market in the late 2010s reinforced the wider diffusion of safety practices (introduced in the late 1990s). Nonetheless, there will be no transition in production practices without associated changes in law enforcement (on the use and sale of high-toxicity pesticides), organization (reformed cooperative models), or cultural meanings (awareness about their impacts).

2.5.2.2. Path dependency and developmental state

The study results add to the findings of previous studies that underscore governance and institutions as the driving factors of food system transitions (Kuokkanen et al., 2017; Schiller et al., 2020; van Gameren et al., 2015). The described transition process and their outcomes can be better understood via two main concepts. First, *path dependency* has a critical role in shaping the process. The rapid collapse of

cooperatives and institutionalization of the smallholder regime in the early 1990s led to the widespread fragmentation of food production and distribution, which became a lock-in mechanism for adopting food control or certifications. The smallholders lack both the motivations and capacities to pursue formal contracts and certifications, especially in the regime where interpersonal relationships and informal institutions dominate (Hoang, 2020).

Second, as a *developmental state*, Vietnam has shown a strong commitment to international trade integration and economic development, while maintaining its long-lasting legacy of authoritative administration (Fritz & Menocal, 2007). Nonetheless, their primarily supply-driven, top-down approach and the inadequate participation of civil society have shown mixed performance, especially in food safety control (Pham & Dinh, 2020; World Bank, 2017). Unlike some examples of transitions in other developmental states (Rock et al., 2009), the government did not establish a strong institutional setting for promoting public-private coordination in addressing food safety issues – perhaps except for the market development of bio-pesticides.

2.5.2.3. Stability and changes of smallholder-based regimes

The study found remarkable stability in both smallholder-dominated regimes of pork and vegetables. This can be explained via three main mechanisms: (i) the crucial role of informal rules, norms, and cultural preferences (daily shopping for fresh food) in shaping consumer and supplier behaviours (Wieczorek, 2018), (ii) the inertia in distribution systems (influenced by low consumer acceptability) deters the comprehensive reconfiguration or transformation of production systems, and (iii) smallholders also adopt cautious yet flexible strategies in adapting to the context of constant changes and market insecurity: retaining the traditional low-risk small-sized production models or migrating to find other incomes (e.g. retailers) in cities, rather than embracing modern or alternative models.

However, the contrasting of the two systems in later phases also shows different levels of destabilization, as well as varying levels of success among niches. While safe and organic vegetables are still small niches, large-scale farming and modern pork supply

chains have developed into niche-regimes. This can be attributed not only to the intrinsic characteristics of each sector (i.e., the importance of processing in pork supply chains and the dependence on labour and land access in vegetable production) but also to the impacts of landscape shocks. The disruption caused by the ASF outbreak in 2019 appears to have had transformative impacts on the pork supply chain, while this is not the case for many food safety scandals in the vegetable chain.

2.5.3. Implications and trade-offs for agri-food sustainability goals

In the analysis, we found major implications for food security, food safety and smallholder welfare in the transition pathways of Vietnamese food systems. The substitution from collective to smallholder systems in the early 1990s coincided with the change in focus from ensuring food security to enhancing income and productivity. In the late 1990s, government policies shifted their focus from productivity to food safety and value chain upgrading, yet this policy shift did not align with opportune changes in production and consumption patterns.

Nutritional and environmental issues are regularly mentioned yet have little impact on the decisions of food system actors. While state and non-state agencies have started to pay more attention to nutritional problems (child malnutrition, micronutrient deficiency, obesity and non-communicable diseases), there are only a few initiatives that integrate nutritional goals into agri-food development (Raneri et al., 2019). Considering the insufficient intake of vegetables and the excessive consumption of red meat (compared to the GBD health recommendations), the governance of upcoming agri-food transitions should integrate the goal of promoting more balanced diets. Nonetheless, the challenge is in addressing the trade-offs between this goal and the interests of small-scale and large-scale pork producers and distributors, as well as the legitimate needs of the poor, undernourished population to consume more protein-rich sources.

In their study on agricultural modernization in Vietnam, Fortier & Tran (2013) argued that the Vietnamese food systems have been locked in by 'technological path dependencies' that prioritize high-energy and high-input technologies. This might be

partially correct, considering the rapid growth of large-scale pork production and the rapid retail modernization, however, there are still different pathways that Vietnamese food systems can follow. The smallholder-led production and distribution networks can be reconfigured into alternative food systems with more balanced diets, less ecological impact, and a fairer distribution of benefits and responsibilities among food stakeholders (El Bilali et al., 2018). To navigate the ongoing transition process towards more sustainable goals, decision-makers must address the diverse practices, attitudes, and motivations of various stakeholders. A national agenda of modernization or sustainable development (i.e. SDGs) will not succeed if the local implementation does not thoroughly consider traditional practices, cultural norms and values, and the needs and expectations of myriad food actors, including poor consumers and smallholder producers.

2.6. Conclusion

The study has examined the transitional process of Vietnamese pork and vegetable food systems. We identified the substitution from collective to smallholder farming in the late 1980s, the rapid domination and empowerment of small-scale food systems in the 1990s, and the multiple adaptations for addressing food safety and productivity issues afterwards. We expect a reconfiguration of vegetable systems to incorporate food safety protocols, and a technological substitution from small-scale to large-scale and high-biosecurity pork production in the future. Nonetheless, the directionality and pace of such transitions still require further investigation. Future research should explore the practices and perceptions regarding sustainability transitions of various food actors at different levels (regime, niche, landscape, intermediaries) and components (production, distribution, consumption, support). One should consider the compound interactions of niche/regime dynamics with landscape movements of urbanisation, modernisation, and globalisation, as well as between the issues of food safety, food and nutritional security, and smallholder well-being. It is crucial to learn about different strategies and struggles and identify coordination mechanisms for co-building futures towards safe, nutritious, and sustainable food systems.

Appendix 2.1 *List of key informants and experts*

No	Code	Organization and position	Date interviewed
01	E1	Bac Tom safe food chain - Director	2019-11-04
02	E2	Vietnam Academy of Agricultural Sciences (VAAS) – Vice Director	2019-12-02
03	E3	Vietnam Organic Agriculture Association (VOAA) – Head of PGS Coordinating Committee	2019-12-13
04	E4	ILRI East and Southeast Asia regional office -	2019-11-15
05	P1	Tang My (Nam Hong) Safe Vegetable Cooperative – Director, farmer	2019-11-19
06	P2	Son Du (Nguyen Khe) Safe Vegetable Cooperative – Director, farmer	2019-11-01
07	P3	Son Du Cooperative – Director	2019-11-01
08	P4	Vegetable wholesaler at Long Bien market, Hanoi	2019-12-06
09	P5	Organic vegetable producer in Son Tay, Hanoi	2019-12-09
10	E5	Dong Anh Plant Protection Agency – Vice Director	2019-12-15

Appendix 2.2 *List of stakeholder validation workshops and discussions*

Name of workshop	Participants	Date organized
MALICA PhD Day	15 persons, including peer PhDs and experts within MALICA network	2020-09-30
Cau Giay Validation Workshop	Around 25 persons, including officials and stakeholders in agri-food, market, health and other fields in Cau Giay, Hanoi	2020-10-24
Dong Anh Validation Workshop	Around 30 persons, including officials and stakeholders in agri-food, market, health and other fields in Dong Anh, Hanoi	2020-12-10

3

Transitioning practices of vegetable small-scale actors in Vietnam: an interplay of food safety, labor demand, and soil environment

Abstract

Food safety is a critical and persistent issue that challenges the sustainability of agri-food systems in Vietnam. The government has launched multiple food safety initiatives, but there is limited understanding of their contribution to changing the practices of small-scale producers and distributors. This chapter explores these transitioning practices by applying Social Practice Theory (SPT) to analyse the transitions in everyday routines of small-scale vegetable producers while being embedded in socioeconomic, technical, and institutional contexts. We conducted semi-structured interviews with small-scale food producers and distributors in Hanoi, Vietnam. The results revealed, contrary to some common perceptions, that smallholder producers are transitioning towards food safety, with the use of more bio-pesticides and eco-friendly pest control methods. The smallholders also reproduce a variety of (sustainable) intensification practices, including crop rotation, organic fertilization, and soil cultivation, to sustain soil fertility and save labour. However, there are no clear patterns of change for post-production practices, although they have been diversifying under the impacts of urbanization. The findings highlight the interplay of food safety, labour, and soil environment in shaping the transitions of smallholder practices. We suggest that success in improving safety in production practices is feasible, but that this requires more thorough interventions in distribution and consumption practices to transform the food systems at large.

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3.1. Introduction

Food safety concerns remain high on the agenda in many developing countries. They are amplified and complicated by the dynamics associated with the development process, including income growth, rapid urbanization, global trade integration, technological progress, and changing consumer demands and lifestyles (Bishwajit, 2014). People in low- and middle-income countries (LMICs) are generally more vulnerable to foodborne diseases due to higher exposure and sensitivity to chemical and biological hazards (Ortega & Tschirley, 2017). However, the design and implementation of food safety regulations in LMICs face critical challenges due to the often 'heterogeneous and fragmented' food value chains, which mostly interact through informal institutions (Grace, 2015a). Thus, the promotion of formal food safety rules, including international and domestic standards, faces high transaction costs and risks, excluding many small-scale actors from the food supply chains (Mercado et al., 2018). Researchers and policy-makers inquire how smallholders can adopt food safety practices and successfully adapt to changing market requirements (Unnevehr, 2015).

As small-scale producers and distributors[8] often constitute the dominant and incumbent parts of the food systems in the developing world, small-scale practices are crucial not only for food safety but also for food security, nutrition, and the environment more generally (Gomez, 2020). Alterations in the everyday practices of small-scale actors can contribute to incremental changes that eventually steer the sustainability transition of food systems (S. Bui et al., 2016; Huttunen & Oosterveer, 2017). They can shape the pathways of food system transitions, either by embracing large-scale, standardized, and modern production (Gómez & Ricketts, 2013; McCullough et al., 2008) or by incorporating alternative, localized, and ecosystem-based practices (Corsi et al., 2018; Watts et al., 2005). However, understanding small-scale practices is never simple since smallholders are not a homogeneous group. Different production factor

[8] Although smallholders mostly refers only to producers with small-scale farm size (usually less than 2 ha of landholding), we used 'small-scale producers and distributors' and 'smallholders' interchangeably in this paper.

endowments (land, capital, and labor), various policy interventions and institutions, and varied levels of technological and market access can all influence the manifold practices of small-scale actors, contributing to the diverse roles that smallholders play in agri-food transitions (Burkitbayeva & Swinnen, 2018).

Considering the essential and dynamic role of smallholders in addressing food safety issues, our study focuses on small-scale actors in the vegetable supply in Vietnam. Since the economic reforms in the late 1980s, vegetable production and consumption have been promoted to improve diet quality and enhance smallholders' incomes. Nevertheless, concerns about the safety of vegetables remain prominent due to the regularly reported poor pesticide use practices (Hoi, A. P. J. Mol, et al., 2009). Multiple interventions have been launched by the government or non-government organizations (NGOs) to promote practice changes towards safer vegetable supply, yet there is limited understanding of whether such changes have actually taken place among small-scale actors and been influenced by such interventions.

The main aim of this study is to understand the transitioning practices of small-scale producers and distributors in Vietnamese vegetable systems. We analyze how the practices of Vietnamese vegetable smallholders have changed over the last 20 years and what intervention points can promote transitions toward safe practices. The first question is addressed by using the lens of social practice theory (SPT), while the second is answered by combining the findings from SPT analysis with the concepts and insights from the sociotechnical transitions literature. The study can contribute to the growing body of studies integrating practice theory with food system transition research (El Bilali, 2018). Empirically, the focus on Vietnam can shed light on how smallholders in a post-socialist emerging economy have adapted their practices in the context of globalization and modernization and what the prospects are for better engaging them as pivotal actors in the transition toward achieving the global Sustainable Development Goals (SDGs).

3.2. Theoretical framework

Social practice theory (SPT) refers to a series of theories developed around the concept of 'practice', with the aim of overcoming the divide between individual human agency and social structure in social sciences (Spaargaren, 2011). From this perspective, daily human actions do not suddenly arise from immediate rational decision-making processes but mostly follow a routinized, habitual, and taken-for-granted manner. Practice-based approaches, therefore, consider such routinized behaviors (practices) as the main unit of analysis instead of individuals who are considered the carriers of such practices (Reckwitz, 2002).

Practices are made up of several interconnected elements, comprising mental, bodily, knowledge, and material dimensions (Reckwitz, 2002). Schatzki (2002) argued that practice is a 'nexus of doings and sayings', meaning the activities and their discursive expression 'hang together' by rules and norms, know-how, and 'teleo-affective structures' (i.e., the ends, goals, projects, values, beliefs, and emotions that give a direction to practices). Such norms and teleo-affectivities are needed for the organization and ordering of practice elements, so they resemble other terms such as 'organizing principles' (Giddens, 1984) or 'conscious logics' of a practice (Huttunen & Oosterveer, 2017). Schatzki also distinguished between practice-as-entity (the idealized form of practices that are collectively recognized by people over time) and practice-as-performance (various enactments of practices in specific temporal and spatial circumstances) (Warde, 2005). Practices can be simple (dispersed) or complex (integrative) or can be bundled together when sharing some mutual elements (Brons & Oosterveer, 2017).

In our study, 'small-scale practices' are (bundles of) practices that small-scale vegetable production and distribution actors enact and reproduce. They include cultivation, seeding, fertilizing, crop protection, harvesting, post-harvest soil management (production), and preprocessing, transportation, wholesaling, and retailing (distribution). Bundles of practice that share the same meanings, such as 'food safety practices', or the same organizing approach, such as 'cooperative practices', can

also be identified. The study intends to comprehend the overall dynamics of small-scale practices (as entities), while the variations in practice performances help illustrate and enrich comprehension.

The study focuses on the long-term dynamics of small-scale practices, i.e. their transitions. Transitions can be understood as changes from one state to another (Geels & Schot, 2007), hence practice transitions refer to the shifts from old, established practices to new ones. To study practice transitions, we apply the widely adopted approach by Shove et al. (2012) to analyze changes in three practice elements: *meanings* (symbols, norms, values, beliefs, or principles that govern actions), *materials* (physical environment, infrastructures, technologies, inputs, and tools), and *competences* (skills and know-how). These elements are independent in some way, but their coexistence enables linkages to be made and practices to be reproduced. Changes in smallholder practices will occur whenever linkages are broken and recreated owing to the introduction of new elements or the impacts of changing sociopolitical contexts.

In addition to zooming in on the practice changes, we also zoom out to explore what factors facilitate or hinder the processes of transitions. The idea of zooming out means 'switching theoretical lens' and investigating the possible connections among practices across space and time (Nicolini, 2009). The (horizontal) connections among practices might be collaboration or competition based on how they share, reproduce and distribute elements (Shove et al., 2012). Yet from a vertical viewpoint, small-scale practices and their elements are embedded in the broader arrangements of multiple institutions and practices that constitute a selection environment for blocking or promoting certain practices.

To analyze vertical connections, we combine practice analysis with transition theory, especially the Multi-Level Perspective (MLP) which focuses on the co-evolution of the three levels of niches, regime, and landscapes that bring about the transition (long-term, fundamental changes) of socio-technical systems. The *regime*(s) are the dominant part of the system, comprising coherent, stable and functionally important

networks of practices and arrangements, while *niches* are smaller and less stable but have the potential to induce transformative changes (Holtz et al., 2008; Smith & Raven, 2012). In the context of food systems in Vietnam, the regime refers to the dominant smallholder-led production and distribution networks, while niches are agri-food initiatives or innovations. There are, however, no clear boundaries between niches and regimes, since niches can grow and influence regime restructuration or replace the regime (Grin et al., 2010). Meanwhile, both niches and regimes are separate from, yet embedded in, *landscapes*, which are broader factors beyond the direct control of niche/regime levels. The MLP and SPT share similar concerns and assumptions on the tension between change and stability and provide different yet complementary lenses for conceptualizing complex dynamics at micro-level everyday routines and macro-level food systems (Hinrichs, 2014).

The analytical framework is shown in ***Figure 3.1***. In applying the analytical framework, we first identify the key practice changes, before examining linkages between practice elements (meanings, materials, competences) aligned with the changes (zooming in). Next, we consider the interactions between practices, elements and broader socio-technical dynamics, including the institutional changes of Vietnamese agri-food systems and other socio-economic processes (zooming out). Those national-level dynamics are influenced by global landscape changes, in which we use the argument outlined by Spaargaren et al. (2012) that two global movements – globalization and sustainable development – are the two main 'organizing principles' (or 'global attractors') that guide the transition dynamics of food practices. Lastly, we identified the intersection points between the cross-level dynamics and practices, which were conceptualized as '*friction points'* (Hargreaves et al., 2013) or '*fractures'* (O'Neill et al., 2019), which can hinder or open opportunities for innovations in practice and therefore be the target of interventions for policy-makers and practitioners.

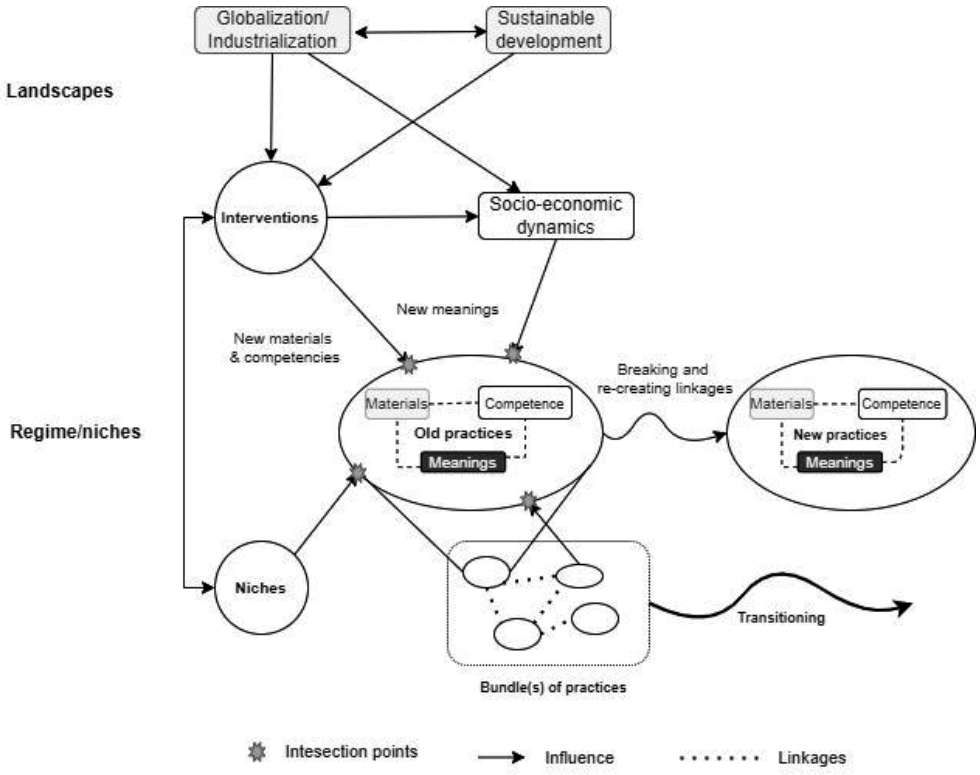


Figure 3.1 *Analytical framework*

Source: Own elaboration, primarily based on Shove et al. (2012) and Hargreaves et al. (2013)

3.3. Materials and methods

3.3.1. Background on vegetable systems of Vietnam

The vegetable production system in Vietnam is dominated by small-scale producers, primarily located in the Red River Delta (RRD), Mekong River Delta (MRD), and Lam Dong Province. Vegetable producers typically have landholdings of approximately 0.25 ha in the North and 0.5 ha in the South, which is among the lowest in the developing world (Rapsomanikis, 2015; van Wijk, 2010). The prevalence of smallholders in vegetable production is the result of a transition process since the early 1990s when the collapse of cooperative systems gave rise to the rapid emergence of small-scale family farms with equitably small land tenures (owing to the 1993 land distribution policy) (Do & Iyer, 2008). Vegetables are important cash crops that bring additional

income for farmers beyond traditional rice cropping, accounting for 83% of income from crop production in rural areas and 89% in the peri-urban areas of the RRD (Huong et al., 2013a).

These small-scale producers are strongly connected to traditional distribution networks, which comprise collectors, wholesalers, wet market retailers, and street vendors (Figuié & Moustier, 2009). Vegetable distribution networks expanded in the 1990s, when many rural and peri-urban farmers, mostly female, migrated and worked as street vendors or wet market stallholders in cities (Moustier et al., 2008). Since the 2000s, small-scale retailers have faced increasing competition from emerging supermarket chains (Maruyama & Trung, 2012).

Food safety has been a long-lasting issue in Vietnamese vegetable systems. Economic pressure and the liberalization of agricultural input markets have led to the increased use of agrochemicals. Cases of pesticide overuse, including high-toxicity types, have been reported over the years (Hoi, A. P. J. Mol, et al., 2009; Schreinemachers et al., 2020). Given the growing public concerns about food safety risks, the government and NGOs have launched several initiatives to enhance food safety control and promote safer practices among smallholders. Some of the initiatives involve the establishment of 'safe vegetable production' zones (*rau an toàn*, abbrev. RAT), the strict prohibition of high-toxicity pesticides (Hoi et al., 2016), and the promotion of safety guidelines like Integrated Pest Management (IPM) and certificates like Vietnamese Good Agricultural Practices (VietGAP) (Ngo et al., 2019; Pham, 2017). The government also endorsed modern retail outlets owing to the notion that they can be more effective in food safety control (Wertheim-Heck et al., 2015).

While having varying successes at local scales, these policies still do not sufficiently address the food safety problem. Some studies attribute the persistence of food safety issues to institutional weaknesses (limited state capacity to enforce food safety control, lack of public–private participation and coordination) (Pham & Dao, 2016; Van Hoi et al., 2013) or the lack of economic incentives to adopt safety standards (Hoang, 2020). Wertheim-Heck et al. (2014, 2015) used practice theory to explain how wet

market shopping is an important part of the daily routine of consumers, and food safety strategies (mostly based on trust relationships with retailers) are embedded in such routinized practices. Wertheim-Heck questioned how the retail modernization strategy ignores the diversity of consumer practices and lacks the flexibility to include different 'real world' consumption practices. However, little is known about how effectively such policies and initiatives have shaped the reproduction of safe and sustainable practices among small-scale producers. A common critique is that the government approach is too productivity-focused with little acknowledgement of market linkages and limited outreach to poor, marginalized producers (Friederichsen et al., 2013; Linh, 2001).

3.3.2. Data collection and analysis

Data collection

The data collection was carried out in several steps. First, we conducted a desk study and key informant interviews to gain an overview of food-related regulations and institutions and sociotechnical innovations (niches) in Vietnamese vegetable supply chains. The desk study utilized literature from various sources including scientific articles, government and NGO reports, and legislative documents, while the key informant interviews involved experts and practitioners with more than 10 years of experience in vegetable supply and agri-food controls (see ***Appendix 3.2***). The outcomes from this step provided a basis for the study's emphasis on small-scale supply practices (often seen as the key driver of food safety issues). It helped outline different categories (bundles) of production and distribution practices, informing the design of research questions in the next step.

Second, on-site small-scale vegetable practices were primarily studied using semi-structured interviews, a survey and participant observation. The fieldwork took place between October 2020 and February 2021 in three districts, Cau Giay, Dong Anh (Hanoi), and Tien Lu (Hung Yen), all in the RRD, Vietnam, representing urban, peri-urban, and rural areas, respectively (***Figure 3.2***). The selection of study sites within the RRD is based on the consideration of close intra-regional linkages between vegetable production and consumption activities, as well as the diversity of food environments

along the urban-rural transect (Huynh et al., 2021). Dong Anh is a RAT zone designated by the Hanoi municipal government, supplying vegetables to the urban core of Hanoi. Meanwhile, Tien Lu and Cau Giay represents the rural and urban districts with strikingly different food environments, with the former having only informal wet markets with little development of modern retailing, and the latter having multiple retail formats—including modern channels, traditional wet markets, and street vending—coexisting and thriving. We selected these sites with the assistance of local authorities and local research networks. In each district, we chose two communes or markets where typical vegetable production and distribution practices were taking place.

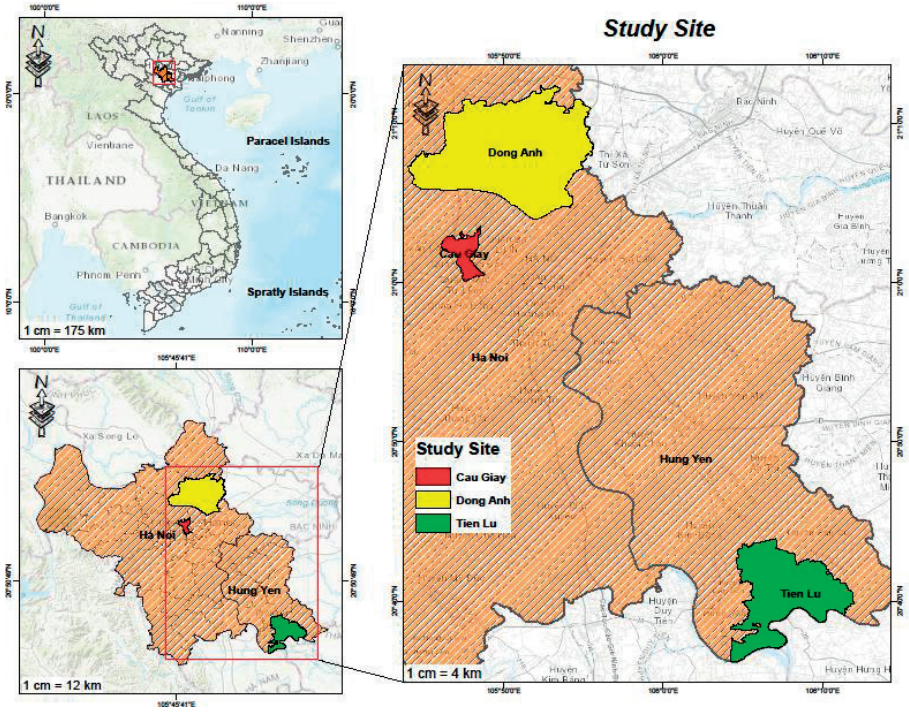


Figure 3.2 *Location of the study sites*

Source: Author using ArcGIS

We used purposive snowball sampling to select producers, paying attention to the diversity of vegetable farmers (with or without cooperatives, certified or non-certified), while wholesalers, wet market retailers, and street vendors were selected using

convenience sampling at traditional markets. A total of thirteen producers and seven distributors were interviewed, while a further 56 producers and 67 distributors were surveyed. Overall, producers in both the survey and interviews have shown to have small and fragmented landholdings (see the general characteristics of the survey respondents in ***Appendix 3.1***). Multiple respondents are engaged in both production and distribution practices, including collecting, pre-processing, and retailing, especially those joining cooperatives or retailing at peri-urban and rural markets.

The qualitative interviews, which lasted between 45-90 minutes, consisted of questions about how specific practices have been reproduced and changed, and how those changes are linked to different key meanings, materials, and competences. To trace back the historical development of practices, we used questions such as "How did you exercise this practice in the past 5-20 years?" and "When and why have the changes happened?". We did not attempt to build general timelines of livelihood trajectories and life courses but focused on identifying instances of key practice changes and the settings that enable them. Meanwhile, the survey comprises questions that inquire respondents about their main bundles of practices, the current situation, and their self-awareness of practice dynamics. The interviews and survey were combined with observations, as the main researcher conducted farm and market visits on several days in October 2020 and February 2021 to observe local production and retailing practices.

Finally, it is important to note that the study is qualitative and explorary in nature (Ahmed et al., 2007). The main findings were drawn from the qualitative interviews, meanwhile the survey data were instrumental in corroborating the interview findings. The use of different methods helps enhance the interval validity of the research (Meijer et al., 2002). However, due to the small sample size and the use of non-probability sampling methods like convenience and snowball sampling, the survey results are limited in external validity and cannot be used to generalise the entire dynamics of small-scale actors in the RRD vegetable systems (Robinson, 2014).

Data analysis

The interviews were recorded, transcribed and managed by Atlast.ti, while survey data were extracted into Excel and analyzed (descriptively) using SPSS. We coded the interview transcripts inductively and deductively following the analytical framework (***Figure 3.1***). After the initial descriptive coding, the codes were categorized using the identified practice bundles and the key associated elements, and new codes and categories were added in the second coding round. We identified major themes that characterize the transitions of different bundles (zooming in). We further constructed narratives on such practice transitions and connected them with dynamics across levels, especially arrangements regarding food safety (zooming out). Results from the interviews and survey were also selectively reported to back the themes and narratives. They would be separately denoted as 'interview results/findings' and 'survey results' to avoid confusion.

3.4. Results: 'zooming in' on small-scale vegetable practices in transition

3.4.1. Production practices

The study identified several transitioning practices among vegetable producers, whereby two bundles of practices stand out, namely, 'crop protection' and '(sustainable) intensification practices' ((***Table 3.1***). The first bundle is organized around the common purpose of preventing pests, weeds, and pathogens, while the second is aimed at enhancing productivity and yield. Some practices have disappeared, as they are considered too effort-consuming and not cost-effective and have been replaced by others (for example, "seed preservation practices" owing to the possibility of purchasing high-yielding seeds in the market).

Table 3.1 *Vegetable production practices in transition and their associated meanings, materials, and competence*

Production practices	Meanings	Materials	Competence
Crop protection practices			
Using biological pesticides	- Enhance safety and reduce health risks for both producers and consumers - Reduce pre-harvest intervals (PHI) - Environmental concerns - Ensure ecological integrity - Reduce pesticide resistance - Reputation of the cooperatives - Social responsibility	- Pesticide labeling - Pesticide shops with sellers able to provide advice - Policies and state capacities to prohibit high-toxicity chemical pesticides - Higher pesticide costs - Pre-harvest intervals - Certification (if possible)	- Skills and knowledge about the impacts of agrochemicals and safer pesticide usage (from IPM training) - Knowledge about pesticide labeling and the benefits of biological pesticides - Ability to supervise (cooperatives)
Using both chemical and biological pesticides	- Productivism: cost-effectiveness of chemical pesticides - Balance effectiveness and risks	- Pesticide labeling - Pesticide shops - Personal protective equipment (PPE) - Pre-harvest intervals	- Ability to read pesticide labels and follow instructions - Ability to observe plant health conditions - Learning and experimenting
Using 'homemade pesticides' and physical methods	- Minimize safety and health risks (especially for self-subsistence) - Take advantage of cheap and locally available ingredients (lemon, chili…) - Ensure ecological integrity	- More work and dedication - Natural insect repellents (lemon, chili, garlic..) - Tools (insect traps and nets) - Certification (if possible)	- Skills and knowledge about ecosystems and agroecological methods (from IPM training) - Ability to observe plant health conditions - Learning and experimenting
Waste management	- Reputation of the cooperatives - Social responsibility	- Waste containers in the field - Waste management plan and workers	- Knowledge about the impacts of pesticide packaging waste

	- Environmental concerns	- Facilities for transporting, disposal, and treatment of pesticide packaging	- Ability to supervise (cooperatives)
(Sustainable) intensification practices			
Using mostly organic fertilizer (esp. chicken manure)	- Maintain soil porosity and fertility - Reduce risks of pests and diseases - Utilize manure from one's farm - Enhance productivity and incomes	- Available manure from chicken farms - Transportation and storage facilities - Area for composting manure - Mineral and synthetic fertilizers (if needed) - Available time - Soil properties	- Know-how from extension programs as well as traditional knowledge - Ability to observe plant and soil conditions - Ability to optimize the usage of organic fertilizers according to plant conditions - Learning and experimenting
Using mostly synthetic fertilizers	- Enhance productivity and incomes - Ensure the essential nutrients for vegetables - Reduce workload and time	- Mineral and synthetic fertilizers - Mineral and synthetic fertilizer costs - Manure (if possible)	- Ability to optimize the usage of mineral/synthetic fertilizers - Learning and experimenting
Post-harvest soil management (incl. composting)	- Improve soil porosity - Remove habitats for pests and pathogens - Ensure soil quality for maintaining yields - Recycle nutrients from agricultural residues	- Work and time - Pumping machine and water - Limestone powder - Available area for gathering and composting residues - Weather (sunlight) - Soil properties	- Cultivation technique - Time management skills - Ability to observe soil conditions - Learning and experimenting - Know-how from IPM training, extension program, and traditional knowledge
Crop rotation	- Improve soil fertility and nutrients - Recover and maintain yields	- Work and time - Compulsory protocols of soil preparation - Weather	- Ability to observe soil conditions - (Traditional) knowledge about seasonal crops

	- Limit pests and diseases - Seasonal suitability	- Soil properties	and farming calendar - Learning and experimenting
Using lightweight machinery	- Balance between labor saving and environmental impacts - Reduce workload (due to loss of labor)	- Lightweight machinery (plowing machine, cultivator, land mower) - Renting cost - Workload	- Cultivation technique - Skills to use and maintain machinery
Using cattle and manual labor	- Concerns for soil health and porosity - Make use of available labor	- Workload - Cattle and buffaloes - Tools (cultivator…)	- Cultivation technique - Ability to manage cattle and buffaloes

3.4.1.1. Crop protection practices: transition toward food safety

There has been a switch from chemical to biological pesticides, as stated by most interviewed producers. The survey results also showed that 90% are now using bio-pesticides, while 27.5% applied physical measures and natural repellents. Only five survey respondents admitted to using chemical pesticides, mostly in the early phase (4-5 days) of vegetable maturity.

Besides, the interviewees confirmed their compliance with the pre-harvest intervals (PHIs), which specify a certain waiting time for the vegetables to be harvested after the last application of pesticides. PHIs can be found on the labels, and biopesticides usually require a shorter time (3-7 days). This implies that the notion and protocols of food safety have been widely diffused among vegetable producers in Dong Anh. This signifies a transition in pest management practices from the unrestrained uses of high-toxicity pesticides (Hoi, A. P. J. Mol, et al., 2009; Hoi et al., 2016) to more regulated, informed, and safer usage.

The use of pesticides and other preventive methods are the central practices in the bundle. One major activity is buying pesticides from dealers. When coming to the shops, many smallholders now reproduce the practice of *selecting and purchasing pesticides with 'biological' labels*. Biological pesticides mostly only target pests and

have little to no harmful effects on water, soil, and ecosystems (Radcliffe et al., 2008). As biopesticides are more selective in treating specific types of pests, the role of sellers becomes more central. The interviews reveal that the producers hardly remember the names and functions of the products; hence, they often have to rely on trust relationships with the pesticide dealer and receive their advice on suitable pesticides and herbicides. "There are too many types to choose, and I did not learn high to know their contents, so it is better to ask the dealer" (vegetable producer, #40).

Although biopesticides were introduced more than 20 years ago, their usage has only gained popularity in the last 5-10 years according to the interviews. The increasing availability of biopesticide products, with labelling and distribution channels, was the key element for this transition. Another factor is the role of the local Plant Protection Department (PPD) since they are responsible for enforcing the national regulations to prohibit the sale and use of high-toxicity chemicals and promote safer products of biological ingredients.

> "Chemical pesticides are cheaper than biological ones [...] The vegetables that we spray chemical pesticides on grow to be better-looking than those with biopesticides. But people in my village now just don't use chemicals anymore. Even if we want to use them, the shops are no longer selling them since the staff from the district and the city (Hanoi) regularly visit the shops and prohibit their sale." (a vegetable producer in Dong Anh, #12).

Biopesticide users primarily attribute concerns for safety, health, and the environment as the central meanings. Being directly exposed to pesticides, farmers are worried about their own health, as well as about the dispersal of those chemicals into the environment. Another driver is their sense of social responsibility and reputation (***Table 3.1***). Some interviewed producers mention press reports on 'two-plotted vegetables', i.e., farmers who grow vegetables in two distinct plots: only one is safe for home use, and the other is for sale. They claimed that that this practice is no longer found in their production zone. Cooperatives also seem to have effects on the practice transition:

> "Because we are a certified cooperative and we sign contracts with canteens [...] If any problem of food safety happens, it could harm our reputation" (vegetable producer, #6).

Awareness about pesticides and their consequences and know-how about alternative pest management methods are prerequisites for the acceptance of safety practices. This could result from the training programs on IPM. As a 'holistic' and 'science-based' approach to combat pests and diseases with minimal application of agrochemical measures (Stenberg, 2017), IPM is the dominant crop protection paradigm globally. IPM was introduced in Vietnam in the mid-1990s with the support of international organizations such as FAO, DANIDA, NORAD, and ACIAR (Van Hoi et al., 2013). Training classes have been organized by local PPD and extension agencies for many vegetable farmers. Nearly half of survey respondents stated that they followed IPM protocols, their extensive application shows that the knowledge from this training has also been disseminated among the untrained producers.

The producers also routinize the practice of *using homemade pesticides and physical measures* to prevent insects and weeds (also introduced through IPM training). Smallholders utilize plant-based insect repellents like garlic, chili, lime juice, and other ingredients like alcohol and limestone to produce spraying mixes. Such homemade mixes are sprayed regularly as a complementary pest control method. Physical controls such as simple hand-picking or using insect traps were also adopted by several respondents. This practice requires more care and dedication, as farmers need to regularly visit and observe the fields to detect and physically remove pests and pathogens as soon as possible. This practice is often performed in combination with biopesticide use, yet four respondents have switched to adopt this practice as their sole plant protection method. Minimizing risks for health and safety, especially for self-subsistence purposes, has served as the key meaning for sustaining the practice.

Several interviewees stated *using both biological and chemical pesticides*. Their practice is built around the notion that agrochemicals can be less risky and more effective if used with caution. For example, one interviewee noted:

> "Chemical pesticides are only used at the earliest stage, and biopesticides are used afterwards. Because I rotated the crops regularly, I need to use chemicals to remove all the pests and pathogens completely" (vegetable producer, #20).

Balancing cost-effectiveness and safety is the key meaning that guides this practice. Intriguingly, whereas insecticides received much stricter supervision, the use of herbicides seems to face fewer restrictions. Some producers consider herbicides a convenient method of weed control and do not feel the public pressure to use more 'biological' alternatives, as in the case of insects and pathogens.

Protocols for *collecting and disposing of waste*, especially pesticide and fertilizer packages, have also been implemented by some producers. In the communes designated as 'safe production zones', waste containers are placed in the fields to prevent the packages from being thrown away improperly. Cooperatives seem to have the ability to supervise waste management practices, as one cooperative leader noted that they often ask members to comply with the disposal rule and launch regular field cleaning.

3.4.1.2. (Sustainable) intensification practices: the interplay of labor and environment

In addition to crop protection, the smallholders also adopted a variety of intensification practices (***Table 3.1***). The bundle '(sustainable) intensification practices' is organized around the notion of maximizing production and productivity for increasing incomes. However, the bundle also involves the idea of improving soil fertility and porosity as well as addressing the lack (or surplus) of rural labor. Hence, small-scale producers attempt to balance the use of more energy-intensive technology with more circular and sustainable practices. The practices are diverse and specific for each producer and area. Traditional knowledge and norms have played a critical role in building the bundle, along with skills and knowledge transferred from IPM trainings and other extension programs.

A prominent practice is the *use of organic fertilizers*, especially chicken manure. Most producers, both in the interviews and the survey, have employed the practice. The utilization of manure for fertilization has a long history, yet it was primarily limited to manure from one's own farm. Cattle and pigs used to be the main sources of manure before the emergence of chicken farms in Dong Anh district and neighboring regions in the 2000s. Smallholders started to buy manure directly from the farms, and afterwards, traders came directly to each village to sell chicken manure. As the use of organic fertilizer requires storage and transportation facilities and significantly more work and time, the key meaning of practice is to restore and enhance soil health.

> "Using chicken manure is more hard work. First, we need vehicles to buy and transport the manure to our home. Then, we have to let it compost until the manure is more porous and ready for use. The weight of manure is much larger, so the workload is higher. If the nitrogen fertilizer is only several kilograms in weight, the amount of organic fertilizer is as large as one hundred kilograms." (vegetable producer, #38)

The *practice of using synthetic and mineral fertilizers* also remains common. The survey reveals that nearly all producers still rely on mineral fertilizers for ensuring the essential elements for the vegetables, while only six producers primarily used synthetic fertilizers. Synthetic fertilizers are considered fast-acting, thus saving time and work. A quarter of producers use both types of fertilizer with the same ratio. Eleven smallholders reported a transition from using mostly manure to using more synthetic fertilizers, unlike the majority of respondents who followed the opposite direction to use more organic fertilizers.

The outcomes of using organic fertilizers have been reported as positive. The interviewees stated that after using more organic fertilizers, soil fertility and porosity were enhanced. They exhibit a clear understanding of how and why soil conditions are important and why organic fertilization is better for soil health. Some areas, which used to be grazing land or paddy fields, became more productive after being cared for and fertilized with manure. However, there are exceptions; for example, several producers

comment that their soil fertility and ecosystems have been declining due to pollution and intensive monoculture.

> "The soil used to be great after we used organic fertilizers. But in the last 2-3 years, the soil becomes polluted, the vegetables wither and die. So, I have to do crop rotation, like switching from cabbage to onion and eggplants, to minimize such impacts" (vegetable producer, #37).

Crop rotation is nothing new but a traditional practice that has been exercised for generations. However, it has had a different meaning for vegetable producers in recent decades. In the past, farmers rotated between rice and vegetables (e.g., two rice crops and one vegetable season) in a year to ensure food security. Since vegetables are now the main source of livelihood for vegetable producers in the designated zones, the rice-vegetable rotation has been transformed into year-round vegetable production. However, the practice of crop rotation remains persistent; producers switch between different species and varieties of vegetables for climate suitability ("each season, each vegetable"), as the vegetables would be more productive and more pest-resistant. One main reason for crop rotation is to restore soil fertility, which has been harmfully impacted by long-lasting monocropping. Nonetheless, this practice is flexible and may differ per farm.

Smallholders have different approaches to cultivating and preparing the soil. Labor plays a central role in this practice. The reduction in the available labor force (owing to youth migration) contributed to the growing *use of machinery*. Renting machinery for plowing, mowing, and tilling is the more affordable and accessible option for most producers. As the farms are small and not suitable for heavyweight machinery, lightweight equipment is preferred. Nonetheless, even lightweight machinery can affect soil structure and make it more compact during wet weather, so cattle and buffaloes remain used (as shown by a few survey respondents). The producers, however, still widely use manual labor to excerise different manual tasks, as vegetables require 'more care and skills than other crops' (vegetable producer, #38). However, the required order of activities has been largely simplified compared to the past. Advanced

technologies and know-how help vegetable producers remove unnecessary tasks and improve productivity with less workload.

Finally, practices of *post-harvest field management* are widely adopted. The central idea is to help the soil remove infections and contaminants and revitalize itself. This integrated practice involves several activities. First is the thorough removal of agricultural residues from the fields, which can be collected and composted to recycle nutrients. The practice is important for exterminating habitats for the reproduction of pests and pathogens. Second, they 'let the soil rest and dry for at least half a month' to utilize solar heating to eliminate pests and facilitate nutrient recycling and restoration of soil porosity (vegetable producer, #30). Finally, producers pump water and use limestone to remove all the remaining insect eggs and fungi. Although this practice involves much traditional know-how, it has been widely diffused among producers in the last ten years thanks to extension programs. Respondents consider the practice a simple procedure to offset the impacts of intensification and reduce pesticide requirements.

3.4.2. Post-production and distribution practices

We also explored the changes in the vegetable distribution practices, involving collectors, processors, wholesalers, transporters, retailers, and street vendors. Unlike production practices, the findings show little evidence of any clear transition in distribution practices. However, we identified two key trends. First, the role of cooperatives and cooperative-linked practices have re-emerged. Second, practices of collecting, wholesaling, transporting, and retailing have been diversified under the impacts of urbanization and enhanced means of transport and communication.

3.4.2.1. The re-emergence of cooperative practices

Cooperatives used to be the dominant regime actors in Vietnamese food systems in the socialist era. After the late 1980s economic reforms, multiple agricultural production cooperatives were dissolved or transformed into service cooperatives. Nonetheless, after the new Cooperative Laws (2003, 2012) and other policies, the government

promoted a new model of cooperatives that would be more economically responsible and play a pivotal role in promulgating safety and organic standards and connecting smallholders with the markets (Nguyen-Minh et al., 2023). In communes designated as RAT zones, such restructured cooperatives were established, with around 10-20 households and a democratically elected director board. The director board is responsible for legal and financial management of the cooperatives, while other members can be voluntarily recruited and engaged in other cooperative's activities (Cooperative Law, 2012).

Our study observed a variety of re-emerging cooperative practices. These practices involve both production (planning, contracting, knowledge, and information sharing, supervising) and post-production (collecting, pre-processing, transporting) activities. For example, at the beginning of each month and each cropping season, the cooperatives *discuss and make plans* about which varieties of vegetables should be grown to meet the orders of their customers. The cooperatives may choose to obtain safety certificates (RAT and VietGAP) and thus become responsible for *supervising* their members to adopt and comply with safety protocols. Another key practice of cooperatives is to organize regular meetings to *exchange information and know-how* (Naziri et al., 2014). Policies and regulations regarding food safety, plant protection, and knowledge about safe practices are disseminated in these meetings.

Contracting is one of the key practices involving cooperatives. Certified safe vegetable cooperatives sign contracts with buyers like supermarkets or catering services. Hereby, the board needs entrepreneurial and financial skills to enact and sustain the practice. Following such agreements, cooperatives *collect* vegetable products from their members and exercise practices of *pre-processing and transporting* the products to the customers. This practice, however, faces several risks and constraints. For example, in the case of contracting with supermarkets, payments are often made every 1-2 months. This could generate financial uncertainties for cooperatives composed of mostly smallholder producers with limited savings. Contracting can also be influenced by socioeconomic shocks. During the social distancing period of the COVID-19 pandemic,

one cooperative reported that sales were lost due to the closure of catering services for companies, while one cooperative having contracts with a supermarket chain maintained or even increased its profits.

Some risks relate to the potential mismatch between the available quantity and safety of products and those demanded by the markets and customers. Sourcing vegetables from external producers sometimes occurs when demand for certain vegetables exceeds the available quantity on the members' farms. In some cases, the contracted amount of vegetables was lower than the harvested produce, prompting the members to sell vegetables (at lower prices) through conventional channels like traders or nearby wet markets. Nonetheless, both circumstances entail the risk of mixing certified products with products from unregulated origins. Some respondents see the mixture of certified and non-certified products as the main constraint for them to comply with certifications. The leader of Nam Hong Cooperative stated that his cooperative used to acquire VietGAP certification, but "after two years, we no longer reapply for that. It is too costly to get, but it cannot ensure marketability [...] It makes no sense when we paid a lot for the certificate, but we have to sell products to the outside market at the same price as normal vegetables" (In-depth interview, vegetable producer, #11).

3.4.2.2. Diversification of wholesaling, transportation, and retailing practices

The distribution practices of small-scale wholesalers and retailers are increasingly professionalized and diversified. This is different from the past practices in the late 1980s and early 1990s, when smallholder producers were also engaged in distribution. While most vegetables grown were for home consumption, the surplus was brought on (motor) bicycles to nearby traditional markets. The vegetable supply chain was short and local with little diversity in vegetable distribution practices.

Since the economic boom in the 1990s, with the expansion of distribution networks and the growing trade between urban and rural areas, more smallholders have become engaged in the vegetable production system but with different roles. The practices of collecting, trading, wholesaling, and retailing started to be routinized by professional practitioners. Infrastructure development and the availability of motorbikes and

telephones facilitated their access to different sources as well as to different marketplaces at longer distances. These elements contributed to the diversification of distribution practices, as shown in ***Appendix 3.3***.

There is considerable variation in how small-scale actors buy and sell products in urban, peri-urban, and urban areas. The more the areas are urbanized, the more retailers are sourcing from wholesale markets or other indirect sources. Meanwhile, retailers in urban markets continue to procure most vegetables from home farms and local farms. The rural–urban difference reflects a divergence in daily lifestyles and routines. Rural and some peri-urban retailers collect products and bring them to nearby wet markets for sale, similar to the traditional practice. For wholesalers and other retailers, the distribution practices mostly involve trading activities at nocturnal wholesale markets, in addition to collecting, gathering, and transporting products and re-selling vegetables at retail markets in the daytime. Overall, the arrangements of the latter practices require more time and work, thus requiring the engagement of more full-time and professional laborers.

Wholesaling practices also involve the extensive use of mobile phones. Since wholesalers acquire products from multiple sources, they have to establish their private 'circle of suppliers'. We also found evidence for digitalization, since wholesalers use messaging applications like Zalo (a Vietnamese mobile app) to support such networking activities. Information about prices, origins, and quality of vegetable products is often exchanged via such apps. New practitioners in wholesaling are often recruited via kinship or close relationships with older practitioners. Necessary entrepreneurial, financial, and communication skills all need to be built up through learning and experience.

> "My elder sister also did that job, and she helped me start this business. After some time working with my sister at the wholesale market, I now have my list of suppliers. They are collectors in different regions [...] In my Zalo, I often contact them to ask about fresh products. After we negotiate the price, my husband and

> I drive to the wholesale market in their district to take products. We sort and bring it here to sell to the retailers" (Interview, vegetable wholesaler #291)

For *retailing practices*, new practitioners are recruited more easily. They may be small farmers who just want to sell their surplus vegetables and earn some additional income or full-time sellers who rely on vegetable retailing as their main source of livelihood. They have different motivations and expectations, leading to varied strategies for maintaining, expanding, or subsiding the practices. Motorbikes, as affordable and convenient transportation means, have a critical role in adopting and reproducing the practice. While there is no clear pattern of the changes in retailing practices at the three study sites, there are interesting accounts from individual retailers on how urban development and advances in transportation affected the trajectory of their livelihoods and practices.

> "Just seven years ago, I just grew vegetables and sold them at the market near my village. I lived alone with my mother, and I did not have much money to buy stuff. Then, I decided to bring my vegetables to this (urban) market as I can sell them at much higher prices. Every day I wake up early to collect vegetables from my farm. Sometimes, I also take some vegetables from the villagers. I bring all of them – around 70-100 kg in total – using my motorbike. My village is 20 km from here, so it takes about only half an hour in the early morning [...] In the afternoon, after finishing, I return home and take care of my farm." (Interview, vegetable retailer, #287)

Street vending is also a retailing practice, yet the difference is that the retailers are often mobile with no fixed location. In urban Hanoi, there are many 'temporary markets' organized on streets with no official approval from the government, making the distinction between street vending and other retailing practices less clear. However, our findings suggest that most street vendors are sourcing products from home and local farms, which is different from the reliance of urban market retailers on wholesale markets.

Finally, on safety issues, we found that most interviewed and surveyed distributors expressed concerns about food safety but had little awareness about food safety certificates such as VietGAP. While safety certificates are among the criteria for some surveyed retailers to select vegetables, yet none could explain how those certificates can be adopted. The survey indicates that a more common criteria is to procure from designated and reputed safe production zones (for example, in Dong Anh). Overall, the distributors apply a set of individual skills and knowledge to assess the freshness and safety of vegetables, along with other factors such as locality, seasonality, and personal trust relations with the suppliers, as described in Wertheim-Heck et al. (2014).

3.5. Results: 'zooming out' to practice linkages and points of intersection

3.5.1. Horizontal and vertical linkages

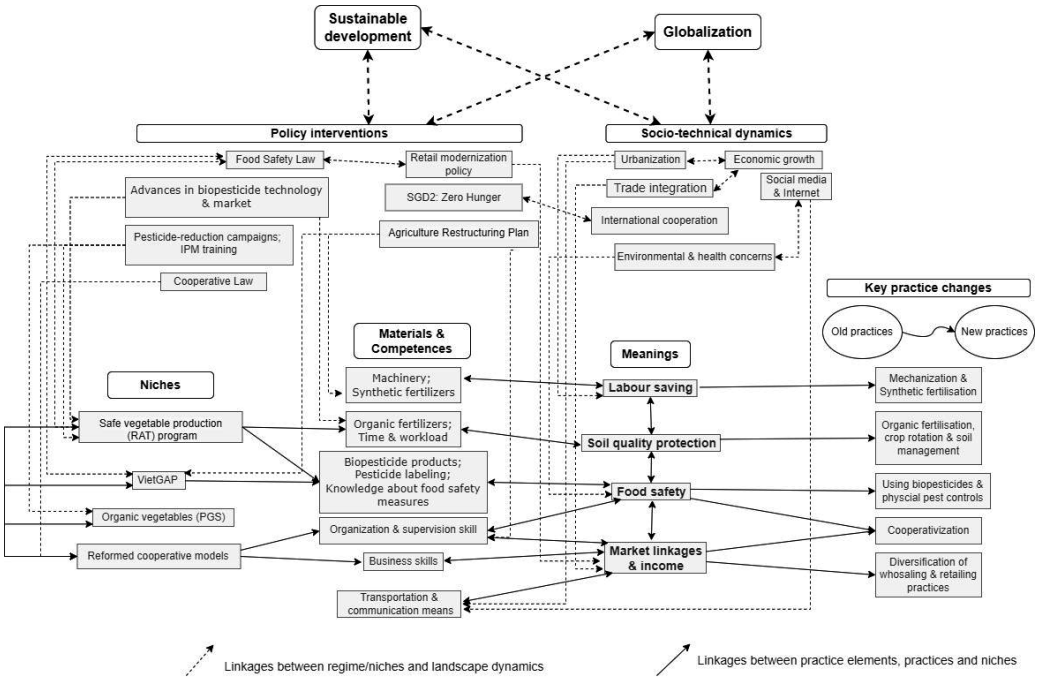


Figure 3.3 *Horizontal links between key meanings, materials, and competencies of small-scale practice dynamics and their vertically linked dynamics.*

Source: Own elaboration based on the interviews and desk review

After 'zooming in' on the small-scale practice dynamics at the study sites, we explore the horizontal and vertical linkages of those practices at the food system or national level. Figure 3 demonstrates these intra- and cross-level interactions, adapted from the analytical framework (***Figure 3.3***) and the findings from the fieldwork and the desk study.

In ***Figure 3.3***, horizontal linkages among elements within practices or between different practices and bundles were identified and mapped. To simplify the combined analysis, we clustered the dynamics in small-scale practices based on the key meanings that guide the directionality of the dynamics. Each key meaning can represent a 'strategy' or 'pathway' that smallholders embrace to adjust their routinized practices. Those key meanings play a central role in connecting key practice changes with the necessary materials or competences.

Second, the vertical linkages were examined by connecting SPT with MLP analysis of food systems. These strategies and pathways are associated with broader movements and certain interventions across levels. At the national landscape level, two determining socioeconomic processes – urbanization and trade integration – have affected the availability and quality of agricultural inputs like pesticides, machinery, labor, and land. At the regime level, three major policy interventions are prominent: (i) the series of policies and initiatives toward promoting safe production and standardization, (ii) the retail modernization policy that promotes the development of modern retail channels replacing weakly regulated traditional markets, and (iii) the 'Agricultural Restructuring Plan' (since 2013) that endorses large-scale farming and subsidizes access to high-tech and sustainable technologies. Such interventions are associated with the establishment of several socio-technical niches, notably the RAT production zones, VietGAP-certified production, and the reformed cooperative models (that might incorporate the former two niches). All of the interventions and processes can be linked with two global attractors: sustainability and industrialization/globalization. These two global principles are continuously introduced and embedded in the international linkages of trade and investment, certification and standards, and the projects of international organization.

3.5.2. Intersection points

The outcomes from the examination of horizontal and vertical linkages help identify 'points of interactions' to denote issues that can block or leverage the diffusion of food safety practices (***Figure 3.4***).

First, we specifically explored the interactions of elements within food safety practices. Food safety practices involve myriad elements with various levels of tightness, of which limitations or weaknesses can differently influence the possibility of adopting and reproducing practices. As shown in the previous section (**Table 4.1**), enacting safe production practices often requires an understanding of crops, pests, and weather, as well as concerns for human health and the environment. Such competences are shown to be strong for committed producers who have built robust knowledge foundations after intergenerational experiences in vegetable farming. However, small-scale producers generally have less capacity to supervise and plan. Another major limitation lies in the predominance of informal norms and personal trust relationships to verify the idea of 'safety', leading to a weak presence of formal institutions like written contracts or certifications (Hoang, 2020). Both can affect the possibility of upscaling safe production and diffusing safety standards through supply chains.

Second, food safety practices can also have collaborative or competitive relations with other practices as they might compete over finite material resources or involve significantly different meanings (Watson, 2012). For example, the uses of *biopesticides* and *chemical pesticides* compete over money and farm habitats as well as in the perceptions of safety and responsibility, while the use of *physical crop protection* might compete with intensification measures over the requirement of labor and time. Collaboration happens when a practice helps to produce elements that are necessary for sustaining others. Safety practices could collaborate with more sustainable intensification practices, especially *crop rotation* and *post-harvest soil management* which have flexible meanings and implementation methods. Both practices can be exercised seasonally or yearly to remove remaining pests and reduce pesticide requirements, along with the other purposes of recycling nutrients and restoring long-

term soil fertility. Another example is the role of emerging *cooperative practices*, which integrate information sharing, supervision, planning, and marketing practices to 'filter' certain practices of crop protection and variety selection. The bundle hence has the potential to transform farming practices by creating linkages with new knowledge and meanings on food safety and sustainability and building relations with new networks involving safe food buyers, intermediaries, and research and extension institutions.

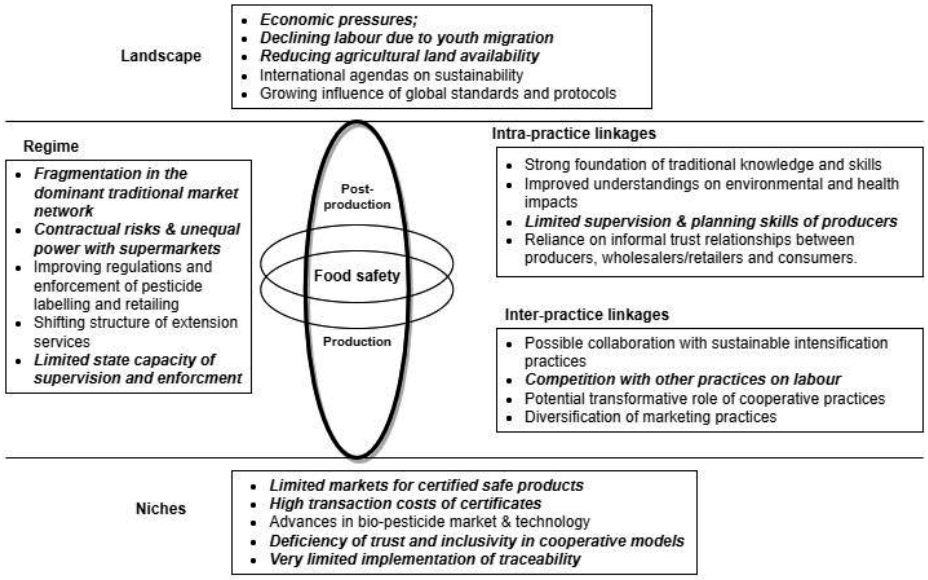


Figure 3.4 *The points of intersection between food safety practices and other dynamics*
Source: Own elaboration based on the interviews and desk review

Finally, using the combined findings from the desk study and the fieldwork, we scrutinized and highlighted specific dynamics within landscape, regime, and niche levels that potentially influence the performance of food safety practices. Building on the above outline of horizontal and vertical linkages, we identified multiple intersection points between the reproduction of safety practices and multi-level dynamics. These points are summarized in ***Figure 3.4***, inspired by the works of Gazull et al. (2019) and Hargreaves et al. (2013). The figure presents different factors that hinder the diffusion of food safety protocols, from the internal weaknesses of practitioners to the competition and mismatches with other practices, from the external risks and

blockages within the regimes to the overwhelming landscape pressures. We will further discuss this aspect in the next section.

3.6. Discussion

3.6.1. The use of social practice and multi-level analysis

This study has examined the dynamic practices of small-scale actors in the Vietnamese vegetable sector, to unfold how and why smallholder practices have changed over the last 20 years, and what can explain the success and limitations of adopting safe food practices. We hereby drew on the SPT and MLP theoretical frameworks. The findings reveal several key patterns of small-scale practice changes, especially the switch to using biopesticides as well as the growing adoption of sustainable intensification practices (organic fertilization, soil management), although uses of synthetic fertilizers and machines remain common. Furthermore, the results provide a detailed description of the different materials, competencies, and meanings involved in different (bundles of) practices. Materials like finance, time, labour, agri-inputs, soil, machines, and weather, along with multiple competencies and meanings are combined in normalizing and routinizing the practices.

This research goes beyond the conventional field of consumer practices (Svennevik, 2022) and adds to the small yet growing number of studies that explore the social practices of food provisioning (Adeosun et al., 2022; Swagemakers et al., 2012; Ulug et al., 2021). However, we also recognized some major difficulties when adopting SPT and MLP to analyze smallholder provisioning practices. The study had to address multiple timespans of provisioning practices, not just daily routines but also seasonal and yearly habitual activities. These practices are also situated in compounded networks involving myriad actors, including human and non-human agents, intersected with a wide range of institutional and market arrangements. Hence, the analysis of provisioning practices could not be limited to the conventional 'social practice model' (practices as intermediating between lifestyles and systems of provision), as in most studies of consumption practices (Spaargaren, 2003).

Therefore, our study also adopted concepts from transition theory to expand the analytical lens and identify the intersections of smallholder practices with niche, regime, and landscape dynamics. The results show how SPT and MLP are complementary in understanding the complex arrangements of practices and institutions. Applying both approaches for qualitative analysis allows for understanding practice-as-entity with particular local enactments.

However, we acknowledge that the findings are mainly applicable for the studied communes and districts in Hanoi and Hung Yen. With a limited sample size and non-probability sampling methods, the study cannot generalise and evaluate the practice-as-performance of Vietnamese or even RRD smallholder vegetables. This invites future research combining our exploratory, qualitative analysis of social practice and multi-level dynamics with robust quantitative studies to assess smallholder practices, drivers, and performance outcomes thoroughly.

3.6.2. Stability and changes in smallholder practices: a food safety transition?

This study emphasizes the combination of stability, change, and diversity in small-scale vegetable supply practices. Stability in smallholder practices, like consumer practices, is reinforced by the continuous reproduction of practice elements. Our findings demonstrate that for all producers, their vegetable production practices maintain some essential characteristics of small-scale, artisanal farming. Smallholders are limited in their land, capital, and labor endowments and are inclined to adopt routines that resemble the old, traditional patterns. In that view, using organic fertilizer, reducing tillage, or adopting crop rotation and post-harvest soil management can be considered the re-enactment of old practices with newly adjusted meanings. Even in the case of using biopesticides, the purchasing and spraying routines do not fundamentally diverge from the conventional ones, while the main differences are the recognition of biopesticide labeling and the active role of pesticide dealers.

Although we recognized the inclination of smallholder practices to stabilize, there are also different accounts of novelty and change in the case study. Many respondents,

especially those associated with cooperatives, reported a switch to adopt safety protocols (guaranteeing PHIs and using biopesticides) and organic fertilizers, whereas others maintained the use of chemical pesticides or synthetic fertilizers. The differences in the acceptance and pace of diffusion among smallholders indicate that the smallholder community is not homogeneous or static but heterogeneous and dynamic (HLPE, 2013; Kaiser & Burger, 2022). This diversity can be attributed not only to the multiplicity of geographic, socio-economic, and ecological backgrounds (Iles et al., 2020) but also to the differences in interest and motivation among practitioners (Warde, 2005). Respondents have rationally explained why they perform certain crop protection or intensification practices, citing one among three key meanings of "food safety", "labor-saving" and "soil quality protection" as the core purposes, while not excluding common purposes like "maintaining farm business" or "earning income". This echoes the notion of Huttunen & Oosterveer (2017) that there should be 'hierarchically organized purposes' in prioritizing the adoption of practices, signifying the critical importance of agency in shaping practice transitions.

The study outlined several technological and socio-institutional developments that impacted the transition of smallholder practices. Policy interventions like IPM training and regulations on pesticides, along with the enhanced access to advanced technologies and the development of other regimes (e.g., the livestock sector), offered new materials and competencies for enacting new practices. Urbanization and modernization are also major determinants of novelties: urban developments encroached and put pressure on farm activities, and small-scale distributors adapt to changing urban and market infrastructures in diverse ways. Additionally, ideas from the safety and sustainability discourses affected the shifting of crop protection and intensification practices.

Our study suggests a certain degree of success of the long-term interventions promoting IPM and safer pesticide usage (Hoi et al., 2016) that led to the diffusion of biopesticides in Dong Anh. However, validating this requires more empirical data, considering that biopesticide products constitute only a small (but growing) share of the global pesticide market (Damalas & Koutroubas, 2018). Meanwhile, there were no

clear normative changes in distribution practices, except for a small group involved in cooperatives. The diversification of distribution practices was not linked with 'food safety meanings' but only to maintain their business and earn an income by adapting to urbanizing contexts. The limited motivation among distributors to change also indicates lock-in effects in the dominant regime (***Figure 3.4***): fragmented traditional markets with inadequate food surveillance and low consumer trust and acceptance of certified safe products (Nguyen-Viet et al., 2017). Even for cooperative practices, the possibility of upscaling is constrained by unequal negotiating power and difficulties in recruiting new members (who must share existing visions and comply with cooperatives' supervision). These lock-ins could hinder the diffusion of safety practices beyond safe production zones and cooperatives.

Our findings enrich the ongoing debate about food safety policy in Vietnam and other LMICs. The neoliberal policy approach that emphasizes "supermarketization" and global standards is emphasized as limited in flexibility and inclusiveness (Hoang, 2020; Wertheim-Heck et al., 2015), but there are also few results in generating practice changes within traditional distribution networks. It highlights the need for more innovations and interventions that simultaneously target various components of vegetable systems, rather than just production, to enact its reconfiguration toward food safety (Bui, 2021).

3.6.3. Future 'pathways' of smallholders: prospects for policies

Our last discussion emphasizes that policy interventions should acknowledge the multiplicity in smallholders' interests, which influence their strategies in adjusting practices. While our study did not attempt to provide a typology of smallholder pathways like some previous studies (Huttunen, 2019; Kaiser & Burger, 2022), we suggest that the three key meanings of 'food safety', 'saving labor' and 'soil environment protection' interact to shape the transitions of smallholder production practices. Among these three meanings, labor has been a constraining factor that influences smallholder decisions to either sustain more labor-intensive practices (using organic fertilizers or physical pest controls) or to adopt labor-reducing technologies.

Considering the short cycle of vegetable crops (i.e., requiring more workload to care) and the typically small landholdings (Huong et al., 2013b), interventions for promoting safe or sustainable vegetable practices in Vietnam should prioritize considering the availability of labor on farms, which seems to decline over time due to youth migration.

Soil fertility is traditionally a vital concern for smallholders who want to sustain long-term productivity. This explains why multiple smallholders adopt organic fertilizers and other soil cultivation practices despite fewer public interventions to protect the soil environment. However, the adoption of such practices, as our case shows, is mainly organized around the idea of securing long-term soil productivity to maintain farm business. This implies that care about the environment might not be the priority of smallholders but that this is embedded in the self-sustaining meaning shaped by path dependency and formative experiences (Hedberg & Zimmerer, 2020). Hence, future initiatives should seek to engage the current soil management practices with broader meanings, especially for promoting coordinated actions to cope with ongoing threats to land availability and the soil environment, such as pollution and land grabbing due to industrial and urban development.

Lastly, food safety is the most strictly steered pathway among the three meanings, with many interventions and niches promoting safe production practices. Such initiatives, along with the public discourse on food safety, are proven to be partially successful in pulling smallholders to adopt safer practices. Smallholders found more institutional support to follow the food safety pathway rather than other goals of soil and environmental protection (Baur, 2020) and could more easily associate their practice changes with the grand narratives of sustainability and globalization by following the global protocols of IPM and GAP. However, as discussed in the previous section, such transitions in production practices are misaligned with the inertia in distribution practices and institutions.

3.7. Conclusion

Our study explored the transitioning practices of Vietnamese vegetable smallholders during the last 20 years. We found that smallholder practices tend to stabilize due to

path dependency and limited capital availability but also identified different accounts of changes and opportunities for innovation. It is intriguing to observe that in our case, smallholder producers were generally not resistant to adopting safety practices, yet it was the inertia in distribution networks that hampered the possibility of upscaling them and transforming the whole supply chain. Food safety, labor, and soil fertility together constitute the three key meanings that constrain or steer pathways of smallholder practices. Their interplay under the landscape pressures of globalization/industrialization and sustainable development has significant impacts on smallholder practices and decisions, either to fulfill a single meaning or to find a balance among the three of them, to 'move up' and upscale good practices, or to 'move out' to find alternative incomes (Fan & Rue, 2020). This study calls for future research and policies that acknowledge the various interactions of smallholder practices and their key meanings and recognize the crucial role that smallholders play in delivering food safety outcomes and other sustainable goals in the developing world.

Appendix 3.1 Descriptive characteristics of survey respondents

Group	Sex (% of female)	Age (yrs)	Household size (number of people)	Income level*	Educational level**	Livelihood diversity *** (number)	Farm size (m^2)	Number of farm plots
Vegetable producers (n=56)	89.9%	53.3 ± 9.8	4.3 ± 1.6	3.7 ± 1.4	2.3 ± 0.8	2.3 ± 1.1	2155 ± 1141	3.9 ± 2.8
Vegetable distributors (n=67)	95.8%	47.3 ± 9.7	4.5 ± 1.7	3.9 ± 1.2	2.3 ± 0.7	2.0 ± 1.0	NA	NA

Note: * Levels of monthly household income per capita (1-5): <1.5, 1.4-2.4, 2.4-3.4, 3.4-4.9, >4.9 million Viet Nam Dong (quintiles based on Viet Nam Household Living Standards Survey 2018)
** Educational levels (1-6): primary school, secondary school, high school, public college/professional high school, bachelor's degree, post-graduate.
*** Livelihood diversity: the total number of livelihood activities of all members currently living in the household.

Appendix 3.2 List of key informant interviews

Code	Organization and position	Date interviewed
K1	Market Management Board – Head	2020-12-02
K2	Department of Economy - Staff	2020-12-03
K3	Director of Dong Anh Plant Protection Agency - Director	2020-12-15
K4	Dong Anh Plant Protection Agency – Vice Director	2020-12-15
K5	Tang My (Nam Hong) Safe Vegetable Cooperative – Director	2020-11-17
K6	Son Du (Nguyen Khe) Cooperative – Director	2020-11-17
K7	Co Loa Agricultural Service Cooperative - Director	2020-12-03
K8	Cau Giay Management Board – Director	2020-12-12
K9	Minh Khai Market Management Board – Manager	2021-01-07

Appendix 3.3 Characteristics of wholesaling and retailing practices

Distribution practices	Daily trading quantity	Buying from	Selling to	Required means
Wholesaling (n = 22)	50-5000 kg/day	Home farms (9); Local farms and cooperatives (6); Other wholesalers (4); Relatives and friends (1); Reputed farms and cooperatives in the province (2); Traders from other provinces and China (2)	Retailers; catering services; restaurants; supermarkets; individual consumers	Automobiles & motorbikes; telephone with message app
Retailing at rural markets (n = 11)	10-200 kg/day	Home farms (6); Local farms (4); Wholesale market (1); Relatives (1)	Individual consumers; restaurants	Bicycles, motorbikes

Retailing at peri-urban wet markets (n = 17)	10-300 kg/day	Wholesale market (8); Local farms (7); Home farms (5)	Individual consumers; restaurants; relatives; traders;	Motorbikes
Retailing at urban wet markets (n = 22)	10-200 kg/day	Wholesale markets (17); Local farms (5); Home farms (4);	Individual consumers; restaurants	Motorbikes
Street vending in urban areas (n = 10)	20-100 kg/day	Home farm (7); Local farms (2); Wholesale market (3)	Individual consumers; restaurants; relatives;	Bicycles, motorbikes

4

Biosecurity and food safety in Vietnam's small-scale pork system: Navigating the regime-practice intersection

4.1. Introduction

The 'livestock revolution' in low- and middle-income countries (LMICs) is marked by an intensifying production in response to the rising demand for meat and animal-sourced foods (Dickson-Hoyle & Reenberg, 2009; Steinfeld, 2004). While bringing significant economic and nutritional benefits (Herrero et al., 2013), this transition also entails new challenges for animal and human health. Higher livestock density, habitat loss, climate change, and expanding trade and human-animal contacts amplify disease risks, with diseases like Avian influenza, foot-and-mouth disease, and African swine fever (ASF) disrupting livestock supply chains and threatening farm livelihoods (Baker et al., 2022; Rohr et al., 2019). Additionally, zoonotic pathogens and the misuse of antibiotics and other chemical residues in livestock products pose a major global health and economic burden (Grace, 2015b; Kirk et al., 2015).

Biosecurity and food safety measures have emerged as critical responses to these challenges. Biosecurity encompasses practices for preventing disease introduction and transmission within farms and regions (FAO, 2007; Huber et al., 2022), while food safety focuses on risk-based management aligned with international standards like Hazard Analysis and Critical Control Point System (HACCP) and Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) of the World Trade Organization (WTO) (Henson & Caswell, 1999). Despite extensive policy initiatives, small-scale producers, who dominate livestock systems in many Asian and African countries, show persistently low adoption rates of such protective measures (Hall et al., 2004; Perry & Grace, 2009). Previous research has examined individual factors like knowledge and attitudes (Chenais et al., 2019; Garforth et al., 2013; Tornimbene et al., 2014) and structural constraints such as inadequate access to veterinary services, market, or government support (Gura, 2008; Knight-Jones et al., 2017; Young et al., 2015). The behavioural and structural lenses, however, have not adequately addressed the interlinkages between livestock dynamics, production practices and the broader socio-institutional and technological contexts in which they are embedded.

Middle-range theories, such as Social Practice Theory (SPT) and transition theories, can offer analytical tools for a better understanding of the interlinked dynamics. SPT examines everyday, routinized activities (*practices*) performed by knowledgeable and capable actors (Spaargaren et al., 2016), while MLP explores fundamental changes (transitions) across niches (local innovation networks), regime (the dominant system), and landscape (the external driving factors) (Geels, 2004). Together, SPT and MLP offer an integrated approach to understanding the "intersection points" where individual practices intersect with broader systemic dynamics, either fostering or hindering change (Hargreaves et al., 2013). This approach can be adopted for studies on *food systems* (Brouwer et al., 2020; Hinrichs, 2014; Nguyen-Minh et al., 2023), highlighting cross-level interactions among food system components like agri-food supply chains, food environment, and consumer choices, and their drivers and outcomes (Gaitán-Cremaschi et al., 2019; Hebinck et al., 2021; Weber et al., 2020).

Applying SPT and MLP, this study aims to investigate practices of biosecurity and food safety in Vietnam's small-scale[9] pork system which expanded significantly since the late 1980s economic reforms (Lapar, 2014). In the context of the large expansion of these production systems, pork smallholders are facing mounting pressures from disease threats like ASF, fluctuating input prices, persistent food safety issues despite efforts to enforce food safety controls (Nguyen-Viet et al., 2019), and potential marginalization from the industrialized, large-scale sector operating under stricter biosecurity and safety regulations (Ngoc Que et al., 2020).

In understanding practices of small-scale pork actors, two questions will be explored: (i) How have small-scale pork practices evolved over the past 20 years, particularly in terms of biosecurity and food safety aspects? (ii) What are the key intervention points for promoting practices that enhance biosecurity, food safety, and sustainability of the small-scale pork systems? The paper is structured as follows: we start by elaborating

[9] Smallholders mostly refer only to producers with small-scale farm size (usually less than 2 ha of landholding), we used 'small-scale' and 'smallholders' interchangeably in this paper. Hence, small-scale (smallholder) pork systems would include the smallholder pig farmers (mostly less than 100 fatteners), and the distribution systems associated with those smallholders.

on the theoretical background, including SPT, MLP, and their integrated framework (section 2). Section 3 explains the methodology, while Section 4 introduces the Vietnamese pork system and the socio-institutional landscapes. Section 5 presents the findings on practice changes and intersections, and Section 6 discusses the smallholder practice pathways and the implications for sustainable food system transitions.

4.2. Theoretical background

SPT is not a single theory but encompasses a range of theoretical approaches focusing on 'social practices', defined as routinized, shared 'ways of doings and sayings' that people reproduce in everyday contexts (Spaargaren et al., 2016). SPT views practices as the primary unit of analysis rather than individuals, who are seen as carriers of practices (Reckwitz, 2002). In agri-food systems, practices include dispersed activities (Spaargaren, 2011) like feeding, breeding, and cleaning (production), as well as slaughtering, processing, and retailing (distribution). These can form bundles of practices sharing elements or locations, such as 'biosecurity practices' or 'food safety practices'.

The common framework developed by Shove et al. (2012) conceptualizes practices as configurations of three elements: *meanings* (norms, values, beliefs), *materials* (tools, infrastructure, inputs), and *competences* (knowledge and skills). Practice changes occur through *de*- and *re-routinization*, when linkages among elements are disrupted and recreated with new elements (Spaargaren & Oosterveer, 2010; Stehouwer et al., 2022). This approach hence innovatively emphasizes how behavior change emerges from trajectories of practices, shaped by socio-historical contexts, rather than invidual decisions (Warde, 2005).

Practice changes do not occur in isolation but are often connected and intertwined in larger networks of social and institutional arrangements. Nicolini (2009) has addressed this notion by proposing the approach of 'zooming in' to scrutinize individual practices and their associated elements, and 'zooming out' to examine interconnections among practices across scales. This approach encourages the broadening of theoretical

lenses, utilizing other frameworks such as the Multi-Level Perspective (MLP) of transition theory.

The MLP focuses on system changes, especially long-term, fundamental ones (*transitions*), viewing transitions as outcomes of confluences of dynamics across different levels (Geels & Schot, 2007). Niches, where innovations are incubated, are often more dynamic and unstable, while the regime – the dominant level that fulfills most societal functioning – is characterized by coherence and stability (Holtz et al., 2008). Landscape factors, including both global/national long-term pressures (i.e., climate change or global trade integration) as well as sudden shocks (i.e., diseases or natural hazards), can significantly shape the overall evolution of regimes and niches.

SPT and MLP significantly differ in their ontologies, as the MLP emphasizes the vertical orders between three levels, and the SPT takes a horizontal, flat viewpoint that often regards practices as equivalents (Shove & Walker, 2010). However, it is argued by Geels (2011) that the levels in MLP are indeed levels of structuration and stability rather than strict hierarchal levels (Giddens, 1984), and the difference between regime and practices is similar to the difference between the established and self-reinforcing practices and the emerging and experimental (proto-)practices. On the other hand, the two perspectives share key similarities in addressing tensions between stability and change, emphasizing how established, interlocked systems often prefer existing trajectories and resist radical changes (Smith & Raven, 2012; Spurling et al., 2013). Disruptions and internal tensions enable proto-regimes or proto-practices to potentially reconfigure or substitute existing regimes and practices (Frantzeskaki & de Haan, 2009; Schatzki, 2013).

Such theoretical parallels establish the foundation for integrating SPT and MLP (Svennevik, 2022). Hargreaves et al. (2013) and other studies (Gazull et al., 2019; O'Neill et al., 2019; Seyfang & Gilbert-Squires, 2019) explored the interplay between regime and practice transitions. The interplay can be termed differently, such as *frictions* (Hoffman & Loeber, 2016), *sticking points* (Watson, 2013), *points of convergence or divergence* (Gazull et al., 2019), or *fractures* (O'Neill et al., 2019).

Overall, all terms refer to the points of intersection between practice circuits and regime dynamics, which can have lock-in effects that hinder innovations or induce frictions that foster changes. We consider those intersection points as essential to the analysis of practice transitions and for suggesting interventions.

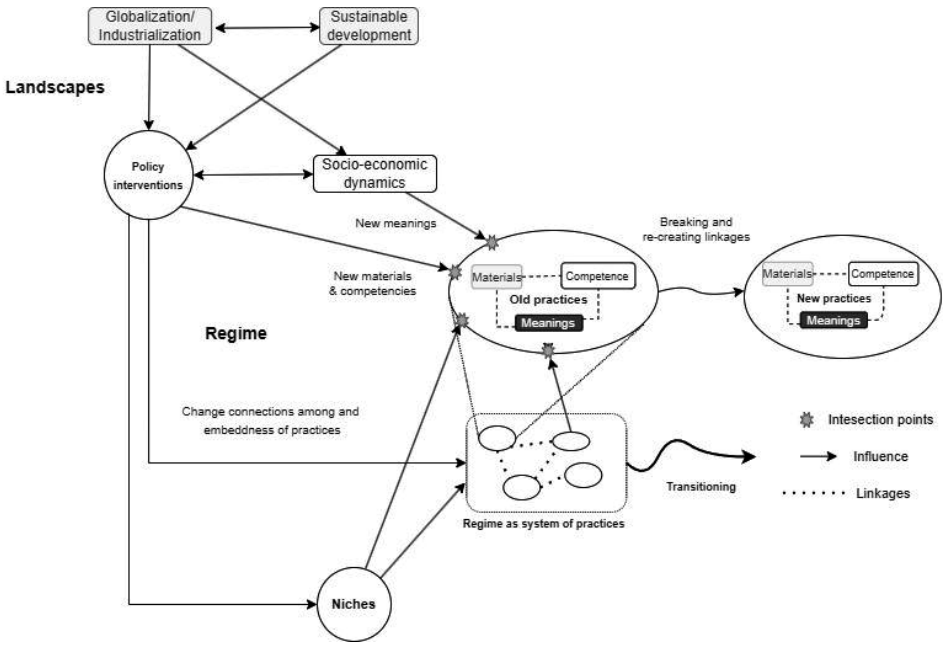


Figure 4.1 *Conceptual framework.*

Source: Own elaboration, primarily based on Shove et al. (2012) and Hargreaves et al. (2013).

The conceptual framework is presented in ***Figure 4.1***. Key practice changes are identified and analyzed via the scrutiny of the three practice elements and their interlinkages. The process of how linkages are maintained, disrupted, and recreated to create practice changes is the focus of 'zooming in' analyses. 'Zooming out' involves the examination of linkages and intersections between practices and regime dynamics, under the effects of global trends, shock events or niche innovations. Spaargaren et al. (2012) identified two global trends: 'globalization' and 'sustainable development', playing the role of major 'organizing principles' that guide agri-food system transitions. We specifically focus on the disconnects between practices of different food system

segments, as highlighted by "Missing Middle" that hinders coordinated action across levels (Veldhuizen et al., 2020). By tracing how biosecurity and food safety issues cascade across practices and regimes, our framework allows us to identify how these multilevel intersections can either lock in unsustainable practices or foster transitions toward more sustainable systems.

4.3. Methodology

4.3.1. Background on small-scale pork systems in Vietnam

Pork is Vietnam's most consumed and produced meat, accounting for over 60% of total livestock output and 50% of daily meat intake (OECD, 2022). The system is dominated by small-scale, family-owned farms, which comprise over 97% of producers with less than 30 pigs (GSO, 2020b), though their numbers declined from 3 million in 2019 to around 2.05 million in 2021 (GSO, 2020b, 2022). Family farms account for around 80% of total pork production (Lapar, 2014) and this contributes approximately 14% of their household income, as reported in a 2008 rural survey (Nga et al., 2014).

Pork supply chains in Vietnam are complex and diverse (***Figure* 4.2**). Most pork flows through traditional channels characterized by networks of middlemen, traders, slaughterers, wet market retailers, and street vendors (Man et al., 2020). These traditional networks exhibit strong path dependency, supported by informal trust relationships and consumer preferences for fresh, locally-sourced products. Nationaal pork production is nearly self-sufficient, with negligible exports and low imports except when domestic supply is disrupted by disease outbreaks (Duong et al., 2015).

The pork system has evolved significantly since the *Đổi mới* economic reforms in the late 1980s (Nguyen-Minh et al., 2023). The collapse of cooperative systems and the introduction of market policies enabled commercial family farming to flourish, with pork production increasing nearly fourfold from 728 thousand tonnes (1990) to 2,811 thousand tonnes (2018) (FAOSTAT, 2022). Such growth was initially driven by herd expansion, later by productivity improvements through enhanced animal health services, breeding technologies, and imported grain-based feeds (Lemke et al., 2008).

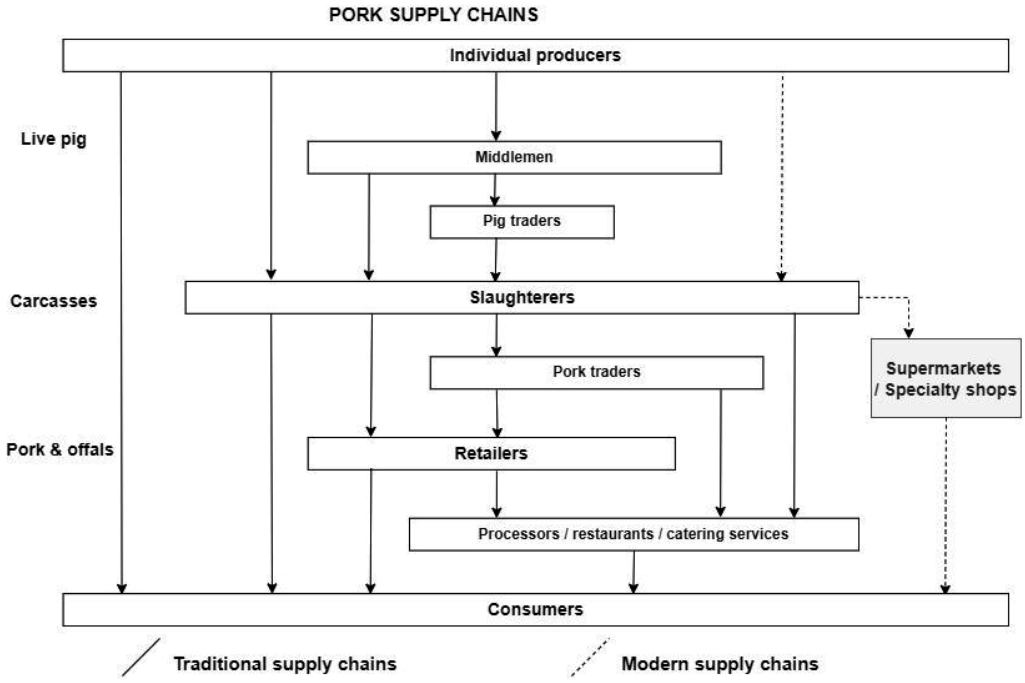


Figure 4.2 *Domestic supply chains of pork in Vietnam*

Source: Adapted from Man et al. (2020)

Recent shocks have created pressures for reconfiguration. The 2019 ASF pandemic caused a 20% drop in national pork production (FAOSTAT, 2022), culling 24% of the pig population by June 2019 (Nguyen-Thi et al., 2021) and leading to a 33% drop in Hung Yen province (Hung Yen GSO, 2020). Beyond ASF, smallholders face input and output price volatility, labor and land shortages, environmental degradation, and food safety hazards (Lapar, 2014). Food safety remains a primary concern, with studies attributing high microbial contamination to poor hygiene practices (Ngo et al., 2021) and ineffective controls over fragmented supply systems (World Bank, 2017).

Alongside the smallholder-dominated system, industrial farms have emerged with larger scale, higher biosecurity controls, and contractual linkages with supermarket chains or agri-food companies (e.g., CP, Vissan) (Costales et al., 2006). Modern supply

chains including supermarkets and specialty shops have grown substantially due to urbanization and corporate penetration (USDA, 2018).

Policy interventions have introduced innovations including Vietnamese Good Animal Husbandry Practices (VietGAHP), a state-sponsored certification scheme promoting standards and traceability (L. T. Nguyen et al., 2019). There are programs like the Livestock Competitiveness and Food Safety Project (LIFSAP, 2010-2018), which aimed to enhance smallholder competitiveness through capacity building and traditional market upgrading (Ngo et al., 2021; World Bank, 2019) and SafePork (2017-2022), which introduced light-touch methods to improve hygienic and safety practices along supply chains (Nguyen-Viet et al., 2022).

Biosecurity policies include the Law on Animal Health (2008) and the Law on Animal Husbandry (2018), supported by training and extension programs. While biosecurity concepts had been introduced through previous programs, adoption rates remained low among smallholders (Baudon et al., 2017). The ASF outbreak led to wider biosecurity application alongside control measures including early detection and culling, compensation schemes, movement restrictions, and risk communication (Nguyen-Thi et al., 2021). Before the 2019 ASF pandemic, the pork sector faced diseases including Porcine Reproductive and Respiratory Syndrome (PRRS), foot-and-mouth disease (FMD), and classical swine fever (CSF). National and provincial legislation now strongly endorses biosecurity as a coping mechanism,[10] supported by technical training, awareness campaigns, and financial subsidies.

4.3.2. Data collection and analysis

The research involves several steps. First, a desk study was conducted on the pork system in Vietnam, reviewing literature from various academic and grey sources, in combination with further key informant interviews with four experts in animal health

[10] Dispatch no. 5329/BNN-CN by MARD in 2019 and Decision no. 205/QĐ-CN-GVN by Department of Livestock Production (MARD) in 2021 & Decision no. 818/QĐ-UBND by Hung Yen People's Council in 2020.

and agri-food development. This provided an overview of the pork sector's development history, structures, institutions, and prevailing issues (as summarized in Section 4.3.1).

Fieldwork employed semi-structured interviews, focus group discussions, and observations (Bueger & Gadinger, 2018) to track practice trajectories and associated elements (Huttunen & Oosterveer, 2017). The fieldwork was conducted in Tien Lu district, Hung Yen province—a core swine farming area in Northern Vietnam that has received government and NGO interventions promoting biosecurity and food safety since 2020. Distribution practices were examined via interviews with supply chain stakeholders (slaughterers, traders, retailers) across three districts (***Figure 4.3***) representing rural (Tien Lu), peri-urban (Dong Anh, Hanoi), and urban (Cau Giay, Hanoi) contexts to capture rural-urban effects on food environments and supply chain structures (Huynh et al., 2021).

Pork producers were selected through snowball purposive sampling (Campbell et al., 2020), with the assistance of local authorities such as the Provincial Department of Agriculture and Rural Development (DARD). Meanwhile, pork distributors were selected via convenience sampling (Etikan, 2016) at traditional markets and nearby slaughterhouses. This resulted in a total of 63 pork smallholder producers (38 backyard farms, 21 small farms, 4 medium farms) and 63 distributors (19 slaughterers, 15 wholesalers, 49 retailers, 4 street vendors) (See ***Appendix 4.1***). Semi-structured interviews enabled *post hoc* inquiry into practical knowledge and experiences, including how respondents regard and discuss practices (Bueger & Gadinger, 2018). Each interview lasted 30-60 minutes, beginning with specific practice questions before exploring technological, institutional, and socioeconomic contexts. Practice trajectories were tracked through inquiries about past and present routines, examining how practice changes are enacted, understood, and stabilized (Sutherland et al., 2012).

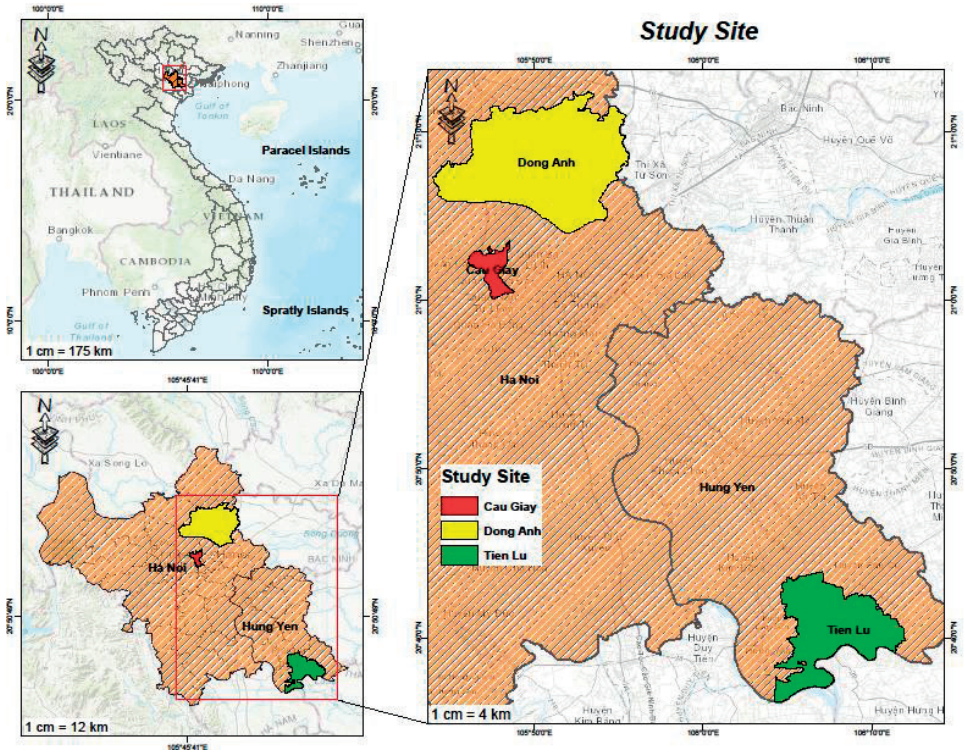


Figure 4.3 *Location of the study sites*

Source: Own work using ArcGis

Interview data were triangulated with two focus group discussions (5-10 participants each) examining shared changes in biosecurity, food safety, and farm development among producers, and one week of on-site observations of disease control and trading activities. However, direct observations of farming practices were limited due to COVID-19 restrictions and biosecurity regulations restricting external visitors.

Interviews were recorded, transcribed, and organized using Atlas.ti. Quantitative data were analyzed descriptively to support qualitative findings. Qualitative coding was conducted deductively and inductively, identifying practice changes and associated elements (first round) before adding themes related to cross-level connections. We followed the analytical steps outlined in Section 2, building narratives around practice dynamics and regime-practice intersections.

4.4. Results: "zooming in" on transitioning pork practices

4.4.1. Production practices

4.4.1.1. General production changes

We identified distinct patterns of practice changes among small-scale producers across practice bundles like feeding, breeding, hygiene and waste management, animal healthcare, and selling and marketing (see more details in ***Appendix 4.2***). These changes reflect shifts in meanings, materials, and competences that created conditions for biosecurity and food safety practices to emerge and evolve (***Table 4.1***).

Production practices shifted fundamentally in meaning since economic liberalization. Before the 1990s, pork production served as low-investment subsistence activity—farms raised small numbers of pigs (<5) in backyards, fed on food scraps and agricultural by-products, slaughtered for home consumption or sold when households needed urgent cash. Economic reforms enabled rapid commercialization to meet increasing consumer demand (Huynh et al., 2007). The upscaling of farm size and the adoption of intensification measures were therefore attributed to the switch in the meaning of pork production from an 'alternative income' or 'saving stock' to the 'main profession' of the households.

The respondents now considered their main goals as 'sustaining and developing the farm'. Maximizing income is not the primary purpose of pork farming, but rather a prerequisite for the farm business to be maintained under the economic pressure of increasing costs and rising living standards. "Previously, when we raised pigs, we just sold them for whatever price, it didn't matter… But now if we cannot manage to get the highest profit, we cannot maintain the livestock production and will have to quit after a few years" (FGD #1). Farm development depends on labor availability (declining due to aging and youth migration), other livelihood opportunities, investments in productivity-enhancing technologies, and impacts of diseases and market shocks. While financial losses from diseases and price drops could induce producers to pause or quit, most sought to recover their herds after several months or years.

Table 4.1 *Meanings, materials, and competences associated with changes in production practices*

Production practices	Meanings	Materials	Competences
General			
- *Using more industrial compound feeds* - *Automatic feeding and watering* - *Using more crossbreeds and artificial insemination* - *Using biogas* - *Daily cleaning* - *Daily monitoring of pig health*	Farm development and sustenance; Saving workload; Income generation; Reduce business risks;	Inputs (feeds, sows and piglets, water, energy, veterinary drugs); Machinery (automatic feeders, housing); Labor; Land; Transportation and communication means; Finance	Different pork farming techniques; Knowledge of animal nutrition and health; Market information; Ability to use and maintain facilities; Learning, experimenting & adapting capacity; Management skills; Social skills;
Biosecurity			
- *Daily cleaning & regular disinffection* - *Daily monitoring of pig health* - *Seasonal vacciation*	Minimizing risks of disease transmission within farms & communities; Reducing economic loss; Survival and sustenance of farming business;	Labour & time; Finance; (Pre-existing) farm facilities & structures; Lime powder & disinfectants; Infection prevention clothing for both farmers and visitors; Veterinarian personnel & medicines; Separate pens & facilities for quarantine & all-in/all-out; Communication (TV, radio, Internet, telephone) and transportation mean;	Knowledge about diseases and biosecurity measures; Knowledge about pig health and nutrition; Ability to seek and process information; Ability to adhere to strict protocols of hygiene, disinfection, and quarantine; Ability to observe pig health conditions; Ability to monitor and keep track of records; Management skills; Social skills
Food safety			
	Reducing risks to the business and consumer health	Feed; Drugs (vaccine, antibiotics); Water and energy; Farm facilities	Ability to acknowledge and purchase drugs and feeds from trusted sources; Ability to maintain hygiene; Management skills

Material conditions vary based on herd size and composition (sows/fatteners), land area, technologies, machinery, labor availability, and income sources. Nearly all respondents (n=62) rely on household labor without external workers, with only 1-2 members dedicated to pork production while others engage in diverse on/off-farm activities. Declining labor availability makes labor-saving technologies central to practice evolution. Producers increasingly adopt industrial feeds, automatic feeding systems, and improved housing to reduce their daily workload. These measures result from enhanced access to input markets and growing interactions with market actors and research/extension agencies, enabled by trade integration policies including tariff removal following Vietnam's entry into ASEAN (1995) and WTO (2007) (Cuong, 2006; OECD, 2015).

Notably, reduced routine workloads enabled more attention to animal care and health monitoring. Producers spend more time detecting sick animals, selecting quality breeding stock, and implementing health protocols. "I must turn over and over again monitor and watch how the pig eats and drinks. For example, if they had leg pains, it could cause fever, and they would stop eating" (Producer #08). Raising sows, however, requires heavier workloads and care during the farrowing time, which could drive some producers to “reduce the number of sows to reduce hard work” (Producer #57).

There were also improvements in competencies, including knowledge of advanced technologies, nutrition, hygiene, and animal health, as well as various sets of skills (management, social, information, etc.). The respondents highlighted how they gained new competences from multiple training and extension programs endorsed by national or local authorities, as well as non-governmental organizations (NGOs) or input supplier companies. The competences were also accumulated by producers’ long-term experiences of trial and experimentation with different production arrangements, and exchanged among peer producers, mainly in the meetings of local organizations and cooperatives.

4.4.1.2. Biosecurity practices in production

Biosecurity encompasses routinized practices mitigating disease introduction and transmission risks: cleaning and disinfection, quarantine and segregation, vaccination and animal healthcare, and monitoring and assessment (Alarcón et al., 2021). The interviews have found critical evolution of how biosecurity practices are exercised, especially in response to the ASF pandemic.

The changes are marked by shifts in meanings. Before ASF, cleaning was viewed as necessary for farm hygiene and ensuring pigs grew healthily. "Keeping the barns clean meant fewer diseases and better growth" (Producer #25). After the outbreak, biosecurity became a crucial strategy for farm survival: "It's no longer just about making the pigs grow faster. Now, the most important thing is preventing disease from getting in" (Producer #56). This shift transformed biosecurity from a daily task into vital risk management essential for farm business sustenance.

Materials for biosecurity range from labor and time to disinfectants, vaccines, and farm facilities. Lime powder is preferred for its low cost and safety, dispersed around pig barns, entrance gates, and neighboring streets. Some producers use traditional methods like smoking Gleditsia australis fruit hulls to disinfect, repel insects, and remove odor. Others opt for chemically active products for higher sterilizing effects. Disinfectants are used on surfaces and facilities and to create disinfection pits or footbaths, which are considered "tiny, simple tasks" yet efficient for maintaining biosecurity space (Producer #36).

Cleaning intensity increased dramatically during ASF. "During the outbreak, I was cleaning 3-4 times a day. Every time I saw waste in the pig barns, I had to remove it immediately and wash the barns to guarantee hygiene" (Producer #30). Even post-crisis, rigorous cleaning (2-3 times daily) and disinfection (1-2 times weekly) continue, reflecting ongoing concerns about disease resurgence.

Producers strengthened their focus on livestock healthcare. Although no ASF vaccine existed during the study, respondents enhanced compliance with vaccination

protocols against other diseases to ensure herd immunity and health. Vaccines are sourced from public veterinary services during compulsory biannual campaigns and sometimes from private stores. However, local veterinary services rely on semi-public animal health workers (para-vets) who are often under-trained and underpaid (Lemke et al., 2008). Personal relationships with para-vets and vet stores are critical for addressing problems outside scheduled campaigns. Producers also added nutritional supplements (minerals, vitamins) to feeds to improve immune systems.

ASF altered interactions among pork actors. Previously, external visitors—particularly brokers and traders—commonly visited farms to inspect pigs and negotiate. Post-outbreak disease transmission concerns led to restricting or prohibiting external visitors. "We used to have traders come in to inspect the pigs and negotiate, but now they don't enter the farm anymore. It's too risky" (Producer #36). Some adapted by investing in video cameras for remote inspection, while communication shifted to phone or messaging apps like Zalo.

Knowledge and skills transfer intensified through formal and informal channels. Farmers access biosecurity information from public veterinary services and training programs alongside informal sources like fellow producers. "I learned the basic biosecurity principles from the local vet, but most of the time, I talk to other farmers and rely on my own experience" (Producer #08). Digital platforms became crucial: "When we have a problem, we take a photo, post it in the Zalo group, and someone usually responds quickly" (Producer #34). Trial-and-error experimentation played a crucial role. "We know what works because we've tested it ourselves. Sometimes the vet doesn't know as well as we do" (Producer #08).

The integration of biosecurity protocols into established routines depends on producers' perspectives and motivations. Some view strict adherence as essential for preventing outbreaks, emphasizing that "details are more important. Most people just know but don't do it" (Producer #56). Others, particularly those with smaller herds, have a more fatalistic outlook: "Afraid? Yes, I'm afraid. But I still dispersed lime powder only [without adopting any quarantine measures]. It is just a matter of luck if it happened to

take place on my farm" (Producer #10). Variations in biosecurity levels also depend on socio-economic foundations—those who strictly comply are often those who invested heavily in farm facilities and infrastructure.

4.4.1.3. Food safety consideration in production

Food safety consideration is integrated into daily production routines, primarily through hygiene and risk management measures. When addressing food safety, producers emphasize feed quality and appropriate antibiotic use. While antibiotics are widely used, respondents insist they are used therapeutically rather than as growth promoters. Concerns about antibiotic residues were expressed: "I do have a rule that if a pig is sick and vaccinated, I will not sell it in at least one week, sometimes two weeks... Every antibiotic has toxicity to some extent" (Producer #13). However, respondents mentioned lack of control over feed or drug quality, noting that while they can regulate their practices, the possibility of banned substances in commercial feeds remains beyond their control (Producer #25).

Many respondents found significant overlaps between food safety and biosecurity, particularly in shared hygiene practices and the core meaning of risk reduction. Producers noted, "a clean environment is required to ensure food safety" (Producer #39), and "food safety affects the producers first before affecting consumers" (Producer #28). These overlaps suggest that biosecurity improvements create foundations for food safety enhancements, though the latter depends more on practices exercised at distribution segments.

4.4.2. Distribution practices

4.4.2.1. General distribution practice changes

Distribution practices exhibit significant heterogeneity and diversity across the urban-rural transect (***Table 4.2***). Results from the interviews show that daily sales volumes range from 2 to 800 kg/day (median 40 kg/day), reflecting diverse operation scales from small street vendors to larger wholesale operations. Infrastructure varies dramatically—from basic wooden cutting boards and temporary stalls in rural areas to

stainless-steel equipment, refrigeration systems, and permanent positions in urban formal markets. This diversity is linked to different practice meanings: for some, distribution represents their primary livelihood requiring sustained investment and regulatory compliance; for others, supplementary income with minimal formalization. Labor arrangements vary correspondingly—some operate as individual vendors with minimal assistance, while others coordinate multiple family members across slaughtering, transport, and retail. Contractual arrangements range from only formal agreements (3.2%), only informal verbal commitments (36.5%), both formal and informal (12.7%) to purely spot transactions (47.6%), reflecting diverse business strategies and trust relationships shaped by location, scale, and market context.

Changes over the past 5-10 years have been predominantly physical rather than social or organizational. Over 90% of distributors upgraded facilities and hygiene practices, with improvements concentrated in 2016-2019 corresponding to programs like LIFSAP or new market regulations. Physical adjustments include elevated platforms, concrete flooring, improved water/drainage systems, and protective equipment, particularly mandatory in urban formal markets. Transaction patterns remained largely unchanged for most distributors. However, some - primarily urban distributors and those supplying institutional customers - shifted transaction practices by establishing formal or informal supply arrangements with schools and restaurants, driven by opportunities to secure stable demand and higher margins (Distributor #179, #285). Some transitioned from wholesale to retail operations or vice versa, reflecting changing strategies to reduce risks or address labor limitations.

Table 4.2 *Meanings, materials, and competences associated with changes in pork distribution practices*

Practice changes	Meanings	Materials	Competences
General			
- *Diversification of distribution practices along urban-rural areas*	- Sustenance and expansion of business - Meeting the changing demands of	- Time, Finance, Labour - Facilities for slaughtering, transporting, selling	- Slaughtering and processing skills - Market information - Ability to use and maintain facilities

- *Upgrading facilities*	consumers (safety & quality)	- Transportation vehicles; Communication vehicles - Water and energy	- Business management skills - Social skills
Food safety			
- *Hygiene while slaughtering, transporting and retailing* - *More sourcing from concentrated slaughterhouses*	- Adhering to veterinary and food safety regulations of the markets - Reducing risks of diseases to consumer health	- Time; Finance, Labour - Slaughterhouse facilities (table, hook, machines, etc.) - Retailing facilities (table, knives, grinder, refrigerator, etc.) - Apron, gloves and masks - Sanitary systems (at slaughterhouses and markets) - Water and energy - Veterinary inspection certificates	- Knowledge about diseases - Ability to acknowledge and acquire pork from trusted sources - Ability to adhere to hygiene standards

4.4.2.2. Food safety practices in distribution

Food safety in distribution centers on hygiene and sourcing practices. Hygiene levels differ across rural-urban and formal-informal market contexts. Key practices include immediate cleaning of tools (knives, chopping boards, grinders), daily cleaning of retailing and slaughtering sites, and disinfection of slaughterhouses once or twice weekly. These efforts are often accompanied by facility upgrades: switching from low, rough surfaces (wooden) to elevated, smooth surfaces (stone or steel), using protective clothing like aprons and gloves, and installing hot water, refrigeration, and sewage systems. Changes are more mandatory in formal markets: "When I started selling at this market, they set up the stainless-steel table; I have to pay for that as well as cleaning fees" (Distributor #37). Some retailers received training and support for proper cleaning protocols through initiatives like LIFSAP and SafePork projects. However, implementation varies significantly based on enforcement levels, with urban markets experiencing stricter supervision than rural contexts.

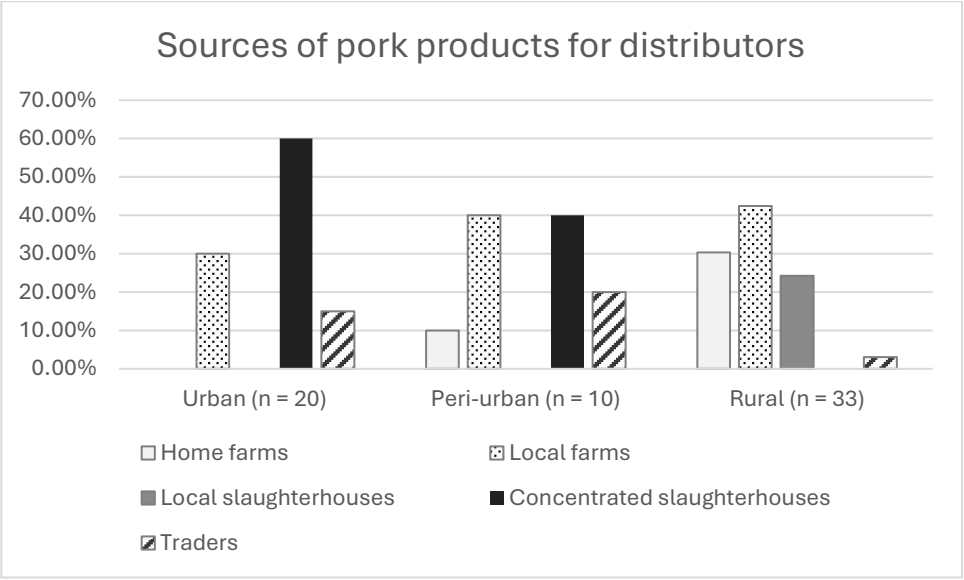


Figure 4.4 *Sources for acquisition of carcass/pork products by distributors at different sites.*

Source: own elaboration based on the interviews

A significant shift involves pork sourcing practices. Practices vary across urban and rural areas (***Figure 4.4***), yet urbanizing retailers increasingly purchase from regulated, concentrated slaughterhouses while abandoning self-slaughtering practices. This shift adheres to urban market regulations requiring veterinary inspection seals: "I started to buy from concentrated slaughterhouses as the pigs can have veterinary marks, and the prices do not differ too much" (Retailer #30). This reflects government policies on modernizing the slaughtering segment and urban markets. Unlike biosecurity changes directly linked to ASF, food safety adjustments preceded the pandemic and reflect broader urbanization and regulatory changes rather than specific crisis events.

4.4.2.3. Biosecurity consideration in distribution

While biosecurity emerged as a central organizing principle for production practices post-ASF, its influence on distribution operated primarily through indirect mechanisms rather than the direct adoption of disease-prevention protocols. The pandemic influenced distribution largely by reshaping sourcing practices and market access

conditions rather than by embedding biosecurity into daily routines. For instance, some distributors reported avoiding farms with suspected diseases or areas under movement restrictions. Additionally, traders and brokers faced increasing restrictions during farm visits, shifting in-person evaluations and transactions toward phone-based negotiations and video inspections. Nonetheless, because these changes were driven primarily by producer-side requirements, they remain reactive and temporary rather than representing a systematic shift in distributor behavior.

4.5. Results: "zooming out" to practice linkages and intersection

4.5.1. Vertical and horizontal linkages

Following the 'zoom-in' analysis of biosecurity and food safety practices within production and distribution contexts, we now zoom out to explore connections with broader systemic dynamics. ***Figure 4.5*** illustrates these interactions, adapted from the conceptual framework at ***Figure* 4.1**, and refined based on empirical findings from interviews and desk research. The figure illustrates horizontal linkages (among practices sharing similar characteristics) and vertical linkages (between practices and cross-level regime and landscape forces).

Horizontal linkages connect practices through shared meanings that act as 'organizing principles', integrating materials and competences. Key meanings include labour-saving, enhanced productivity, risk reduction, and regulatory compliance. For example, feeding and breeding innovations align with productivity enhancement meanings, while biosecurity measures cluster around risk reduction imperatives. These shared meanings facilitate bundling of related practices and enable cross-practice learning and adaptation. This is also linked to increasing availability of productivity-boosting or disease-preventing materials, and the growing exchange of know-how on animal care and disease prevention.

Vertical linkages reveal how regime and landscape dynamics cascade downward to shape practice elements. Policy interventions—animal health laws, biosecurity training, agricultural restructuring—directly influence available materials and accessible competences. The Law on Animal Health (2008) and ASF response

programs made disinfectants more available and biosecurity training more widespread. Landscape factors operate more diffusely: trade integration expanded access to industrial feeds; urbanization shifted demand patterns and regulatory enforcement; social media enabled new knowledge exchange forms; disease outbreaks disrupted existing configurations while promoting new element adoption. Niche initiatives like the VietGAHP certification programme and contractual linkages contribute to competencies and materials, enhancing smallholder knowledge and capacity on nutrition, biosecurity, and farm management skills (Interviews & FGD #1). The extent of their influence, however, requires further in-depth investigation.

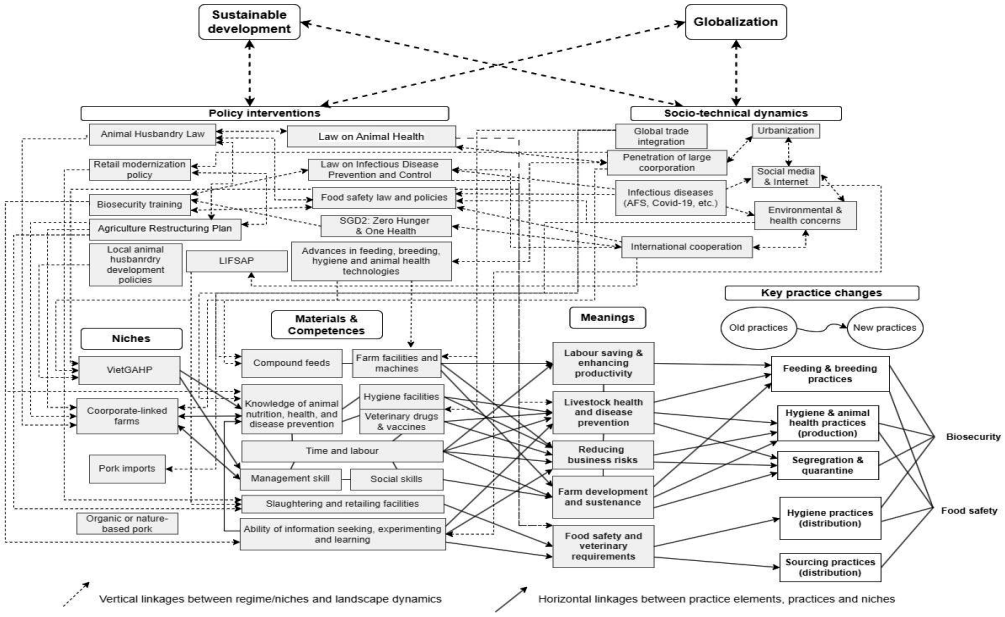


Figure 4.5 *Horizontal and vertical linkages between practice, practice elements, and cross-level dynamics.*

Source: Own elaboration based on the interviews and desk review

4.5.2. Intersecting practices and regime dynamics

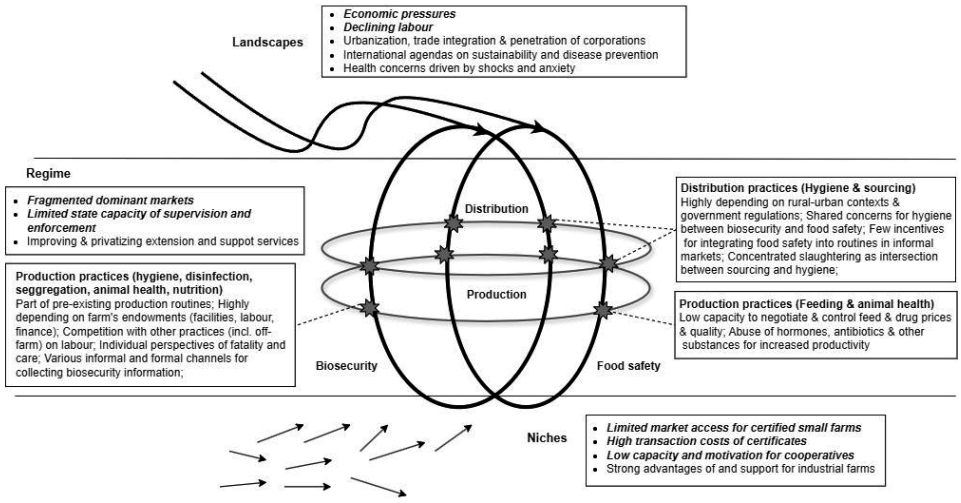


Figure 4.6 *The intersection between small-scale pork practices and cross-level dynamics regarding food safety and biosecurity*

Source: Own elaboration based on the interviews and desk review

Examining cross-level linkages discloses several critical intersection points where small-scale practices are either aligned with or disconnected from the dominant production and distribution regimes (***Figure 4.5***). Food safety practices intersect with both production and distribution segments, creating multiple alignment and misalignment points across the supply chain. Biosecurity practices, in contrast, show strong alignment with production regimes but weak intersection with distribution practices, as disease prevention protocols remain largely confined to farm-level operations rather than extending systematically through slaughter and retail channels.

The intersection of biosecurity and production practices shows a strong alignment. Driven by the pressures of the ASF pandemic, many producers have successfully integrated biosecurity measures into their existing farm management routines, not only hygiene and disinfection, but also to the housing, feeding, and care of pigs. The adoption, however, is dependent on a farmer's existing material conditions, including financial capacity and farm facilities, as well as their varied perspectives on animal

care. Producers who have already invested in facility upgrades are more likely to sustain systematic protocols, while those with smaller operations may have a more fatalistic outlook. Another critical factor is knowledge of biosecurity, which is acquired not only through formal channels but also through informal networks of peer producers. Biosecurity-related practices also compete with other on-farm and off-farm practices in terms of labour and finance, embedded in the macro-trends of urbanization and migration.

For food safety and production, intersection points lie in feeding and animal care practices. Smallholders perceive the difficulties in controlling and monitoring the quality and price of feed and veterinary drugs. Nonetheless, the misuse of antibiotics and other drugs should not be attributed only to their widespread availability on the market but also to the key meanings of smallholders in increasing productivity and meeting market preferences for leaner pork products.

The intersection between distribution and food safety is particularly dynamic, shaped by constantly evolving hygiene and sourcing practices. These shifts are influenced not only by physical infrastructure, such as slaughtering and retailing facilities, but also by evolving regulatory frameworks. The implementation of food safety protocols varies significantly across urban and rural settings, government enforcement, and individual attitudes. Although food safety regulations emphasize hygiene, much like biosecurity, the application of hygiene standards is inconsistent between producers and distributors, with the latter having fewer incentives to adopt disease-preventing protocols. Centralized slaughterhouses emerge as key nodes where concerns about sourcing and hygiene converge, yet their food safety compliance also relies on state supervision rather than internal motivations.

All the intersections are embedded in the overall regime conditions, including the dominance of fragmented small-scale distribution systems and the limited yet dominating state-run food control. Overall, they are shaped by the landscape dynamics of economic pressures, urbanization, declining labor sources, the growing presence of global institutions (in trade and business, as well as for sustainability causes), and

shocks such as ASF and the COVID-19 pandemic. We will further reflect on those intersecting dynamics and their implications in Section 4.6.2.

4.6. Discussion

This study examined the dynamics of Vietnam's smallholder pork system through the dual lenses of Social Practice Theory and the Multi-Level Perspective. It enables an integrated understanding of micro-level practice changes and macro-level structural influences that have shaped pork production and distribution practices over the past two decades.

4.6.1. Shifting small-scale pork practices

We started by addressing the research question on the evolution of small-scale pork practices. The results reveal significant shifts in production practices, reflecting a growing emphasis on labour optimization, enhanced animal care, and disease prevention. The transition from subsistence to commercial production fundamentally altered the meanings of practices, while material investments in labor-saving technologies enabled producers to redirect their efforts toward animal health management and off-farm activities.

Labor stands out as a key driver of practice trajectories. Declining availability due to youth migration and competing livelihood opportunities prompted mechanization and industrialization (Hostiou et al., 2020; Leavy & Hossain, 2014). Paradoxically, labor constraints enabled improved care practices—reduced routine workload allowed greater attention to health monitoring and breeding. This could be attributed to the emergence of "good farmer" identities for which many career livestock producers (often with larger farms) seek to balance income and productivity with animal welfare, echoing patterns observed in New Zealand and Latin America where producer identities evolve beyond pure profit maximization (Maye & Chan, 2020; Naylor et al., 2018).

Producers have adopted more standardized biosecurity measures, such as cleaning, disinfection, quarantine, and vaccination. This is particularly accelerated by the

African swine fever (ASF) pandemic, which acted as a critical 'trigger event' (Sutherland et al., 2012), disrupting prior routines and fostering the 'bio-securitization' of farms (Dobson et al., 2013). This pattern—where crisis events drive rapid practice change—echoes findings from other LMIC livestock contexts (Chenais et al., 2019; Tornimbene et al., 2014; Young et al., 2015). However, biosecurity adoption varies markedly by various factors, from socio-economic and biophyscial conditions (farm size, pre-existing facilities, financial capacity) (Hall et al., 2004; Perry & Grace, 2009) to different perspectives on risk and luck (Enticott et al., 2021).

Food safety practices remain more fragmented and less standardized, reflecting a lack of coherent normative transition. Producers recognize risks from feed quality and antibiotic use, but perceive limited power to address them. This mirrors findings from Brazil and Thailand where antibiotic misuse persists despite producer awareness, driven by structural constraints: financial barriers, inadequate veterinary access, weak oversight, and supply chain power imbalances (Albernaz-Gonçalves et al., 2021; Lekagul et al., 2021).

On the other hand, distribution practices show marked urban-rural differentiation. Urban retailers increasingly source from regulated slaughterhouses, while rural areas maintain artisanal slaughter, creating stratified food safety landscapes. This spatial heterogeneity reflects the trend of increasing enforcement of food safety controls in urbanizing contexts, in alignment with policies of retail market and supply chain modernization (Jaffee et al., 2019; Wertheim-Heck et al., 2015).

4.6.2. Navigating practice intersections for sustainability transitions

The practice-regime intersection framework reveals several leverage points for improving biosecurity, food safety in Vietnam's smallholder pork system, while also highlighting critical disconnects that undermine system-wide sustainability goals.

First, material investments in biosecurity offer strong entry points where facility and technological upgrades not only improve conditions directly but also motivate sustained protocol adoption. Public support through subsidies, low-interest loans, or

cost-sharing schemes could further accelerate biosecurity uptake. Those interventions have been implemented in Hung Yen and other provinces through extension programs.[11] However, interventions must avoid favoring resource-rich producers while excluding backyard farms—a risk documented across LMIC livestock interventions (Knight-Jones et al., 2017; Young et al., 2015). Additionally, the prominence of informal knowledge exchange suggests strengthening peer learning through cooperatives and digital platforms may prove as effective as formal training, given farmers' preferences for experiential, locally-adapted learning.

Addressing food safety requires different approaches. For pork producers, production-level interventions should strengthen collective bargaining power and oversight mechanisms rather than individual behavior change, recognizing structural constraints limiting producer agency (Tompson et al., 2021). However, cooperative effectiveness varies significantly based on local contexts and historical factors (Nguyen-Minh et al., 2023). Rather than imposing top-down cooperative structures, interventions should cultivate collaborative practices among producers, including joint purchasing, shared equipment use, peer monitoring, and knowledge sharing. It is equally critical to embed safety protocols for antibiotic and drug use into daily producers' routines, while simultaneously reinforcing hygiene, sanitation, and other care practices (Tompson et al., 2021).

On the distribution side, regulatory convergence at concentrated slaughterhouses and wet markets offers critical leverage points for improving food safety. Urban retailers increasingly source from regulated slaughterhouses to comply with veterinary inspection mandates, driven by government policies and urbanization pressures. However, rural reliance on artisanal slaughtering persists due to fragmented enforcement, perpetuating traditional sourcing practices. Persistent fragmentation of hygiene practices and divergent perceptions among pork value chain actors, as documented in previous studies (Dang-Xuan et al., 2016; Ngo et al., 2021), could

[11] Examples include the Programme 818 (Decision no. 818/QĐ-UBND by Hung Yen People's Committee) to promote the development of biosecure and VietGAHP livestock production.

increase cross-contamination risks during transport and marketing, undermining safety efforts. Effective interventions should modernize slaughterhouse infrastructure, strengthen veterinary inspection capabilities, and create economic and regulatory incentives for formal sourcing. Wet market improvements—upgraded hygiene facilities and cold storage—could further institutionalize safer handling practices, but must align with retailer and consumer preferences to avoid repeating the failures of previous modernization efforts (Wertheim-Heck et al., 2015). Combining infrastructure-based measures with practice-based "light-touch" solutions may prove more effective than rigid market modernization alone (Ngo et al., 2023).

Lastly, to enhance both food safety and biosecurity of pork systems, adopting system-oriented, cross-cutting interventions that address disconnects and leverage synergies is critical. While biosecurity practices are well-developed on farms, a disconnect exists between the distribution regime and the adoption of disease-prevention protocols. Also, the inconsistency in food safety practices across different stages of production and distribution poses challenges for consistent regulatory compliance. Nonetheless, opportunities for synergy exist; for instance, the shared emphasis on hygiene and disinfection protocols can serve as a precondition for preventing both animal and human disease transmission. The COVID-19 pandemic demonstrated how disruptions cascade across practices, affecting supply chains, consumer behavior, and enforcement at farms and informal markets (Bardosh et al., 2023; Marchant-Forde & Boyle, 2020). The synergy can be supported by bundling interventions into an integrated approach like One Health, which simultaneously addresses animal, human, and environmental health across the entire supply chain (Mackenzie & Jeggo, 2019).

However, for effective implementation, interventions must align with existing practice routines and account for structural constraints, such as unreliable input markets, price volatility, and limited credit access. Addressing those trajectories and contexts helps formulate enabling conditions for multiple practice improvements in biosecurity, food safety, and other goals like animal welfare and environment. Rather than imposing external models, successful approaches should work within existing practice logics, respecting farmers' core priorities—farm development, risk reduction, and livelihood

sustainability. This calls for adaptive, participatory intervention design, engaging practitioners to develop context-specific solutions rather than imposing standardized protocols.

4.6.3. Use of practice and transition theory in livestock agri-food research

The integration of social practice and transition theoretical lenses offers a comprehensive framework for understanding transitions in smallholder livestock systems. The application of these theories to livestock supply chains has been limited, allowing for their combined use to provide novel insights into how sustainability practices, such as biosecurity and food safety, evolve through the gradual reconfiguration of existing routines embedded in broader system transitions. The study has shifted its focus beyond conventional practice research on consumer practices (Svennevik, 2022) to examine food supply practices (Huttunen & Oosterveer, 2017; Kaiser & Burger, 2022), building on a few studies that utilize SPT in livestock production systems (Bassi et al., 2019).

The framework proves particularly valuable for understanding biosecurity transitions, where the ASF pandemic served as a clear trigger event that accelerated the adoption of practices through existing care routines and social networks. The biosecurity concept is 'novel discursively than it is materially' (Donaldson, 2008), as it incorporates 'a whole range of pre-existing practices that follow their own normativities and temporalities' (Fortané & Keck, 2015). It thus demonstrates how external shocks interact with practice elements to enable rapid transitions that previous voluntary programs had not yet achieved. For food safety, the usefulness of the dual lens is less pronounced due to two challenges: (i) the practices and elements are more dispersed and difficult to connect to cross-level dynamics, lacking the coherent organizing principles that characterize biosecurity practices, and (ii) involving more complex networks of human and non-human agents that span production, distribution, and consumption domains with varying regulatory frameworks and market structures.

The study has some limitations that should be acknowledged. First, retrospective interviews may suffer from recall bias, with interviewees identifying specific change

moments rather than comprehensive practice dynamics over time. Also, COVID-19 and ASF restrictions prevented direct practice observation, limiting deeper understanding of how practices are actually performed in daily routines. Second, the Northern Vietnam focus and ASF context may limit generalizability to other livestock systems or geographical regions. The findings apply primarily to the studied districts in Hanoi and Hung Yen, and limited sample size could preclude broad generalization of practice-as-performance across Vietnamese smallholder pork systems.

Future research could address these limitations through longitudinal studies that track the evolution of practice over multiple years and comparative analyses across different livestock systems and geographical contexts. More participatory methods that engage practitioners as co-researchers would provide deeper insights into their own practice dynamics. This suggests the value of combining exploratory qualitative analysis of social practices and multi-level dynamics with quantitative studies to assess smallholder practices, drivers, and performance outcomes more comprehensively.

4.7. Conclusion

This study examined small-scale pork practices in Vietnam over the past two decades using an integrated Social Practice Theory and Multi-Level Perspective framework. We found that the incorporation of biosecurity into existing production routines was accelerated with ASF pandemic as the primary trigger, yet still relied on pre-existing material conditions and individual perceptions of fatality and care. Food safety practices, meanwhile, have also evolved, yet in more dispersed ways, depending on rural-urban settings and varying regulations. Interestingly, while both producers and distributors are concerned about hygiene and disease prevention, the lack of incentives in distribution practices limit system-wide improvements. The examination of practice changes and cross-level dynamics reveals key intervention points: material investments that anchor biosecurity in farm infrastructure, informal knowledge networks for enabling peer learning, and regulatory convergence in concentrated slaughterhouses. The framework proved valuable for understanding why practices of

biosecurity and food safety followed different pathways despite their conceptual similarities.

Looking forward, the study suggests that small-scale pork production will likely coexist with industrial operations, but with enhanced biosecurity practices, while food safety practices still vary under different regulatory and urbanization pressures. Succ essful interventions depend on addressing structural constraints while working within existing practice logics, rather than imposing external models. However, the transition toward modernized pork systems must not marginalize smallholders, who continue to play crucial roles in rural livelihoods and food security. This study advocates for integrated interventions that address critical production-distribution disconnects and support adaptability and inclusion of smallholders in the context of modernizing livestock and food systems.

Appendix 5.1 *Summary of interviewees*

a. Descriptive characteristics of interviewees

Group	Sex (% of female)	Age (yrs)	Household size (number of people)	Income level*	Edu-cational level**	Number of fatterners	Number of sows	Animal units***
Pork producers (n=56)	36.5%	53.1 ± 8.2	4.71 ± 1.78	3.2 ± 1.4	2.4 ± 0.8	54.3 ± 87.7	5.5 ± 7.0	13.6 ± 20.8
Pork distributors (n=67)	81.0%	46.0 ± 9.2	4.67 ± 1.80	3.4 ± 1.3	2.3 ± 0.8	NA	NA	NA

Note: *Levels of monthly household income per capita (1-5): <1.5, 1.4-2.4, 2.4-3.4, 3.4-4.9, >4.9 million Vietnam Dong (quintiles based on Vietnam Household Living Standards Survey 2018)
**Educational levels (1-6): primary school, secondary school, high school, public college/professional high school, bachelor's degree, post-graduate.

*** Animal Unit (AU): A conversion unit of livestock and poultry based on live weight, independent of breed, age, and sex. Each animal unit is equivalent to 500 kg of live animal weight (Resolution no. 13/2020/NĐ-CP dated 21 January 2020 by the Government of Vietnam).

b. Composition of pork producers by farm type

Farm type	Number	Percentage (n = 63)
Household/backyard farms	38	60.3%
Small-scale farms	20	31.7%
Medium-scale farms	5	7.9%
Large-scale farms	0	0%

Note: Farm classification based on animal units according to Resolution no. 13/2020/NĐ-CP by the Vietnamese government dated 21 January 2020: (a) Large-scale farms: ≥300 AU; (b) Medium-scale farms: 30 to <300 AU; (c) Small-scale farms: 10 to <30 AU; (d) Household/backyard farms: <10 AU.

c. Composition of pork distributors by activities

Distribution activity	Number	Percentage (n = 63)
Slaughtering	19	30.2%
Retailing (traditional market)	49	77.8%
Wholesaling	15	23.8%
Collection	5	7.9%
Street vending	4	6.3%
Transportation	2	3.2%
Retailing (modern retail)	2	3.2%
Food service	1	1.6%

Note: The 63 pork distributors engaged in the distribution activities listed above. Multiple respondents are engaged in more than one distribution activity, therefore percentages sum to more than 100%.

Appendix 5.2 *Meanings, materials, and competences for specific bundles of production practices*

Production practices	Meanings	Materials	Competences
General	Farm development and sustenance; Saving workload; Saving costs; Enhancing productivity; Reducing risks; Reducing environmental impacts	Inputs (feeds, field, veterinarian drugs…); Machines and facilities; Labour; Time; Finance	Different pork farming techniques; Knowledge of animal nutrition and health; Learning, experimenting & adapting capacity; Social skills; Management skills; Ability to use and maintain facilities;
Feeding - ***Using more industrial compound feed***	Reducing workload; Ensuring nutrition for pigs of different ages	Compound feed (for pigs of different ages); Facilities for transportation and storage;	- Knowledge of animal nutrition - Ability to manage product quality - Ability to process and mix feed ingredients - Ability to use and maintain machines
- ***Automating feeding & watering***	Reducing workload; Reducing feed loss; Flexible schedule	Machines (automatic feeder & drinker)	
- ***Mixing purchased feeds with self-produced feeds***	Saving costs; Utilizing local by-products; Improving quality and taste;	Raw materials; Local by-products; Machinery (chopping, grinding, pellet-making); Facilities for transportation and storage	
Breeding - ***Using more crossbreed*** - ***Artificial insemination (AI)***	Improving breed quality and productivity; Saving workload and cost; Reducing disease risks;	Sows (adult female pigs); Semen; Facilities for transportation & AI; Separate pens for sows & piglets;	- Ability to select high-quality females and males - Knowledge of pig physiology - Know-how on breeding technique
Hygienic and manure management - ***Using biogas***	Reducing odour and pollution; Creating good farm conditions; Reducing disease	Biogas plants; Water & energy; Disinfectants; Labour; Finance; Enhanced facilities (floor, wall, air circulation, etc.)	- Know-how about functions and maintenance of biogas - Knowledge about hygiene and

- ***Daily cleaning***	risks; Utilizing biogas & digestate for fertilization;		slurry/manure treatment - Ability to adhere to hygiene protocols
Animal health care (AHC) - ***Daily monitoring*** - ***Seasonal vaccination*** - ***Using both public and private services***	Ensuring livestock health & reducing disease risks;	Vaccination & veterinarian medicines; Private and public veterinarian services; Finance;	- Knowledge about animal health and vaccination protocols - Ability to monitor and assess pig health - Social skills
Selling - ***Trading with local networks of traders, middlemen, and slaughterers***	Improving income; Reducing workload;	Transportation vehicle; Telephone; Labour;	- Social skills - Financial management capacity - Capacity to obtain market information

5

Strategic niche management for food safety and sustainability: cases of Vietnamese agri-food certification initiatives

Abstract

In many low- and middle-income countries (LMICs), food safety and sustainability certifications are being implemented by either governments or grassroots movement to promote transitions towards sustainable agri-food practices. While studies have explored their performance and policy contexts, little is understood about their potential contributions to system transformation. This study addresses this gap by examining two Vietnamese certification initiatives: Vietnamese Good Animal Husbandry Practices (VietGAHP) for safe pork and the Participatory Guarantee System (PGS) for organic vegetables. Using the Strategic Niche Management (SNM) framework, the study analyzes these initiatives as 'niches' that can strategically develop through three internal processes (envisioning, network building, learning) and diffuse into the regime via major routes (growth, replication, accumunation or translation). The findings reveal that PGS excels in maintaining robust expectations, fostering community-based networks, and enabling reflexive learning, while VietGAHP leverages state support and policy alignment to engage more easily with regime actors. However, both initiatives face significant constraints in scaling due to market informality, institutional fragmentation, and limited consumer demands. This suggests the need to not only support the internal development of niches but also to provide enabling institutional and market environments for integrating diverse niches into pathways of food system transformation in LMICs.

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5.1. Introduction

Transforming agri-food systems to achieve the United Nations Sustainable Development Goal 2 requires balancing food security with health, socio-economic, and environmental sustainability (Fanzo, 2019). Food safety is a critical aspect of this sustainability endeavour, especially regarding microbial foodborne diseases (World Health Organization, 2015) and the use of agrochemicals and animal drugs (Carvalho, 2017). These concerns drive stricter regulations and increased adoption of certifications to incentivize transitions in local agri-food practices (Hoffmann et al., 2019; Unnevehr, 2022).

Certifications are market-based instruments that set standards and guidelines for firms, cooperatives, and producers to comply with, to achieve a wide range of socioeconomic, health, and environmental benefits (Oya et al., 2018). Many certifications are designed for farm or processing facility-level performance, aligning with common quality and safety protocols like HACCP (Hazard Analysis and Critical Control Point), GLOBALG.A.P. (Global Good Agricultural Practices) and Global Food Safety Initiative (GFSI) (Trienekens & Zuurbier, 2008). Some incorporate sustainability criteria including labour rights, fair trade, and environmental protection (Côte et al., 2019; Hu et al., 2022). Certifications are typically audited through third-party (independent organizations) (Hammoudi et al., 2009). However, there are also local, grassroots, and community-based certification initiatives, which offer more affordable ways to support safe and sustainable products through alternative networks like community-supported agriculture (CSAs), box schemes, farmers' markets, specialty shops, and direct sales (Goodman et al., 2012).

Academic literature on agri-food standards and certifications has focused on governance and institutional aspects, examining motivations, value chain coordination, and policy contexts (Henson & Reardon, 2005; Higgins et al., 2008). Other studies assess their effects on food security, food safety and health, consumer behaviour, and socioeconomic well-being, and the environment (Hoffmann et al., 2019; Oya et al., 2018). However, understanding of their broader systematic effects remains

incomplete, especially regarding their potential to transform food systems at scale in LMIC contexts (Hidayati et al., 2021).

Transition theories, including the Strategic Niche Management (SNM) framework, offer relevant research perspectives. These perspectives emphasize how dynamics in socio-technical systems may give rise to fundamental changes, and what role novel solutions can play therein (Raven et al., 2010). The SNM framework accentuates the role of local networks to protect and nurture innovations, termed 'niches', before they can diffuse and eventually influence or replace the dominant system (regime) (Kemp et al., 1998). By applying SNM, we can consider certification initiatives in the developing world a form of 'niches', as they are often novel and 'alternative' to the food systems dominated by traditional markets and informal arrangements (S. Bui et al., 2016). The SNM lens denotes the need to analyze internal niche development as well as the dynamic interactions between niches and various regime components, especially the enabling and constraining factors that shape their upscaling potential (Hidayati et al., 2021; Seyfang & Longhurst, 2016).

This study, therefore, aims to explore the strategic development of certification initiatives in the context of an LMIC food system, drawing on SNM and other perspectives of transition theory. Through two Vietnamese case studies - the VietGAHP certification for safe pork and the community-based Participatory Guarantee System (PGS) for organic vegetables - we seek to answer two questions:

> (1) What key strategic activities were employed to support the development of these agri-food niches?
>
> (2) How are these niche initiatives interacting with regime components and likely to diffuse into the regime?

The paper is organized into several sections, starting with the theoretical background (Section 2) and methodology (Section 3), followed by overview of the two case studies (Section 4). Section 5 elaborates on the findings about the niche development and diffusion strategies of the two niches. The discussion (Section 6) compares the cases,

examines SNM's applicability, and outlines prospects for certification-driven food system transformation in LMICs.

5.2. Theoretical background

The study adopts the SNM framework alongside other perspectives in transition theory. SNM is an analytical approach that aims to facilitate the analysis of innovations' development and diffusion through real-world cases (Caniëls & Romijn, 2008). SNM draws on several assumptions (Hoogma et al., 2002; Kemp et al., 1998; Schot & Geels, 2008). First, the regime is understood as a configuration of interconnected and self-reinforcing socio-institutional, material, and economic elements embedded in broader landscapes—external contexts that lie beyond the regime's direct influence. Hence, regime actors favor existing, normalized trajectories, resulting in 'path dependencies' or 'lock-in' mechanisms that resist adopting radical innovations (Kemp et al., 1998). Second, overcoming these barriers requires a bottom-up co-evolution process between technologies, markets, and institutions. This involves the creation and development of niches, protective spaces that provide *shielding* innovations against selection pressures while enabling their testing, adaptation, and stabilization. Such niches would help build capacities for innovations (*nurturing*) before they can challenge the systematic barriers (*empowering*) (Smith & Raven, 2012). The development should be 'strategic' as it requires deliberate decisions of relevant stakeholders on innovation selection and diffusion (Hoogma et al., 2002), though it is often unable to predict successful future innovations (Austin et al., 2012; King & Baatartogtokh, 2015).

The SNM framework is chiefly utilized for ex-post analysis of niches in different socio-technical systems (energy, mobility, food, etc.), yet there have also been attempts to create ex-ante decision-making and planning tools for developing niche innovations (Caniëls & Romijn, 2006). However, even when being used for ongoing and forward-looking projects, SNM does not focus on individual, practical management on an everyday basis, but on the 'forum of interactions' between (multiple) niches and the regime and landscape components (Mourik & Raven, 2006).

The SNM literature suggests that three internal niche-building processes are necessary for the strategic development of niches:

(1) *Expectations and visions* should be voiced and shared among stakeholders, which helps attract newcomers and resources. Articulating expectations is needed, particularly when the innovations are still in early development and their performance and functions remain uncertain. The expectations are more effective if they are: (a) robust (accepted and shared by many actors), (b) specific (clear and focused enough to offer practical guidance), (c) evidence-based (supported by outcomes from projects and experiments) (Schot & Geels, 2008).

(2) *Actor networks* should be built in a way that ensure they are (a) broad: they engage diverse stakeholders with different views and interests; (b) deep: resources can be mobilized from the member organizations to support the networks' activities (van der Laak et al., 2007).

(3) *Learning processes* are vital for identifying necessary adjustments that enhance the niches' technological performance and socio-economic embedding. The processes involve not only learning about technological and infrastructure issues of the innovations, but also their user contexts, societal and environmental impacts, and relevant policies and regulations (Mourik & Raven, 2006). Learning processes, hence, should be: (a) enabling the collection and exchange of data for enhancing performances (*first-order learning*), (b) reflexive, as even cognitive frames (norms, rules, assumptions) and design can be questioned and adapted if necessary (*second-order learning*) (Elmustapha et al., 2018).

These three processes are not isolated but significantly intertwined (Geels & Raven, 2006). However, even when all the conditions for internal processes are fulfilled, they alone cannot instigate wider system transformation without further external diffusion processes beyond the initial niche. Four patterns of niche diffusion are identified: *growth*, where niches expand in size or influence; *replication*, where core designs are adopted in new locations or contexts; *accumulation*, where separate niches are linked

to generate greater effects; and *translation*, where elements of niche innovations are integrated into the regime, leading to its adaptation or transformation (Naber et al., 2017; Seyfang & Longhurst, 2016). The outcomes of these external processes depend on the dynamic interactions between niches, regimes, and landscapes, for which the optional conditions may foster the emergence of new markets or institutional structures that support wider diffusion, and ultimately enable the reshaping or even replacement of the prevailing regime (S. Bui et al., 2016).

5.3. Methodology

This study uses a qualitative case study approach to explore the ex-post Strategic Niche Management of two initiatives: PGS for organic vegetables and VietGAHP for safe pork. We chose on the cases of pork and vegetable chains because both are nutritionally and socio-economically important (Huong et al., 2013a; Lapar, 2014) yet face critical food safety and sustainability issues (Hoi et al., 2016; Ngo et al., 2021). Using desk review and the assistance of local partners, we identified extisting and past efforts promoting new solutions for both chains. PGS and VietGAHP were selected as they have operated for at least ten years, allowing detailed ex-post analysis.

Data collection utilized various tools to gain a comprehensive understanding of the PGS and VietGAHP initiatives. First, a desk review of academic journals, reports published by relevant organizations, and legal documents was conducted. This helped provide an overview of the two niches within their broader institutional contexts.

To gain further empirical insights, twenty semi-structured interviews were carried out between November 2021 and May 2023. A diverse range of stakeholders was purposefully selected to capture multiple perspectives on the initiatives, including key staff from both PGS and VietGAHP, local beneficiaries (farmers and retailers), representatives from a business partner (a specialty shop chain), and local government officials. Local beneficiaries and authorities were selected from Tien Lu district, Hung Yen province (for VietGAHP) and Thanh Xuan commune, Soc Son district, Hanoi (for PGS). The interviews, which lasted between 30 and 90 minutes each, explored various aspects, including the historical and ongoing development of the initiatives (with a

focus on key changes), their organizational structures and functions, and their strategies for niche development and diffusion. Interviews with beneficiaries and authorities served to triangulate and validate information provided by niche representatives.

Finally, social media resources were also utilized to supplement the data. Publicly streamed workshops and presentations related to the PGS and VietGAHP initiatives were identified, primarily sourced from official channels on platforms like YouTube and Facebook. These public discourses provided valuable insights into how the initiatives are presented and discussed by their managers and relevant stakeholders.

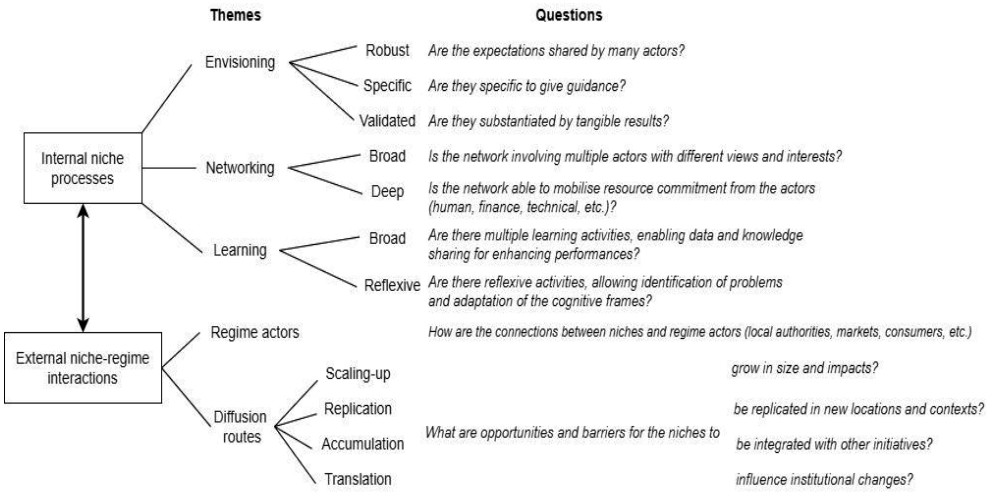


Figure 5.1 *Themes and questions for qualitative data analysis.*

Source: own elaboration, based on the SNM literature (Caniëls & Romijn, 2008; Naber et al., 2017; Schot & Geels, 2008; Seyfang & Longhurst, 2016; van der Laak et al., 2007)

The data, including documents, interview transcripts, and videos, were managed and analyzed using Atlas.ti. We coded the data inductively in the initial coding stage, drawing upon the theoretical foundation, specifically the three internal niche processes and four diffusion patterns. The analysis aimed to address the questions outlined in ***Figure 5.1***. The second coding was more deductive, adding new codes and themes, fostering a more nuanced understanding. This is followed by a comparative

construction of narratives that illuminate the development and diffusion trajectories of the two cases.

5.4. Overview of the case studies

5.4.1. VietGAHP for safe pork

VietGAHP (Vietnamese Good Animal Husbandry Practices) is a certification scheme developed by the Ministry of Agriculture and Rural Development (MARD, now the Ministry of Agriculture and Environment), aimed at enhancing the safety and quality of livestock products, protecting the health of producers, consumers, and the environment, and promoting traceability.[12] Initially developed in 2008 as part of VietGAP (Vietnamese Good Agricultural Practice) – the first nationwide safety certification modelled after ASEANGAP, HACCP, and other global certifications such as GlobalG.A.P. and FreshCare. The pork-specific version was formalized in 2008 and upgraded into VietGAHP in 2015.[13] The updated VietGAHP for pork production in 2016 features 45 technical and managerial criteria, covering biosecurity, breeding, feeding, hygiene, veterinary protocols, waste and disease management, and monitoring. Third-party certification bodies designated by MARD and provincial Departments of Agriculture and Rural Developments (DARDs) grant certificates valid for two years to households, cooperatives, and enterprises.

In this study, the Hung Yen case of VietGAHP can be understood as a niche initiative, cultivated through interventions to support the growth and diffusion of VietGAHP pork production. The niche was initiated under the World Bank-funded Livestock Competitiveness and Food Safety Project (LIFSAP) (2011–2018), which aimed to enhance the efficiency and safety of household-based livestock systems while

[12] Decision no. 2509/QĐ-BNN-CN dated 22 June 2016 on promulgating regulations on certification and procedures for good farming practices for safe pig and chicken farming in household farms.

[13] The VietGAP certification for pig production started in 2008 (Decision no. 1506/QĐ-BNN-KHCN) and came into implementation in various provinces before being upgraded into VietGAHP (Vietnamese Good Animal Husbandry Practice) in 2015 (Decision no. 4653/QĐ-BNN-CN). Specific VietGAHP for safe smallholder pig and chicken production was also issued in 2016 (Decision no. 2509/QĐ-BNN-CN).

reducing environmental risks. The project nurtured novel practices of safe pork production and retailing by providing institutional support, technical training, infrastructure investments (upgrading of retailing markets), and certification facilitation (World Bank, 2009). Through LIFSAP, Hung Yen province implemented GAHP pilot zones across four districts (Van Lam, Van Giang, Khoai Chau, Tien Lu), establishing over 49 GAHP producer groups, which facilitated training, knowledge exchange, and acquisition of certifications. The end of LIFSAP did not dissolve the niche; it was then continued under the new province-level programme, namely Programme 818 (launched in 2020). The programme further promoted safety and biosecurity within livestock production, emphasizing 'disease safety, food safety, and environmental protection', which became more urgent after the African swine fever (ASF) pandemic in 2019.[14]

Empirical studies revealed mixed performance outcomes of VietGAHP. The adoption of VietGAHP is proven to improve compliance with protocols of disease prevention, breeding, feeding, and recording (L. T. Nguyen et al., 2019), and help reduce pig morbidity and mortality (Lapar et al., 2017). However, studies found no difference regarding food safety (*Salmonella* and bacterial contamination) between pork sampled from VIetGAHP/LIFSAP chains and conventional chains (Ngo et al., 2021) and only marginal price premiums between certified and non-certified pork sold in traditional markets (Giang Hương et al., 2023). Nevertheless, some certified producers can benefit from stable linkages with local buyers (slaughterhouses) or supermarkets, helping lower intermediary costs and gain predictable returns (Giang Hương et al., 2016).

5.4.2. PGS for organic vegetables

The Participatory Guarantee System (PGS) represents a grassroots niche innovation designed to promote agroecological practices and local food governance. Developed by the International Federation of Organic Agriculture Movements (IFOAM) - Organics International in 2004, PGS is a 'locally focused quality assurance system' that relies on

[14] Decision No. 818/QĐ-UBND by Hung Yen People's Council (2020)

trust, participation, and horizontal accountability among peer stakeholders (IFOAM, 2019a). Using internal group verification through grassroots networks of farmers, consumers, and civil society actors, PGS provides a lower-cost, unbureaucratic alternative to third-party certification (Anselmi & Vignola, 2021). Most PGS schemes are based on IFOAM principles, which cover aspects of health, ecology, fainress and care (IFOAM, 2019b), although the approach can also be applied to other types of production (Grovermann et al., 2024). Those principles are translated into guidelines and standards that emphasize non-use of chemical and synthetic inputs, prohibit genetically modified organisms (GMOs) use, and encourage practices (crop rotation, intercropping, and composting) that help maintain and improve soil fertility, water quality, and biodiversity (Grovermann et al., 2024).

In Vietnam, PGS was introduced in 2008 through a pilot project by Agricultural Development Denmark Asia (ADDA) in partnership with the Vietnam Farmers' Union. Initially launched in Thanh Xuan commune (Soc Son district, Hanoi), the project aimed to establish a localized framework for organic production and marketing. The innovation of PGS and organic farming was nurtured and protected through intensive technical training, the establishment of farmer groups, and building contractual linkages with interested buyers like specialty shop chains. PGS Vietnam has been a member of IFOAM since 2009. Following the completion of the ADDA project in 2012, the coordination responsibility was handed over to the local Coordination Committees, under the supervision of the Vietnam Organic Agriculture Association (VOAA, established in 2011) and its member organization, the Center for Organic Agriculture Development Support (CODAS). Besides PGS Vietnam, there are also other PGS initiatives (totaling 17 by 2024) established by other NGOs (Rikolto, Seed to Table, ActionAid, etc.) and enterprises, adopting organic or safe standards to supervise agricultural production.

PGS Vietnam has developed a specific set of standards for organic crop and livestock production. The first set of standards for crop production was developed in 2009 and approved by IFORAM in 2013, incorporating IFOAM principles and the government-approved Sectoral Standards for Organic Production and Processing (10TCN 602 –

2006). The standards have undergone several revisions, with the recent named VOAA standards in 2024 (TCCS 01:2024/VOAA) to be aligned with the 2017 National Standards on Organic Production (TCVN 11041).[15]

Organizationally, PGS Vietnam was sustained through a bottom-up structure, including: (i) individual farmers, (ii) farmer groups (including 5-10 farmers each), (iil) intergroups (including 3-17 groups, depending on locations), and (iv) Coordination Committee (one for each initiative). The intergroups play a key role in planning and conducting cross-inspections (twice a year), collecting samples, reporting results, and recommending certification for each other. Besides, field engineers from the Coordination Committee monitor the groups at least twice a month, ensuring strict compliance with the standards.

Some studies have examined the outcomes of PGS initiatives in Northern Vietnam's vegetable production, finding positive impacts on agroecological practices such as intercropping, composting, and bio-pesticide use, yet mixed effects on economic performance (Grovermann et al., 2024; Laura, 2023). The certified farms have significantly lower yields than conventional ones, while production costs vary depending on input uses and labour requirements (Pham & Shively, 2019; Phamova et al., 2022). However, a 2013 study showed that consumers in Hanoi are willing to pay 70% more for organic vegetables (Hai et al., 2013), suggesting that PGS producers can achieve economic viability through premium pricing via modern and alternative retail channels (Grovermann et al., 2024).

[15] According to Vietnam's 2006 Law on Standards, public standards are classified into two main types: national standards (TCVN), which are issued by ministries or equivalent authorities and are applicable nationwide; and local standards (TCCS), which are issued by other organizations and are only valid within the scope of their management. Additionally, sectoral standards—previously regulated under the 1999 legislation—were used within specific sectors but have since been encouraged to upgrade to national standards.

5.5. Results

In this section, we explore the internal processes and external diffusion efforts of the two niches. We also investigate the barriers and opportunities they face in diffusing these niches to the broader systems, presenting a comparative analysis that draws insights into niche-regime interactions.

5.5.1. Internal niche processes

An overview of the three internal niche processes in the two cases is presented in ***Table 5.1***.

Table 5.1 *Comparative overview of the internal processes of the two niches*

Niche processes and conditions	VietGAHP for safe pork	PGS for organic vegetables
Articulating and shaping expectations ***a. Robust*** ***b. Specific*** ***c. Validated***	• Shifting expectations throughout the period, divided between biosecurity, food safety, and market access • Specific expectations are shared by many, yet long-term visions could differ between stakeholders • Fulfilling targets but lacking consideration of project sustainability	• More consistent core expectations, shaped by IFOAM guidelines • Specific expectations and long-term visions shared by both managers and local participants • Not fulfilling targets but having more sustained impacts
Network building ***a. Broad*** ***b. Deep***	• Engaging mostly government agencies and a restricted number of interested farmers • Limited brokering activities, although there are efforts to foster market linkages	• Engaging broader networks of farmers, retailers, and NGOs, but facing great difficulties in recruiting farmers • Play key roles in brokering and building market linkages • Some market protection from contracted buyers (specialty

	• Limited or no market protection from the government or buyers is provided for producers • More, but still limited funding from the government and NGOs	food retailers) during the transition period (0.5-1 year) for producers • Limited funding from the contributions of members
Learning ***a. Broad*** ***b. Reflexive***	• More learning about technical aspects but less about market and social aspects • Limited communication, mostly through state platforms • Fewer second-order learning, mostly within government agencies	• Broad learning about technical and economic aspects, including more active learning on a new traceability system. • Limited communication, relying on the marketing platforms of partnered retailers • More second-order learning, especially through online seminars and workshops

5.5.1.1. Articulating and shaping expectations

For the VietGAHP initiative, there was a shift in expectations between LIFSAP and Programme 818. While LIFSAP focused on building market connections for broader food safety adoption, Programme 818 prioritizes biosecurity in response to livestock pandemics like ASF. Furthermore, the long-term visions for diffusing VietGAHP also changed:. LIFSAP aimed to promote widespread VietGAHP adoption by establishing cooperative groups in selected communes, while Programme 818 targets producers demonstrating "capacity and willingness to follow VietGAHP" (G1, DARD staff, interview), reflecting the programme's stated goals of phasing-out of small-scale livestock farms and promoting concentrated operations.

The expectations for VietGAHP were communicated through local training workshops, tailored to specific needs of local beneficiaries. This is evident in the communication

appoach used by the niche managers - local DARD staff: "First, we talk about the situation, like global as well as the domestic issues of food safety and epidemics... Thus, we emphasize the importance of VietGAHP for ensuring food safety and preventing diseases. We teach farmers proper livestock raising practices to avoid using banned substances..." (G2, local DARD staff, interview). The focus on locally relevant issues of animal and human health resonated with the rationale of producers who joined VietGAHP: "first, to ensure public health, and second, to manage diseases on our farms by following proper protocols" (G5, pork producer).

Meanwhile, the goal of enhancing profits or accessing higher-value markets was not shared by all producers, considering the lack of evidence of market advantages from VietGAHP adoption. Most producers still rely on traditional traders and intermediaries, with limited supermarket access due to strict requirements. Nonetheless, some producers still access supermarkets and hence consider acquiring stable prices a key benefit: "You might get a slightly higher price by selling to supermarkets... The [supermarket] price does not change much even if the market price fluctuates." (G6, pork producer).

Limited evidence of market profitability may hinder the long-term sustainability of these initiatives. This concern is exemplified by the LIFSAP project. Despite achieving all its targets, including the number of training sessions and established VietGAHP groups, many participants did not pursue certification after project completion (G3, provincial DARD staff, interview). We will explore this further in the next sub-section on network building.

Unlike the VietGAHP case with its evolving expectations, the *PGS initiative* maintained maintained consistent visions. Guided by IFOAM's principles of health, ecology, fairness, and care, expectations were established through the ADDA project and later local development. This, however, required managers and practitioners sufficient time to embrace these agroecological principles: "The more I work in organic agriculture, the more I understand the importance of upholding all these principles for a truly organic product" (O1, PGS Coordinating Committee, interview). To make principles accessible

to broader stakeholders, the Coordination Committee uses more specific and practical approaches. "Initially, we focus on improving farmers' economic well-being, highlighting how organic practices can increase income. Once satisfied, we can then address health issues and, finally, environmental protection" (O1, interview).

While local producers shared expectations for economic benefits, their primary motivation often stemmed from personal health concerns. As one organic producer explained, "Before, using strong chemical pesticides caused headaches whenever I sprayed them. Since switching to organic methods and using my self-made herbal pesticides, protecting my health has become the biggest benefit" (O5, organic producer, interview). However, some producers have expanded their visions beyond personal well-being, such as O6 who hopes to "encourage everyone to adopt clean vegetable production methods to protect the environment and ensure the health of consumers who enjoy our products" (O6, organic producer, interview).

Interviewee O1 from PGS Coordinating Commitee acknowledged the challenge of fulfilling stakeholders' expectations. She highlighted the unfulfilled targets set by the ADDA project when many producers dropped out. "When we measured its success, the project seemingly failed. It was like that we started with 100 farmer groups, but only 20 stayed by the end." However, the long-term, sustained impacts of the initiative were noted. "Yet, three years after the project ended, even without support, it still spread among farmers, and many consumers still sought out PGS-certified products. This showed a shift in people's perceptions, which cannot be measured immediately in numbers."

5.5.1.2. Building networks

The *VietGAHP initiative* in Hung Yen utilized the existing government networks and state-supported social organizations like the Farmers' Union and Women's Union. Initially, NGOs like ADDA provided financial and technical support. However, the follow-up Programme 818 relies solely on state funding. While external actors like research institutes and universities might be involved as trainers and advisors, the primary

responsibility belongs to provincial and district-level government staff from agencies like the DARD, extension services, and veterinary centers. The initiative directly benefits local producers, slaughterhouses, and wet market retailers. These beneficiaries receive training, material and financial grants, and technical support to improve biosecurity, and food safety, and obtain VietGAHP certification.

However, Programme 818 targeted mostly medium-sized producers, significantly reducing participation compared to LIFSAP. Two factors might explain this shift. First, as mentioned, many small-sized certified farmers from the initial project did not renew certificates, due to the lack of price premiums of certified products when being sold through traditional channels. Second, there are adjustments in new livestock policies[16] requiring farms to be 100-400 meters away from nearby communities, depending on size. This posed a challenge for small-scale farms located in existing settlements, often on fragmented land plots. The planned relocation of pig farms to concentrated areas had limited success due to land-use planning difficulties.

There are efforts to promote pork supply chain coordination, either among producers (cooperatives or farmer groups) or between producers and distributors (slaughterhouses and catering services). However, such efforts have limited achievements. Most formerly established GAHP groups could not continue functioning when LIFSAP ends. Currently, most local producers are unaffiliated with pig-farming cooperatives, except for the Duc Thang cooperative which has only 15 members. Even when they have joined cooperatives, the primary benefit seems to be obtaining inputs like breeds, feed, and veterinary drugs at lower prices, rather than expanding market access (Giang Hương & Hùng, 2023). There were no recorded brokering activities and no active involvement of modern retailers in the niche. Even though there are national and provincial policies and programmes[17] for supporting market linkages, their

[16] Law on Animal Husbandry 2018 (No. 32/2018/QH14) & Decree No. 13/2020/NĐ-CP

[17] Decree No. 98/2018/NĐ-CP by the Vietnamese government to encourage the development of cooperation and association in the production and consumption of agricultural products & the OCOP (one commune one product) programme for developing value chains of specialities and traditional products.

coverage and success are not assured. The success of vertical integration efforts is not assured, as G3, a staff member from Hung Yen Provincial DARD, explained, “Market integration is not just the focus of livestock, but also of other agricultural sectors. The government has models, websites, platforms, and guidance to help farmers connect with markets, build brands, and ensure traceability. But if the farms are too small, and if they lack qualifications and determination, they will find it difficult to access those resources” (G3, provincial DARD, interview).

The *PGS initiative*, on the other hand, has built a robust network encompassing producers, retailers, NGOs, and research institutions. Some retailers, like the specialty chain Bac Tom, are deeply involved, even holding seats on the Coordination Committee. Other retailers, for instance, Tam Dat, Soi Bien, and Biggreen, also actively connect with organic farmers through the initiative's brokering activities. This strong network thrives on shared goals. Bac Tom, for example, aims to be Vietnam's ‘leader of pro-nature foods,’ aligning wholly with the PGS visions. Maintaining these connections benefits all stakeholders, including the managing organizations themselves. Since the initiative is self-funded by member contributions, organic producers willingly pay fees to gain access to broader markets and secure relationships with these important retailers (webinar, dated 2024-05-10). Despite the strong network, potential conflicts can still arise due to differing priorities or misunderstandings. The managers play a crucial role in mediating these situations, facilitating communication, and finding common ground (O1, PGS Coordinating Committee, interview).

Beyond market access, producers also receive technical and financial support, which is critical during their transition to organic farming. This shift typically takes a few years, allowing soil fertility to recover and natural pest-control ecosystem to develop. The PGS initiative recognizes this challenge: "PGS organic vegetables require a transition period of 6 months to a year," explains O2, a PGS-linked and Bac Tom farming engineer. "We support farmers by buying their produce at premium prices during this time, but traceability codes must indicate the 'transitional' status, which is equivalent to ‘safe vegetable’ products”. However, despite the support, not all producers complete the transition. Strict regulations set by PGS principles, along with oversight by the

Coordination Committee, can also hinder members from retaining and hence limit the niche's expansion. We will elaborate on this challenge further in the next sub-section on upscaling and diffusion.

5.5.1.3. Learning activities

For the VietGAHP initiative, major learning activities include data collection (conducted by government agencies), training sessions (often combining topics like VietGAHP and government policies with biosecurity practices), technical advice and support, information search, and knowledge sharing. The staff also encourages stakeholder visits to successful farms as demonstration models. The support involves a multitude of technical, policy, and even market aspects. "We try to help people decide when to stop and when is the best time to develop [their farms]. Especially whether small-scale farmers should diversify their farming activities or focus on livestock only" (G1, local DARD staff).

For PGS, the initiative prioritizes technical advice and training on various aspects like farming techniques, farm design, input acquisition, and PGS rules and organization. Regular visits to organic farms, especially for consumers and interested business partners, were also arranged. PGS also learned to actively embrace technological advances, including adopting QR code traceability system in 2019. Initially, it was challenging for PGS organizers to promote digital traceability, as "PGS farmers, unlike private farms, are mostly seniors who knew little about the Internet… We designed it in a way that even the elders can easily use it with simple smartphones, and it should be cheap, costing only 100-150 thousand VND [$4-6] a month. Those who don't use it will have no chance to sell their products via the PGS system." (O1, PGS, interview). The organizers also had a plan to adopt a digital farm diary system, facilitating the recording and tracking of farm activities.

While both initiatives emphasize technical (first-order) learning, they differ significantly in reflexive (second-order) learning. Some government staff can hold critical insights on the future development of VietGAHP (G1, G2 & G4, Interview), but there is a lack of

evidence for any reflexive learning activities on VietGAHP, either within or beyond the circle of government institution. For PGS, second-order learning is fostered through regular workshops and webinars organized by VOAA, featuring experienced organic and PGS practitioners, enterprises, and experts. Those webinars offered chances for sharing stories and lessons, providing critical insights, and stimulating discussion about PGS development and the strategies for broader impacts. For instance, during a stakeholder webinar, the PGS organizers highlighted the need to (i) enhance connections among stakeholders, including farmers and SMEs, to create 'ecosystems' for organic food, (ii) improve the traceability and transparency of the supply chains, and (iii) better engage government authorities, especially regarding land policies (webinar, dated 2021-12-24).

5.5.2. External niche-regime interactions

This sub-section focuses on the interactions between the two niches and the corresponding regime components, as well as the potential, opportunities, and challenges for their diffusion into the mainstream pork or vegetable regimes.

As disclosed by the review and interviews, the two niches have nuanced differences in interacting with regime market actors, despite both targeting smallholder producers and mainstream consumers (***Table 5.2***). With limited resources, VietGAHP primarily engages farms with upscaling potential, yet remains dependent on traditional supply chains. There are limited efforts to integrate into modern retail systems, due to producers' challenges to meet supermarket requirements and delayed payments. Nevertheless, some VietGAHP producers have developed stable links with local slaughterhouses, occasionally connected to institutional buyers such as catering services. On the other hand, PGS prioritizes producers and retailers with strong commitments to organic transition. The niche does not rely on mainstream supply chains, instead establishing its own distribution network through specialty shops that align with PGS's values. Producers in both cases face constraints in meeting the volume or consistency demands of supermarkets, hindering their long-term linkages.

Table 5.2 *Interactions between the two niches and different regime actors*

Regime actors	VietGAHP for safe pork	PGS for organic vegetables
Smallholders	Recruiting smallholders with motivation and capacities for upscaling	Recruiting smallholders with motivation for agroecological transition
Traditional supply chains	Heavily relying on traditional supply chains	Not relying on traditional supply chains
Modern supply chains (supermarkets and convenience stores)	Expecting but not acquiring sustained linkages with modern chains	Not relying on modern supermarkets (mostly through alternative channels like specialty shops)
Consumers	Targeting all consumers	Targeting consumers with substantial concerns for health and the environment
Local authorities	Financed and implemented by local authorities	Gaining approval from local authorities
National authorities	Supported by national government policies	Attempting to gain official endorsement by the national government

The nature of the niche organization shapes how they interact with authorities. Local authorities play a central role in planning, financing, and implementing VietGAHP, for which its development must align with the government's long-term focus on developing large-scale, modern supply chains. Conversely, PGS organizers struggle to gain national support, despite some success at the provincial level. Interviewee O1 emphasizes the importance of aligning values and leadership: "To expand PGS, people and the government are the key... If the government leaders are open-minded for new ideas, they would be long-term supporters [of the initiative]." This highlights the contrasting approaches: VietGAHP benefits from established government support, while PGS navigates a more challenging path with potential value mismatches with existing agri-food governance.

The diverse niche-regime connections significantly influence niche diffusion routes and potentials (***Table 5.3***). VietGAHP enjoys considerable advantages for *growth* due to strong government backing (financial and political) and integration with the growing large-scale farming sector. However, the obstacles might come from uncertain price premiums, insufficient market linkages, and weak cooperation among smallholders (see 5.5.1.2). On the other hand, PGS faces tremendous challenges in terms of participation and management. Maintaining strict PGS standards requires constant supervision, yet limited funding and human resources restrict its scaling capacity. Additionally, the target population of beneficiaries – local small-scale farmers – is declining, either due to aging, youth migration, and land use conversion (as noted by some cooperative leaders in Webinar 2024-05-10) or difficulties of adhering to regulations. This is demonstrated by the drop in the number of PGS groups in 2020, with hundreds of producers leaving when failing to meet the PGS regulations. However, as Interviewee O1 suggests, prioritizing maintaining core values over blind expansion should be a more suitable approach for PGS.

Table 5.3 *Diffusion opportunities of the two niches*

Diffusion routes	**VietGAHP**	**PGS**
Growth	Likely with strong policy support for large-scale, industrial farms, but face challenges from the lack of market benefits	Difficult and slow due to strict regulations and limited human/financial resources
Replication	Very likely due to simpler protocols, but depending on state support	Likely (currently 17 PGS in Vietnam) for different chains and with different standards (organic, VietGAP, Basic GAP)
Accumulation	Can be integrated with other state or non-state programmes (OCOP, SafePork, etc.)	Can be integrated with other NGO initiatives

Translation	Have been integrated into provincial and local development policies	Can influence local policies as well as national regulations on organic agriculture

Source: own elaborations based on desk review and interviews

Both niches, however, exhibit substantial potential for *replication*. VietGAHP (and its VietGAP equivalents) can be adopted by various entities, including individual farms, cooperatives, and firms or corporate-linked farms. As VietGAHP standards primarily focus on food safety and biosecurity, their adoption is relatively simpler. Nonetheless, their heavy reliance on state support could pose a challenge, especially in regions where local governments and policies are unsupportive. PGS, meanwhile, relies on grassroots movements with robust capacities to develop their niches. The core concept of PGS – community-based certification systems – can be replicated for various commodity chains and standards, not just IFOAM organic ones. For instance, Rikolto, another international NGO, has adopted PGS to promote safe vegetable production (using Basic GAP standards), establishing more than 10 intergroups across six Vietnamese provinces since 2010. Another project by Oxfam Novib and GreenHub (2018-2022) has supported six local enterprises in implementing PGS to control quality in their raw material production areas.

Regarding *accumulation*, while neither case demonstrates clear examples of *accumulation*, we found prospects of harmonization and coordination among the studied niches and other initiatives. This could address diverse needs and target different segments within the food system. For instance, promoting VietGAHP alongside projects like ILRI's SafePork[18] or initiatives that develop alternative market channels could bring more leverage altogether. Different PGS initiatives also foster

[18] The SafePork project (2017-2023) by the International Livestock Research Institute (ILRI) aims to mitigate the burdens of foodborne diseases in informal, emerging and niche markets through the adoption of light-touch, market-based approaches and interventions.

stronger integration to promote wider recognition of these certification schemes among consumers and policymakers.

The *translation* of the niches into institutional changes has also been evident in the case of PGS. In contrast, VietGAHP has been initiated as part of the national and provincial strategies to transform food systems, again raising questions on whether VietGAHP should be considered part of the niche or the regime, a point further explored in the Discussion. PGS has sought political legitimacy from the state, at both national and provincial levels, which could help propel their replication and expansion (through the mobilization of land and finance) and gain wider market access (Interview of O1 from PGS Coordinating Committee & webinar 2021-11-25). In 2018, the Vietnamese government issued Decision No. 109/2018/NĐ-CP on organic agriculture, including provisions that encourage producers to join PGS. The comprehensive National Standards for organic agriculture (TCVN 11401) and a certification system (Vietnam Certified Organic) were established in 2017. The National Standards, while sharing multiple standards with the PGS Vietnam standards, are different in several criteria[19] and the certification scheme, in which the National Standards only permit third-party certification bodies. PGS is not mentioned in the 2020-2030 Government Plan for Organic Agriculture Development (Decision No. 885/QĐ-TTg by the Prime Minister in 2020). The shortage of consideration for community-based certification systems like PGS suggests a gap between government support for organic agriculture and the grassroots movement of organic production. In July 2024, the PGS organic standards are upgraded into the new state-approved VOAA organic standards (TCCS 01:2024/VOAA) in harmonizing the IFOAM standards and the national organic standards.

[19] Different from the PGS Vietnam standards, the National Standards do not explicitly ban the parallel production of organic and non-organic products of the same variety and have a longer required transition period (12-18 months) than PGS (6-12 months). The National Standards also require seeds to be produced organically, while PGS prioritizes organically produced seeds, but can accept conventional seeds on the condition that the seeds must not be treated with prohibited pesticides or have been rinsed to remove all chemicals before use.

5.6. Discussion

The research concerns the development of agri-food certification initiatives and their interactions with the broader agri-food systems in LMICs. It focuses on two cases in Northern Vietnam: organic vegetables and safe pork products. By analyzing these cases, the research has identified the key strategic activities of each initiative and the regime conditions influencing their potential to diffuse beyond local implementation. The findings invited further discussions on their future diffusion pathways and prospects for transition policies.

5.6.1. Strategic development and diffusion of agri-food niches

The cases represent two contrasting types of agri-food niches, diverging in organizations and functions despite their shared goals of achieving food safety and sustainability. PGS employs a community-based certification model aligned with IFOAM organic standards, operating outside the mainstream system. VietGAHP is a government-initiated program utilizing GAP safety standards and third-party certification, leveraging existing state institutions and traditional supply chains. While PGS exemplifies a typical bottom-up, grassroots niche, VietGAHP's categorization as a niche is arguable, given its mainstream dependence and the lack of market protection, which are often required for niches (Smith & Raven, 2012). However, in the Vietnamese context, VietGAHP can still be considered ‘niche’ as it has potentials to transform the supply system from informal, small-scale to standardized, coordinated arrangements. This can apply to many LMICs where elements of modern food systems, such as standards or supermarkets, represent transformative niches challenging traditional small-scale regimes.

The comparative analysis reveals similarities and differences between the niches in development processes. Some shared characteristics are found: both niches tailor their visions to local expectations, and the learning focus on technical training and support. Nonetheless, the niches strikingly differ in how expectations are articulated and shared. VietGAHP, aligned with government policies, prioritizes time-bound project objectives that address food safety and biosecurity. PGS, in contrast, adopted more

long-term approach, gradually converting local expectations and building networks of stakeholders with shared values. PGS's robust expectations are grounded in the distinct identity of organic farming and the role of IFOAM in providing consistent, sustainability-oriented guidance. The flexibility of VietGAHP's versus the robustness of PGS's expectations can reflect a trade-off between achieving *tangible outputs* and *long-term sustainability goals*. While *validated, tangible outputs* of ongoing projects are deemed necessary for 'good expectations' (Schot & Geels, 2008), they might limit the efforts to pursue long-term sustainability visions (Gernert et al., 2018).

The niches also differ in networking and learning activities. This reaffirms the well-attested association between the breadth of niche networks and the extent and reflexivity of learning processes (Schot & Geels, 2008). PGS networks encompass diverse production, market, and support stakeholders, with explicit learning goals focusing on data exchange and lesson sharing. This enables co-learning and adoption of innovative technologies, or example digital traceability system (Pesch et al., 2017). The development of PGS networks mirrors the trajectory of many grassroots niches: when the network diversifies and expands, demands for centralized coordination increase (Hermans et al., 2013). On the other hand, VietGAHP's state-centric network arrangements limit learning activities to those familiar with state institutions, primarily technical training and assistance. While social and market learning are occasionally integrated, the lack of open, reflexive discussions suggests that changes in VietGAHP were primarily driven by top-down policy decisions rather than bottom-up collective learning processes.

The key differences in niche development strategies, however, are not pronounced when examining diffusion pathways. Both niches exhibit a *high potential for replication*, whether it be their certification models or farming protocols. This is consistent with previous studies that identified replication as the most common and feasible diffusion pathway (Seyfang & Longhurst, 2016). Remarkably, the *limited potential for niche growth* can be attributed to resource constraints, institutional mismatches, and market acceptance. The stringent PGS protocols hinder the possibility of expanding membership, while local financial or human resources constrain the supervision and

coordination capabilities. Cost-effectiveness is a key concern, as the benefits of price premiums and market integration may not outweigh the certification and labor costs (Mourik & Raven, 2006). This is linked to the broader factors of market conditions and consumer preferences (Borsellino et al., 2020). Both small-scale VietGAHP and PGS-certified producers do not have sustained access to modern retail channels, mostly due to their struggle to comply with strict requirements (Moustier et al., 2009). Meanwhile, in traditional markets and supply chains, the dominance of informal arrangements complicates the acceptance of formal certifications or regulations, leading to low consumer familiarity with safety or sustainability labels (My et al., 2017) and a general lack of trust in food systems and controls (Ha, Shakur, & Pham Do, 2019). Only a few pork producers (primarily larger scale) and organic vegetable producers selling to alternative channels have reported market access benefits from certification (Grovermann et al., 2024).

The *translation* of the two niches to the regime policies significantly relies on their complex interactions with the state. Power and politics have played a pivotal role in the translation of innovations (Lovell, 2007; Turner et al., 2020). In many developmental states in Asia or Latin America (Rock et al., 2009; Schiller et al., 2020), government support is crucial to empowering or even controlling niche innovations for political gains. This is also demonstrated in Vietnam with the recent introduction of state-controlled organic standards and certifications. This policy indicates the global trend of "conventionalizing" and institutionalization of agrecological and organic farming from niches to regime markets and institutions (Giraldo & McCune, 2019; Levidow et al., 2014), which can be pronounced in countries like Vietnam with a long history of state-centric interventions . In response, PGS actively sought political legitimacy from the government for better mobilization of resources. However, as suggested in the interviews, PGS organizers also have a deliberate strategy for maintaining their autonomy. They keep the niche 'small and beautiful' (Coles et al., 2018) enough to ensure effective coordination and supervision, as well as avoid losing their core identity when interacting with market and state pressures (Augenstein et al., 2020; Gernert et al., 2018).

5.6.2. The usage of SNM

The study presents the empirical use of SNM in the case of agri-food initiatives in Vietnam. The findings suggest that SNM could be an appropriate lens to examine the past and ongoing development of agri-food niches of Vietnam and other LMICs, even though it was initially designed for technological innovations in the Western contexts (Kemp et al., 1998). The conceptual framework that distinguishes three internal processes enables a clear and straightforward analysis. Rather than just being descriptive, the findings also provide insights that illuminate and challenge several assumptions of the SNM. First, the SNM assumption about the essential role of 'niche protection' is not supported, especially in the VietGAHP case. As some studies pointed out, niche shielding should be temporary to avoid affecting the adaptability of the niches (Schot & Geels, 2008), we can further posit that social-organizational innovations might not necessarily need protection as they require immediate market and user responses for quick adaptation. Second, the study concurs that factors like agency, actors, power, and politics should be considered more in the SNM framework (Elmustapha et al., 2018; Raven, 2012). It is necessary to explore further the agency of PGS and VietGAHP initiatives, as well as the power relations with the government.

Although our analysis has the findings from various data sources, this remains insufficient to assess the future development and diffusion of niches or the transition pathways of agri-food systems. This uncertainty also reminds us that SNM is used primarily as an ex-post analytical framework rather than an ex-ante planning tool (Mourik & Raven, 2006). SNM can contribute significantly to the historical understanding of niche development and niche-regime interactions, yet future research should combine it with other forward-leaning, scenario-building tools for effectively planning future agri-food system transitions.

5.6.3. Prospects for agri-food transition policies

We revisited the overall question of how certification initiatives can contribute to the ongoing transformation of LMIC agri-food systems. The two cases display distinct advantages and challenges, shaped by their strategies and socio-institutional

embedding. Notably, despite showing significant advantages in terms of networking and learning abilities, PGS is not more likely than VietGAHP to trigger system transformation. As discussed in section 5.6.1, the locked-in fragmented, informal markets, as well as the complex political dynamics, may frustrate efforts to upscale certifications beyond local niches. Although certifications as market-based mechanisms could incentivize safe and sustainable practices at local levels, their market share could remain minor without challenging the regime norms and structures.

The findings suggest that the niches in the case study have ample room for improvement. Emphasis should be placed on learning and communication, not only to build shared expectations and cohesion but also to create data-driven foundations for enhancing performance and reflecting lessons. Building robust and coordinated networks is also critical, utilizing market-based (benefit sharing, financial investment, grants, contracts) and non-market (cooperation, technical support, research, education) linkages. When developing these linkages, it's essential to balance local stakeholders' interests with government policies and market demands, while aligning with long-term sustainability goals. VietGAHP and other initiatives can learn significantly from PGS in these areas, especially in terms of community support and mobilization, and a persistent sustainability focus.

5.7. Conclusion

The study highlights the contrasting pathways of niche development and diffusion through two agri-food certification initiatives in Vietnam. The two niches are remarkably diverging in terms of internal niche activities, with PGS exhibiting more reflexive learning and broader networking activities. They have similar yet subtly different diffusion strategies; both show strong potential for replication, while VietGAHP has a greater advantage in translating its innovation into national and local policies. However, both VietGAHP and PGS struggle to grow their niches and achieve broader diffusion into the mainstream market, revealing difficulties from high market informality, limited institutional capacities, and inadequate consumer trust or familiarity. These challenges are not unique to Vietnam but are shared across many LMICs with hybrid traditional-

modern food systems and unstable-performing regulatory structures (Oya et al., 2018; Unnevehr, 2022).

The findings reinforce the need for more enabling institutional and market environments, including more coordinated food supply chains, more capable and trustworthy control structures, and enhanced consumer awareness of certified products. Also, it is essential to empower local actors in recognizing the values of diverse agri-food initiatives. Different agri-food niches can vary in size, target dissimilar local segments (production, distribution, or consumption), and pursue different ideals, ranging from standardized, modernized systems (Jaffee et al., 2019) or agroecological, sustainable alternatives (Côte et al., 2019). Despite their differences, diverse niches can contribute to innovative visions and ultimately influence regime reconfiguration or transformation (Bui, 2021). As Vietnam is advancing its national roadmap of food systems transformation[20], engaging with these diverse, locally embedded initiatives offers more adaptive and inclusive pathways rather than relying solely on top-down, one-size-fits-all approaches.

[20] The Vietnamese government approved National Action Plan on Food Systems Transformation in Vietnam towards Transparency, Responsibility, and Sustainability by 2030 (Decision no. 300/QD-TTg dated March 28, 2023)

Appendix 5.1 *List of key informants*

No	Code	Organization and position	Date interviewed
01	O1	PGS Coordinating Committee Head	2022-01-18
02	O2	PGS Coordinating Committee & Bac Tom Safe Food Chain, Field Engineer	2022-01-18
03	O3	Bac Tom Safe Food Chain, Director	2022-12-08
04	O4	Rikolto Staff	2022-01-23
05	O5	Thanh Xuan, Soc Son, Ha Noi - Vegetable producer #1	2023-05-13
06	O6	Thanh Xuan, Soc Son, Ha Noi - Vegetable producer #2	2023-05-13
07	O7	Thanh Xuan, Soc Son, Ha Noi - Vegetable producer #2	2023-05-13
08	V8	Thanh Xuan, Soc Son, Ha Noi - Vegetable cooperative head	2023-05-13
09	G1	Tien Lu Sub-Department of Agriculture and Rural Development Staff	2022-01-18
10	G2	Tien Lu Sub-Department of Agriculture and Rural Development Staff	2021-11-20
11	G3	Hung Yen, Head of Office of Livestock Production - Department of Agriculture and Rural Development	2021-11-22
12	G4	Tien Lu, Head of Agricultural Extension Agency	2021-11-20
13	G5	Tien Lu, Hung Yen – Pork producer #1	2021-09-21
14	G6	Tien Lu, Hung Yen – Pork producer #2	2021-09-22
15	G7	Tien Lu, Hung Yen – Pork producer #3	2021-09-23
16	G8	Tien Lu, Hung Yen – Biosecurity trainer	2021-09-23
17	G9	Tien Lu, Hung Yen – Pork retailer #1	2021-12-17
18	G10	Tien Lu, Hung Yen – Pork retailer #1	2012-12-17
19	G11	ILRI Researcher #1	2021-11-25
20	G12	ILRI Researcher #2	2021-12-17

Appendix 5.2 *List of media sources*

No	Code	Title of the media artifact (in English)	Platform	Date published
1	M1	Organic farming and Participatory Guarantee Systems	Youtube, Facebook	2021-11-25
2	M2	Key features of the Participatory Guarantee System	Youtube, Facebook	2021-12-10
3	M3	How to sustain PGS organic products?	Youtube, Facebook	2021-12-24
4	M4	Organic farmers' viewpoints: Sweat, PGS and Markets	Youtube, Facebook	2024-05-10
5	M5	PGS – Practical experiences and application lessons	Youtube, Facebook	2024-05-23
6	M6	Standardization: Foundation for the sustainable development of Vietnamese organic agriculture	Youtube, Facebook	2024-06-14

6

Discussion

6.1. Introduction

The thesis was written with a central focus on food systems transitions. Food systems across both the Global North and South have undergone profound transition processes in recent decades, driven by urbanization, demographic shifts, technological advances, and climate change (Bishwajit, 2014; Gómez & Ricketts, 2013; Hazell & Wood, 2008; Reardon et al., 2019). These processes generate significant economic and nutritional benefits but also entail sustainability challenges, including malnutrition, food safety risks, socio-economic inequities, and environmental degradation (Ambikapathi et al., 2022; HLPE, 2017; IPES-Food, 2016). This has sparked a global call for navigating food system transitions towards sustainability goals, as endorsed by the United Nations' Sustainable Development Goal 2 and related targets (United Nations, 2016; Willett et al., 2019).

In low- and middle-income countries (LMICs), including Vietnam, these transitions are particularly complex due to the prolonged coexistence of modern and traditional systems, pervasive informal institutions, and uneven governance capacity (HLPE, 2017; Vorley, 2023; Wieczorek, 2018). This complexity pinpoints particular challenges in implementing locally tailored solutions that address key food system issues while aligning with global and national sustainability targets. Despite growing recognition of these challenges, few studies have comprehensively captured the dynamic interplays between global and local levels, production and consumption segments, and formal and informal actors in LMIC food system contexts.

This thesis addresses these gaps by developing and applying the concept of the Missing Middle, indicating critical disconnects that occur both horizontally (between production and consumption) and vertically (between global and local levels) within food systems. Rather than viewing these gaps as fixed structural barriers, this research adopts a dynamic perspective, recognizing that the disconnects are constantly shifting, driven by changes at multiple levels from local practices to national institutions and global pressures.

To analyze those dynamics, the thesis integrates two complementary theoretical frameworks: Social Practice Theory (SPT), which illuminates micro-level reconfiguration of routinised behaviours, and transition theory - specifically the Multi-Level Perspective (MLP) and Strategic Niche Management (SNM) - which elucidates macro-level interactions among niches, regimes, and landscapes. This dual lens enables a cross-level analysis of how the Missing Middle emerges, persists, and might be bridged in the contexts of co-evolving food system elements. Through this integrated approach, the thesis makes both empirical contributions to deepen our understanding of the challenges to sustainability transitions in LMIC food systems and theoretical contributions to assessing food system dynamics.

The main research question guiding this thesis is: *How can the Missing Middle be understood, analyzed, and addressed to support sustainability transitions in LMIC food systems?* In addressing this question, the thesis suggests the deployment of both transition theory and practice theory to "zoom in" and "zoom-out" on food system dynamics at different levels to understand their interactions and potential misalignments. This hence translates into three sub-questions:

1) What patterns, drivers, and issues have been shaping the historical and ongoing transitions of LMIC food systems?
2) How have practices among various actors shifted and interacted to influence food system outcomes?
3) What are the strategies of niche networks that help connect sustainable food production with consumption, in addressing system barriers and supporting sustainability transitions?

The thesis adopts a case study approach (Flyvbjerg, 2006), using Vietnamese food systems as the case for investigating LMIC dynamics. Vietnam provides an ideal case study as one of the countries with a prominent food system transition, particularly following economic reforms in the late 1980s and later, the accelerating global trade integration after WTO accession in 2008. The continuing expansion of food production, including stronger emphasis on high-value products, the modernization of supply

chains, and the shifting dietary patterns, has brought significant benefits but also persistent challenges, including food safety risks in pork and vegetable supply chains. By focusing on patterns of changes within production and distribution practices and institutions of these two commodity chains, this thesis illuminates the cross-level dynamics and the Missing Middle gaps that hinder successful solutions to key sustainability challenges.

This discussion chapter presents findings from the four empirical chapters to provide comprehensive answers to the research questions. Section 6.2 summarizes integrated findings that directly respond to the three sub-questions, drawing on insights from across the case studies. Section 6.3 synthesizes those findings to illuminate the main research question regarding the characteristics of the Missing Middle in LMIC food system transition contexts, while highlighting the utility of the theoretical lenses employed. Section 6.4 outlines policy recommendations, and Section 6.5 elaborates on the study's limitations and prospects for future research.

6.2. Key research findings

As outlined, this section summarizes the key findings from the empirical chapters that help address the three research sub-questions. Hence, the section draws key insights from these findings on how they illuminate certain aspects of the Missing Middle (both horizontally and vertically).

6.2.1. Historical and ongoing transition patterns

RQ1: What patterns, drivers, and issues have been shaping the historical and ongoing transitions of LMIC food systems?

The first sub-question is mainly addressed in Chapter 2, which traces the evolution of Vietnam's pork and vegetable networks from 1975 to 2019. The analysis combines the Multi-Level Perspective (MLP) and Multi-Pattern Approach (MPA): MLP identifies transition pathways across decade-scale system changes, while MPA disaggregates these pathways into shorter-term patterns (under 10 years) showing how specific

networks expand, contract, adapt, or face interventions. The analysis divides the studied period into three phases: 1975-1992, 1992-2008, and 2009-2019.

Phase 1 (1975-1992) began with the collectivization of agri-food systems from 1975 to the early 1980s, followed by decollectivization efforts driven by both top-down policies and grassroots movements. Like many former socialist economies, Vietnam saw the collapse of centrally planned agri-food systems in the early 1990s, leading to the *substitution* of cooperatives by individual, smallholder farming.

Phase 2 (1992-2008) witnessed the empowerment of smallholder farms throughout the 1990s, supported by land liberalization, trade integration, and urbanization pressures that demanded higher-quality, year-round food availability. Later, in the 2000s, several niches emerged, particularly supermarkets and safe vegetable production, in response to heightening food safety and health concerns.

Phase 3 (2009-2019) is characterized by an ongoing *adaptation* process to address food safety and environmental concerns, as niche innovations such as VietGAP and organic certifications expanded. Additionally, corporate-driven supermarkets and convenience stores have experienced significant growth, indicating forthcoming changes in value chain structures and food environments.

Despite modernisation pressures, smallholder systems have proved remarkably durable, underpinned by: (i) dominant and entrenched informal rules, norms, and cultural preferences (such as daily shopping for fresh food) that shape consumer and supplier behaviors; (ii) inertia in distribution systems linked with small-scale production; and (iii) smallholders' cautious yet flexible strategies that retain traditional low-risk production models over modern, higher-investment alternatives. However, a divergence is emerging between pork and vegetable systems. Vegetable networks are likely to remain smallholder-dominated but may undergo incremental reconfiguration, whereas pork systems show stronger potential for technological substitution toward large-scale, biosecure production.

Vietnam's transition patterns align with broader macro-trends across LMICs, including (neo)-liberalization, supermarketization (Reardon & Hopkins, 2006), nutrition transition (Popkin, 2009), and growing environmental and food safety concerns (Jaffee et al., 2019). However, Vietnam's trajectory is distinguished by the combination of state-driven, top-down structures and fragmented, grassroots actors. While the developmental state can accelerate transitions through targeted policies, weak cooperation and coordination hamper the establishment of robust food safety control.

This helps us identify some key lock-ins and disconnects. *Vertically*, national agendas and policies, while promoting trade liberalization, retail reform, and safety certifications, have not sufficiently acknowledged the resilience and capacities of smallholders and traditional distribution networks, and have limited incentives to engage those actors in their food safety solutions. *Horizontally*, widespread fragmentation between production and distribution reinforces informal market arrangements, in which actors embedded in networks of personal trust lack both institutional support and economic incentives to transition to standardized contracts and formal quality assurance.

6.2.2. Transitioning practices of regime actors and their interactions

RQ2: How do practices among various regime actors have shifted and interacted to influence food system outcomes?

The second sub-question is explored in Chapters 3 and 4 through case studies on Vietnam's small-scale vegetable and pork systems. Using Social Practice Theory and the Multi-Level Perspective, the chapters employ the "zooming-in/zooming-out" approach to trace the evolution of practices and their connections to cross-level dynamics, while highlighting disconnects across food system segments.

In both chapters, clear shifts toward safer and more sustainable small-scale production practices are evident. Vegetable farmers have increasingly integrated biopesticides, organic fertilisation, crop rotation, and post-harvest soil management (Nguyen-Minh et al., 2024). Pork smallholders have incorporated biosecurity measures (disinfection, vaccination, quarantine) into their daily routines. These changes are

driven by improved access to materials (affordable inputs, infrastructure), enhanced competences (via IPM, VietGAHP training and informal digital networks such as Zalo groups), and shifting meanings (heightened awareness of health risks, farm viability, and consumer safety).

By contrast, distribution practices show striking inertia. Chapter 3 argues that traditional wholesalers, retailers, and wet-market consumers continue to rely on personal trust, visual assessment, and relational flexibility (Wertheim-Heck, Vellema, et al., 2014; World Bank, 2017), rather than formal safety or quality standards. Even cooperative-based distribution remains limited by unequal bargaining power and the difficulty of attracting new members. Likewise, Chapter 4 shows that although small-scale distributors are aware of biosecurity, this awareness has not been translated into practice. Food-safety improvements in distribution remain heavily dependent on sporadic state inspections rather than on internal incentives for safety improvement. The persistence of informal quality assessment reflects the embedded nature of distribution practices in social relationships that prioritize flexibility and relationship maintenance over standardized procedures (Hoang, 2020).

This asymmetry suggest a core *horizontal* Missing Middle: production practices are progressively reconfiguring while midstream and retail practices remain locked in informality and fragmentation. *Vertically*, national food-safety policies and certification schemes are poorly aligned with the capacities, motivations, and trust-based logics that dominate traditional marketing channels.

6.2.3. Strategies of niche networks and systemic constraints

RQ3: What are the strategies of niche networks that help connect sustainable food production with consumption to address system barriers and support sustainability transitions?

The third sub-question is addressed in Chapter 5, which employs the Strategic Niche Management (SNM) framework to analyze two Vietnamese agri-food certification initiatives: the Participatory Guarantee System (PGS) for organic vegetables and Vietnamese Good Animal Husbandry Practices (VietGAHP) for safe pork production.

Both serve as niche networks linking sustainable food production with markets and consumers through certification schemes. VietGAHP, a state-led program, offers third-party certification aligned with government policies on food safety and modernization, while PGS, guided by IFOAM's principles, represents a grassroots, community-based model in which farmer groups collectively carry out peer assessments under the overall supervision of a coordination committee.

The two initiatives illustrate contrasting strategies across the three niche development processes of envisioning, networking, and learning. VietGAHP emphasizes time-bound, project-driven objectives aligned with food safety and biosecurity agendas, relies on state-centric networks, and prioritizes technical learning through training and extension services. In contrast, PGS maintains robust, long-term expectations centered on organic principles and sustainability, fosters inclusive networks among farmers, specialty retailers, and NGOs, and encourages reflexive and broad learning.

However, when it comes to diffusion, both initiatives show different yet similar pathways. Both initiatives face critical barriers against *growth*: PGS is limited by low consumer awareness, stringent protocols, supervisory shortages, and weak institutional support beyond the local level. VietGAHP, despite strong policy backing, suffers from high compliance costs, low price premiums for smallholders, and restricted access to modern retail channels (Moustier et al., 2009). Meanwhile, *replication* is the most common and feasible diffusion pathway for both (Seyfang & Longhurst, 2016). PGS spreads horizontally through the multiplication of local groups, benefiting from their low-cost, community-based model (even though the replications do not necessary follow organic standards). VietGAHP relies on project-based replication through government programs and donor-supported pilots. Lastly, the translation of those niches into mainstream policies is divergent. VietGAHP is already a top-down government policy, while PGS is rarely recognized into national legislations. The 2017 national policy, which promulgates a nationwide organic standard, reflects an effort to 'conventionalize' organic agriculture (Vittersø et al., 2005; Yakovleva & Flynn, 2009); yet, it risks eroding the autonomy of grassroots organic movements under growing market and state pressures.

The Chapter, therefore, highlights critical horizontal and vertical gaps in niche-regime interactions within Vietnamese food systems. *Horizontally*, both initiatives face challenges linking production and distribution when informal, trust-based markets dominate and formal certification lacks consumer recognition. *Vertically*, persistent misalignments exist between ambitious national policies to modernize food systems and limited local implementation. State-led initiatives like VietGAHP lack sustainable market incentives, while grassroots PGS, despite strengths in learning and networking, lacks state support. These disconnects underscore the need for interventions that create an enabling environment, foster reflective learning across initiatives, and enhance consumer trust in certified products.

6.3. Synthesis

Having synthesised the empirical findings in relation to the three sub-questions, this section directly addresses the central research question: *How can the Missing Middle be understood, analysed, and addressed to support sustainability transitions in LMIC food systems?*

Before addressing these implications, a preliminary question arises: Why is the Missing Middle a helpful concept for understanding food system changes, particularly in LMICs? In other words, what is the analytical added value that the Missing Middle deliver beyond the existing food system-related frameworks? Agri-food system transition literature already employs numerous overlapping concepts. Studies use "lock-ins" or "barriers" to describe factors hindering system change. Terms like "midstream", "intermediaries", or "support systems" attempt to capture middle-tier activities. However, none of these concepts adequately captures the dual characteristics of being both *missing* (hidden, absent, weak, or dysfunctional) and *middle* (positioned between system elements in ways that shape their interactions and ultimately influences transition directions and outcomes).

The Missing Middle, while being imperfect terminology, offers a distinctive analytical lens. Rather than functioning as a concrete analytical category, it operates as a reflective heuristic device that prompts deeper examination of how interactions

between food system elements evolve during transitions. To enhance its analytical utility, this thesis proposes a typology of Missing Middle mechanisms. Here, mechanisms refer to systems of parts and processes working together to produce specific outcomes—explaining at an underlying level why phenomena occur. By systematically classifying and describing Missing Middle mechanisms, we can better explain why these gaps emerge, persist, and matter for transition outcomes.

6.3.1. Understanding the Missing Middle: four mechanisms

Understanding the Missing Middle requires attending to both its dimensional position and the mechanisms through which it operates. Dimensions refer to the relative spatial or functional position of the 'middle' in relation to the different food system elements. The disconnects operate horizontally when elements occupy the same spatial level (global, national or local), or vertically when they span at different levels. However, dimensions cannot specify *how* the middle interacts with these elements or *why* these interactions lead to undesired outcomes.

Mechanisms address this explanatory gap. They illuminate the underlying processes through which disconnects emerge and persist, revealing not merely where gaps exist within food system structures, but how and why they form and resist changes. Mechanisms and dimensions are complementary: dimensions map the structural locations of Missing Middle phenomena, while mechanisms explain the processes that generate these gaps. Both aspects prove essential for understanding how the Missing Middle operates within food systems and for identifying appropriate intervention points.

Table 6.1 *Mechanisms of the Missing Middle in LMIC food systems*

Mechanisms	Examples of "Missing Middles"	Description	Chapters
Hiding	Midstream actors (wholesalers, processors, logistics providers) and	This refers to the overlooked midstream segments and informal actors whose roles are often neglected in policy and research discourses.	2, 3, 4

	traditional supply networks		
Blocking	Certified niche initiatives; Interventions for scaling sustainable production practices;	Niche initiatives and sustainable practices are prevented from scaling or integrating into the mainstream system (regime) due to systemic lock-ins (e.g., market informality, fragmentation) and high compliance costs.	2, 3, 4, 5
Mismatching	Mismatches between production and distribution practices; Misalignments between national modernization policies and local implementation capacity.	Different food system components operate under conflicting expectations or priorities, resulting in misaligned incentives and fragmented actions	3, 4, 5
Depleting	Insufficient regulatory enforcement capacity; Limited financial/human resources for niche supervision	The absence or erosion of crucial support structures, capacities, resources, or institutional elements required to enable sustainability transitions	3, 4, 5

As outlined in ***Table 6.1***, based on the empirical studies in the previous chapters, the thesis proposes four mechanisms for explaining the MM: Hiding, Blocking, Mismatching, and Depleting. Below these proposed mechanisms are further explored.

6.3.1.1. Hiding

The Hiding (or Neglecting) mechanism denotes key actors, infrastructure, or functional segments within the food system that are essential for operations but are often overlooked in research, policy, and governance frameworks.

In its primary application, this mechanism is exemplified by the "*hidden middle*", indicating the systematic overlooking of the *midstream segment*, processing, storage, wholesaling, and logistics activities. Despite accounting for 30–40% of value added and costs in LMIC food value chains, the midstream segment receives minimal policy

attention (Reardon, 2015). Rapidly evolving under urbanization, income growth, and penetrating private-led investments, the midstream is increasingly playing key roles, not only by linking producers to consumers but also for translating sustainability needs across supply chains (Grabs et al., 2024).

In this thesis, beyond the modernizing, private-led midstream, we also highlight *informal distribution networks* as another example of being subject to the Hiding mechanism. Both Chapter 3 and Chapter 4 describe how small-scale wholesalers and retailers operating through traditional wet markets remain central to Vietnamese vegetable distribution, yet remain underrepresented in food safety policies (Nguyen-Minh et al., 2024). In both cases, pork and vegetable distribution networks show high levels of informality across all segments, which is a 'defining and dynamic feature of urbanisation' in LMICs (Vorley, 2023). The papers show that despite its underpresentation or antagonistic policies, both informal networks are incredibly resilient, owing to the dominance of norms, personal relationships, and cultural preferences (e.g., consumer preferences for fresh food) as well as economic advantages in delivering affordable food to low-income households (Wertheim-Heck et al., 2019).

This Hiding mechanism operates through multiple reinforcing processes. First, skewed policy and intervention biases that predominantly target upstream production and downstream retailing, systematically overlooking the middle segments (Yeritsyan et al., 2024). As documented in Chapter 2, Vietnamese food system policies have historically emphasized production improvements and, more recently, modern retail development, while largely neglecting the midstream and informal distribution segments that handle the majority of fresh food flows (Nguyen-Minh et al., 2023). Second, data gaps pesist as LMICs often track only aggregate statistics like crop output and exports while collecting minimal midstream data (Ambler et al., 2023). Third, the informal sector faces purposeful neglect driven by dominant policy narratives framing informality as jeopardizing food safety and quality (Béné, 2022; Wertheim-Heck et al., 2015), which are also demonstrated in Chapter 3 and 4. While the recent COVID-19 pandemic amplified critiques of the informal midstream network, it has also prompted

renewed calls for recognizing the informal sector's essential role and developing effective governance tools to engage constructively with it (Kushitor et al., 2022; Mekonnen et al., 2022).

6.3.1.2. Blocking

The Blocking mechanism denotes systemic impediments that actively resist alternative solutions that support sustainability transitions. This aligns closely with 'lock-ins' in transition theory, which serves as a key concept for explaining why contemporary agri-food systems resist transformation (Conti et al., 2021; Kuokkanen et al., 2017). Examples of lock-ins in agri-food systems are primarily documented in studies of alternative food networks (AFNs) and various sustainable agri-food paradigms, models, and technologies (agroecological, organic, precision, nutrition-sensitive, climate-smart, circular, etc.) (Hackfort, 2023; Iles, 2021; Weituschat et al., 2022; Williams et al., 2024).

Predominantly positioned in Western contexts, the dominant narrative identifies lock-ins as self-reinforcing dynamics that perpetuate the unsustainable agro-industrial status quo, fostering structural inertia and resisting systemic change (Conti et al., 2021). These lock-ins are maintained by interconnected factors across political, institutional, infrastructural, technological, and cognitive domains: the dominance of powerful actors (primarily concentrated corporations), misaligned institutions, cultural and attitudinal resistance to change, and persistent suboptimal technologies and infrastructures (Even, Thai, et al., 2024).

In this thesis, the Blocking mechanism operates by 'locking-in' the current status of food systems, hindering niche initiatives and sustainable practices from achieving broader scale or successfully integrating into mainstream regimes. Chapter 5 documents how Participatory Guarantee Systems (PGS) for organic vegetables and VietGAHP for safe pork face multiple barriers, high compliance costs, insufficient financial and human resources, low consumer familiarity, and a lack of policy support. This echoes similar reasons hindering the scaling of AFNs reported in case studies across Asia, Africa, and Latin America (Anselmi & Vignola, 2021; Bottazzi et al., 2023;

Hruschka et al., 2024; Mutiara & Arai, 2017). This thesis argues that many of these barriers are rooted in systemic structures, specifically the dominance of informal, fragmented markets that undermine market benefits and disincentivize certification uptake. This observation does not dismiss the need for recognizing the critical role of the informal sector as reflected through the Hiding mechanism. Rather, it acknowledges that while informal distribution networks serve essential functions, they simultaneously create structural barriers requiring targeted interventions rather than being overlooked or defended unconditionally.

The Blocking mechanism in LMIC food systems is rooted in several reasons. One *is path dependency*, where past decisions and historical developments shape current institutional arrangements, creating momentum that tends to perpetuate existing trajectories. Chapter 2 analyzes how Vietnam's rapid collective system collapsed in the early 1990s after which centralized governance legacy created fragmented cooperative practices at the grassroots level and overreliance on state support at policy levels (Nguyen-Minh et al., 2023). Another is *system inertia* (Conti et al., 2021), a tendency among actors to reject enacting necessary change. Inertia can be rooted in both lack of technology, knowledge, or market incentives, or in the vested interests of actors within specific socio-economic contexts (Stål, 2015). The latter cause of inertia is often grounded in political economy, emphasizing how power consolidation by dominant actors reinforces system barriers (Even, Thai, et al., 2024). LMIC food systems, while also experiencing system inertia like Western countries, demonstrate that not only power concentration but also power fragmentation contributes significantly to systemic inertia, sustaining the Blocking mechanism. Chapters 3 and 4 illustrate this fragmentation: thousands of dispersed smallholder producers operating independently, extensive networks of small-scale wholesalers and traders with limited coordination, and multiple governance layers spanning national to commune authorities. This configuration reveals that while large corporations may have vested interests in locking in existing regimes, the dominant networks of small-scale and informal actors also possess vested interests in maintaining current arrangements. This power fragmentation creates formidable challenges, as interventions must

simultaneously engage with all these dispersed actors to achieve system-wide transformation.

6.3.1.3. Mismatching

The Mismatching mechanism operates through misalignments and incompatibilities that impede collective action in addressing food system challenges. These disconnects manifest across multiple dimensions: divergent interpretations and expectations, incompatible institutional logics, and misaligned priorities (Conti et al., 2021; Even, Thai, et al., 2024; Smink et al., 2015). Divergent interpretations reflect fundamental disagreements among stakeholders regarding the current state of food systems, key terminology, causes of unsustainability, and intervention foci (Mausch et al., 2020). Such divergence emerges from heterogeneity of interests and values, with powerful actors sometimes imposing their priorities over others (Brooks, 1995; Turnheim & Sovacool, 2019). Even when stakeholders share expectations, institutional decision-making logics may generate misalignments: private sector entities prioritize profitability and efficiency through entrepreneurial logic, whereas public institutions emphasize stability and risk mitigation through hierarchical logic (Smink et al., 2015). These incongruities ultimately generate conflicting action priorities, which prove especially problematic in resource-constrained LMICs (Béné, Oosterveer, et al., 2019).

Mismatching can occur among actors across different food system segments and levels. The most notable example is the disconnect between producers/suppliers and consumers, where producers frequently base product designs on assumed rather than verified consumer preferences, leading to the failure of new food products (Little et al., 2015). Suppliers and consumers also diverge in values: while large firms often emphasize modern, efficiency-driven perspectives, consumers may prioritize post-modern qualities such as freshness, naturalness, variety, and food identity (Wikström et al., 2016). Mismatches can occur between government sectors—such as agriculture, nutrition/health, and trade—which operate with siloed norms, mandates, and priorities, and lack formal arrangements for cross-sector dialogue and coordination (Duncan et al., 2022). Finally, mismatches occur between global or

national agri-food agendas and local realities, where implementation fails to capture local contextuality or becomes misinterpreted or exploited by dominant groups (Béné, 2022).

This thesis demonstrates Mismatching through several key examples from Vietnam's pork and vegetable systems. Chapters 3 and 4 reveal regime-practice misalignments between smallholder production practices that have selectively adopted food safety and biosecurity protocols and distribution practices that show minimal normative change. Chapter 5 documents mismatches between policy expectations and implementation outcomes: despite government support for VietGAHP, producers do not see any financial benefit when selling through traditional channels, which limits the adoption and sustainability of the niche.

Several mechanisms explain the Mismatched MM in LMIC contexts. First, food systems are highly complex with significant heterogeneity among actors (Ambler et al., 2023; Mausch et al., 2020). Chapters 2-4 document this complexity in Vietnam, where modern, mixed, and traditional food systems coexist and evolve at different paces, creating asymmetrical dynamics as some components adopt new solutions while others resist change. Second, these differences generate variations in interests, values, and priorities, while power imbalances, organizational logics, and communication barriers prevent collaborative solution development (Smink et al., 2015). Chapter 5 illustrates divergent priorities between government agencies promoting certification, producers seeking market security and profitability, and retailers requiring consistent supply, with limited negotiation platforms. Additionally, trends toward intensification, consolidation, and distancing can undermine the proximity of food system actors, not only geographically but also operationally and cognitively, further reinforcing those differences if bridging efforts are absent (Dubois, 2018). Crises can either prompt shared understanding and collective actions, or conversely, exacerbate misalignments and tensions by suppressing alternative voices in favor of promoting unified and rapid responses (Gordon et al., 2022). Chapter 4 demonstrates this duality: while ASF prompted collective biosecurity adoption, it also exacerbated distribution mismatches

by prioritizing large-scale production and retailing over smallholder and informal networks.

6.3.1.4. Depleting

The Depleting (or Deficiency) mechanism refers to the absence or erosion of crucial support structures, capacities, resources, or institutional elements required to enable sustainability transitions. This depletion manifests itself through limited resources (biophysical, financial, or human), inadequate institutional capacity, or insufficient infrastructure for supply chain development (logistics, processing, and markets).

In many LMICs, government institutions often exhibit mixed performance and insufficient governance capacity (Wieczorek, 2018). A significant manifestation of this is the inability to enforce regulations, particularly those related to food safety and quality (Grace, 2015a). Also, support systems, including research, extension, veterinary and phytosanitary, and market information services, are frequently unable to provide adequate and equitable access for food suppliers. These capacity and resource limitations often stem from financial constraints (Abdulai & Béné, 2025). Even when policies are in place to support initiatives like certification or nutrition programs, their implementation suffers from weak financial allocation at both national and local levels. These challenges are compounded by corruption, political tensions, and incompetent leadership within government institutions, ultimately undermining resource mobilization and implementation efforts (Abdulai & Béné, 2025; Mimba et al., 2007). In response to the persistent challenges of public systems, agricultural extension has shifted toward more pluralistic models that involve the private sector and development agencies. However, this privatization introduces new challenges, including ensuring inclusive access for smallholder farmers and small and medium-sized enterprises (SMEs) (Doran et al., 2009; Maiangwa et al., 2010; Uddin & Qijie, 2013).

Examples of the Depleting mechanism appear throughout the thesis. Chapter 2, for instance, highlights the limited capacity of state extension services to reach underprivileged households (Nguyen-Minh et al., 2023). Chapter 4 reveals weak regulatory oversight and supervisory capacity among state agencies contributing to

persistent food safety risks, both at the farm level (e.g., antibiotic overuse) and along processing and retailing chains (e.g., cross-contamination). Chapter 5 illustrates resource depletion and limitation in niche initiatives: the PGS system operates with limited funding relying primarily on member contributions, constraining its ability to maintain strict supervision and expand membership. Similarly, the VietGAHP initiative received only temporary government support through projects like LIFSAP, with formerly established GAHP groups being unable to continue functioning after project funding ended.

The Depleting mechanism emerges from several interconnected factors. Limited resources and capacities at multiple governance levels constrain both state and non-state actors' ability to implement transformation initiatives effectively (Bai et al., 2009). Even when resources are available top-down, actors at the grassroots level lack sufficient know-how to access and utilize them, particularly those with inadequate linkages to other public, private, and research sectors. Weak collaboration among government sectors could exacerbate the limitations. As documented in Chapter 2, production agencies, market management authorities, and food safety regulators operate independently with separate mandates and budgets (Nguyen-Minh et al., 2023). This siloed structure prevents coordinated support for system-wide interventions, fragmenting already limited resources and reinforcing deficiencies in budgets, personnel, and technical expertise. Lastly, political competition and conflict can divert attention and resources away from long-term capacity building toward short-term political priorities (Abdulai & Béné, 2025).

Drawing on the literature and the empirical findings, the sub-section has identified four mechanisms—Hiding, Blocking, Mismatching, and Depleting—that explain how and why Missing Middle disconnects emerge and persist in LMIC food systems. Understanding these mechanisms and how they operate across horizontal and vertical dimensions enables further diagnosis of the Missing Middle in specific contexts and identification of targeted interventions.

6.3.2. Analyzing the Missing Middle: the dual lenses

Beyond identifying the mechanisms through which the Missing Middle operates, a second critical task is analyzing how these mechanisms manifest and interact in particular LMIC contexts. This requires systematic examination of interactions between food system elements, their embedding in broader transition dynamics, and the specific ways MM mechanisms are enacted and reinforced.

This analytical challenge invites the use of complementary theoretical lenses capable of operating at different scales. Following Nicolini (2009)'s approach of 'zooming in' and 'zooming out', the thesis applied the dual theoretical lenses of Transition Theory and Social Practice Theory. The former provides macro-level structural mapping of landscape pressures, regime configurations, and niche experiments, while the latter enables micro-level investigation of how practices are performed, reproduced, or stabilized in everyday settings. This combination is theoretically sound as both theories focus on tension between stability and change: the MLP "regime" corresponds closely to stabilized practice bundles in SPT, and both trace transformation to contextual disruptions that reconfigure existing arrangements with new elements (Keller et al., 2022).

Empirically, the dual lens delivers critical explanatory power. Chapters 2 and 5, drawing primarily on MLP and SNM, map cross-level interactions between landscape pressures (global standards, trade integration, crises), regime structures (smallholder dominance, informal markets, fragmented governance), and niche experiments (certification schemes, cooperatives). This reveals why niches fail to scale and why regime reconfiguration remains partial and asymmetrical. While transition analysis alone cannot fully capture the Missing Middle, it establishes essential foundations—historical path dependencies, state-centric legacies, and persistent capacity deficits at regime and niche levels.

The two lenses are more integrated in Chapters 3 and 4, where a unified framework was built around two primary conceptual grounds. First, practice elements (materials, competences, meanings) are systematically traced to their multi-level contexts, for

example,how vaccines, IPM knowledge, and biosecurity protocols are introduced by regime or niche-level development before diffusing into local routines. Second, by overlaying regime dynamics with evolving practice configurations, the analysis adapts intersection analysis (Gazull et al., 2019; Hargreaves et al., 2012), pinpointing critical points of blockage and leverage: where regime rigidity blocks practice change, or where reconfigured practices could, under different conditions, destabilize and trigger regime shifts. This illuminates why sustainable production practices remain confined to small producer groups or pilot projects, as they lack capacity or agency to incite complementary shifts in other regime elements (regulation, finance, infrastructure, market access, distribution networks).

The dual-lens approach requires going beyond conventional consumption-oriented SPT literature (Svennevik, 2022) to attend to supply-side practices. Unlike consumer practices, supplier practices (farming and distributing) are distinct in critical aspects: (i) they are shaped by economic viability and security imperatives, making them sensitive to price volatility, market access, and income risk; (ii) they remain deeply entangled with biological and climatic cycles, so configurations are constrained by non-negotiable biophysical factors (seasonality, pest dynamics, soil fertility, weather extremes); (iii) they are subject to greater formal institutional oversight and mainly top-down regulatory enforcement. These distinctive drivers shift analytical emphasis toward livelihood viability, risk management, and compliance burdens—dynamics that can clash with consumption practice drivers like convenience, taste, price, and identity. These differences align with the conflicting logics (Smink et al., 2015) that constitute mechanisms sustaining the MM.

In deploying the two theories, three theoretical and methodological challenges arise. *First*, both theories originated in highly formalized, industrialized Western contexts. Their application to LMICs necessitates deliberate adaptation to distinct characteristics like pervasive informality, prolonged coexistence of modern and traditional food system elements, and pronounced resource and capacity asymmetries (Downs et al., 2020; HLPE, 2017). This requires practice analysis to recognize heterogeneity of actors' values and capacities, illuminating how food practices can

adapt rapidly in some cases yet rarely scale to other circumstances. For transition theory, analysis should shift emphasis beyond technological niches and stable consumer-driven markets (Geels, 2002) to social and organizational innovations and instable and informal regime institutions (Bock, 2012; Nguyen-Minh et al., 2023; Vorley, 2023; Wieczorek, 2018).

Second, the two frameworks are primarily based on ex-post analysis, posing challenges to reconstructing historical trajectories and forecasting future paths. While instrumental in illuminating observed sequences of landscape pressures, regime reconfigurations, and practice intersections, analysis is constrained by scarcity of longitudinal data (especially on informal and midstream segments), the rapid and often undocumented LMIC changes, and reliance on retrospective interviewee accounts. The dual lens is valuable in investigating how past dynamics have emerged along the Missing Middle, yet caution is warranted regarding their causal relations and predictive capacity.

Third, combining the two theories necessitates careful consideration of the Missing Middle's ontological and structural status. As discussed by Geels (2011) and others, practice theory adopts a 'flat' ontology where practices exist as horizontal arrangements without inherent hierarchy, while transition theory employs a 'vertical' ontology with separate landscape, regime and niche levels. These ontological viewpoints fundamentally shape how the Missing Middle can be conceptualized: either as bundles of contingent misalignments among practices or as more durable, structural voids between dynamics across levels. Attempts to reconcile these viewpoints often argue that "levels" in transition theory simply reflect different degrees of institutionalization and stabilization of socio-technical practices (Spaargaren et al., 2012). While theoretically appealing, this remains insufficient for fully explaining the Missing Middle's nature, which can be both structural and contingent in LMIC contexts. This thesis retains both interpretations. The Missing Middle can be analyzed either as persistent cross-level disjunctures, or as a fluid zone of frictions among practice changes. The former serves better for diagnostic purposes, identifying where systematic gaps exist between policy levels, supply chain segments, or governance

scales requiring institutional responses. The latter serves better for discursive purposes, gaining thorough understandings of how disconnects emerge dynamically from interplay of co-evolving practices, and why some interventions could foster practice changes but not system transitions.

6.3.3. Addressing the Missing Middle: trajectories, complexity, and political economy

Lastly, the general question requires clarification on how we can address the Missing Middle in LMIC contexts. This sub-section elaborates on several key considerations for interventions aimed at bridging the Missing Middle, based on the LMIC food system characteristics and the case studies. Further policy recommendations will be detailed in the next section 6.4.

The first consideration is the *non-linear trajectories* of the food systems in LMICs that thoroughly shape the Missing Middle. As illustrated in Chapter 2 (Nguyen-Minh et al., 2023), Vietnamese food systems do not follow a linear trajectory from traditional to modern configurations as commonly depicted in policy frameworks (HLPE, 2017; Jaffee et al., 2019). Similar patterns appear across many LMICs, where food systems demonstrate complex pluralistic arrangements with multiple system types coexisting simultaneously, and where future developments remain subject to considerable uncertainty. This non-linearity creates inherent unpredictability for interventions: addressing one gap may inadvertently generate new ones in unexpected locations, while external shocks can temporarily accelerate certain adaptations yet simultaneously create new disconnects elsewhere. Interventions must therefore prioritize adaptability over optimization, incorporating mechanisms for monitoring how gaps evolve and adjusting strategies as systems develop along context-specific pathways.

Second, in addressing the Missing Middle, one should consider the *diversity of actors, interests, and operational logics*. Such heterogeneity means standardized interventions inevitably encounter variable outcomes. What constitutes a "missing" element in one context may be present but unrecognized in another, or may be

deliberately absent because it conflicts with local logics. Formal certification systems designed for modern retail channels may prove inappropriate for informal markets operating on trust-based relationships. This demands context-specific rather than one-size-fits-all approaches. However, locally tailored solutions may lack scalability, and the diversity of solutions can itself create coordination challenges. To address this dilemma, interventions should work with existing diverse solutions rather than attempting to standardize all of them, while still seeking to build coherence among approaches. This requires flexible frameworks that support multiple pathways that accommodate varied local implementations yet maintain space for cross-context learning and adaptation.

Third, addressing the Missing Middle requires explicit engagement with the *political economy* that determine intervention feasibility. Power configurations, whether consolidated or fragmented, fundamentally shape what coordination mechanisms can emerge and which actors have the capacity and incentives to invest in bridging gaps. Politics and policies determine which which gaps receive mainstream attention: disconnects aligned with state priorities or donor agendas attract resources, while equally significant gaps affecting marginalized actors or those operating outside formal systems remain unaddressed. Resource constraints compound these challenges, as limited financial, human, and institutional capacities may prevent implementation even when solutions are technically feasible and politically acceptable. This implies that addressing the Missing Middle requires more than identifying gaps within food systems. It demands active engagement with existing power structures to develop coordination mechanisms and solutions that not only are technically viable but also command the necessary political support and institutional capacity.

6.4. Policy recommendations

Drawing on the above discussion, this section will propose several recommendations for policy interventions to address the Missing Middle in LMICs. The recommendations are based on the key issues identified in the different Chapters in this thesis, targeting the Missing Middle mechanisms proposed in the synthesis.

Recognizing and engaging smallholders and small-scale midstream actors

The first recommendation centers on smallholder producers as well as small-scale midstream actors, including wholesalers, traders, and wet market retailers. These actors play key roles in both maintaining and reconfiguring the regime in food systems, either by sustaining their fragmented, informality-based market structure or by timely adapting their practices to food safety regulations and urbanizing contexts. Food system decision-makers should actively engage these informal and small-scale actors as partners in transformation rather than attempting to bypass or replace them. Policy-makers should avoid two extremes: vilifying informal actors as primary culprits for food safety issues, or romanticizing current food systems while intentionally ignoring structural issues like fragmentation that hinder scaling of innovations. Instead of imposing standardized protocols that exclude smallholders and informal actors, accessible mechanisms should be co-developed offering training, material support, and incremental pathways toward improved practices. This gradual participatory and needs-based approach should support shifting small-scale and informal practices while acknowledging both their essential functions and limitations. This recommendation addresses Hiding by engaging overlooked midstream and informal networks, and Blocking by working with rather than against the fragmented power structures sustaining current configurations.

Fostering and bundling practice changes

In line with the previous recommendation, interventions targeting practice changes should create synergies across production, distribution, and consumption rather than isolated segment-level improvements. This requires: (i) building enabling environments by addressing core meanings (farm viability, risk reduction, labor saving) alongside necessary materials and competences, (ii) working within existing routines rather than imposing external models, (iii) promoting coordinating practices that integrate information sharing, supervision, and marketing, including integrated approaches like One Health that simultaneously address biosecurity, food safety, and environmental goals. Interventions must provide long-term commitment beyond short-term projects

by investing in material infrastructure, strengthening peer networks, and targeting critical nodes like cooperatives and slaughterhouses where multiple practices intersect. This recommendation addresses Depleting through long-term material, financial, and human resource support while tackling Mismatching by aligning interventions with existing practice trajectories and livelihood priorities.

Aligning multi-level and multi-sectoral values and expectations

Beyond addressing supplier-consumer mismatches, interventions must align multi-level and multi-sectoral policies with implementation. Food system actors operate with divergent priorities based on conflicting expectations and values—misalignments exacerbated by incompatible institutional logics and siloed sectoral functions. Fostering alignment requires: (i) establishing dialogue platforms among producers, distributors, retailers, government agencies, NGOs, and consumers to foster shared understandings and co-develop strategies and interventions, (ii) creating multi-sectoral working groups or coordinating committees to address cross-cutting challenges like food safety, (iii) developing public-private partnerships that blend grassroots innovation with policy recognition and scale local solutions beyond pilots. Research and science actors could play critical roles by generating evidence on policy coherence and tradeoffs across sectors, documenting diverse pathway outcomes, and translating actor priorities through participatory approaches. These mechanisms address Mismatching through coordinated expectations and priorities while tackling Depleting through unified resource mobilization.

Co-building and prioritizing monitoring and enforcement capacity

Another key recommendation is to strengthen monitoring and enforcement capacities for food quality and safety by building broad, robust public-private coalitions rather than relying solely on state systems. As discussed across the different Chapters, state agencies alone lack sufficient resources to monitor dispersed informal networks effectively. Policymakers should strategically focus limited regulatory resources on critical control points—cooperatives, pesticide shops, centralized slaughterhouses, and wholesale markets – guarenteeing their regulatory oversight on such critical points

in supply chains. Meanwhile, policies should support various monitoring and enforcement options including third-party certification bodies, community-based participatory guarantee systems, cooperative internal quality controls, and digital traceability platforms. Research agencies should provide technical support, capacity building, and frameworks for coordination, working with both public and private sectors who can play key enforcement roles. This recommendation addresses Depleting by mobilizing additional resources through public-private partnerships and strategic prioritization, while tackling Blocking by strengthening enforcement coalitions that overcome production and distribution system inertia.

Promoting inclusive transformation pathways

Lastly, policymakers should acknowledge multiple food system transformation pathways, including modernization, standardization, agroecology, and promotion of healthy and sustainable consumption, rather than imposing singular visions that privilege large-scale, corporate-led solutions. Food systems in LMICs follow non-linear trajectories where traditional, mixed, and modern systems coexist and evolve at different paces. This plurality and uncertainty means it is not recommended to strictly copy the transition paths of Western food systems, given their shortcomings in terms of diets, inclusivity, and environmental outcomes.

Hence, diversity should be taken into account in food system planning, including: (i) supporting development of both formal and informal retail channels, (ii) ensuring standardization and certification initiatives accommodate different scales and organizational models, (iii) maintaining space for smallholder and community-based solutions. Learning among different innovations, whether state, corporate, or community-led, should be fostered. Science and research play critical roles in documenting how diverse pathways perform across sustainability dimensions, generating evidence to foster reflexive learning and inform adaptive policymaking. State policies should recognize the strengths of community and grassroots innovations in inclusive networking and reflexive learning, and such innovations can be translated into

regime reconfigurations aimed at balancing healthy diets, environmental protection, and fairer benefit distribution.

6.5. Limitations and future research

This section elaborates on some limitations in the thesis, alongside several key prospects for future development. The first and most remarkable limitation is regarding the case study design, which focuses predominantly on production and distribution practices while giving limited attention to consumption practices and perspectives. Although Chapters 2 and 5 incorporate consumer preferences through secondary literature, the thesis lacks primary data on how consumers actually perform their food acquisition and consumption practices, and engage with the food environments – including key aspects of availability and accessibility of healthy and safe products, access to marketing and food safety information, or the informal trust relationships in wet markets, etc (Turner et al., 2019). The study also lacks perspectives on diets and nutrition outcomes, given that those aspects stricly influence their dietary choices, and having complex interplay with food safety (Nordhagen et al., 2022). While some of those aspects have been covered in previous literature on food systems in Vietnam (Ha, Shakur, & Do, 2019; Tran & Sirieix, 2020; Wertheim-Heck, Vellema, et al., 2014; Wertheim-Heck & Raneri, 2019), future studies should integrate consumption analysis with production and distribution research, examining how consumer practices and dietary choices interact with supplier practices to shape system outcomes. Analysis of niche innovations should similarly incorporate consumer dimensions to identify critical mismatches affecting market diffusion.

Secondly, the thesis relies predominantly on qualitative methods and ex-post analysis of historical transitions. Although the qualitative case study approach excels at revealing contextual nuances and causal mechanisms, it restricts generalizability and precludes rigorous quantitative assessment of relationships between variables. Future research should employ mixed-methods designs that integrate the interpretive depth of qualitative inquiry with the statistical power of quantitative analysis. Combining large-scale surveys and dietary assessments with in-depth interviews, focus group

discussions and practice observations would enable more robust system-wide analysis. Moreover, quasi-experimental designs, i.e., involving intervention and control groups, could more effectively isolate the causal impacts of specific policy instruments or niche innovations on health, socio-economic and environmental outcomes under varying contextual conditions. Finally, incorporating longitudinal data analysis would significantly enhance transition studies by providing a clearer, more dynamic picture of food system transformations over time.

Thirdly, the thesis is grounded in the specific context of Vietnam, which necessitates caution when generalizing its findings to the diverse settings of other LMICs. Although Vietnam exhibits important parallels with many LMICs in its food system transition, its distinctive combination of characteristics, i.e., legacy of developmental-state planning, rapid marketization after the Đổi mới reforms, export-oriented agricultural intensification, and strong cultural preferences for fresh food, can create a unique configuration that may not be replicated elsewhere. As a result, the Missing Middle mechanisms identified here may function differently in contexts marked by varying state capacities, midstream infrastructure development, levels of market concentration, or alternative cultural norms regarding food quality and trust relationships. Future research should therefore undertake comparative studies across multiple LMICs to examine how Missing Middle dynamics operate under diverse institutional, economic, and socio-cultural conditions. Moreover, studies that contrast transition pathways across countries at different stages of development could provide critical insights into the evolving trajectories of food system transitions, thereby clarifying how Missing Middle may change and how they should be addressed over time.

Lastly, forthcoming research should advance the Missing Middle framework itself by operationalizing its core constructs more rigorously and evaluating targeted interventions. The proposed typology of four mechanisms (Hiding, Blocking, Mismatching, and Depleting) remains largely conceptual, with limited translation into measurable indicators. Developing robust, empirically grounded metrics to assess the presence, intensity, and interaction of each mechanism would facilitate systematic intervention studies, enabling researchers to test whether addressing specific Missing

Middle dynamics actually improves food-system sustainability, inclusivity, and resilience. Adopting action-research or co-design approaches, in close collaboration with cross-level food system actors, could further transform the Missing Middle from a primarily analytical heuristic into a practical diagnostic and policy tool capable of generating context-specific, actionable recommendations.

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English Summary

Food systems in low- and middle-income countries (LMICs) face complex, intraconnected challenges as they transition towards more sustainable futures. Despite notable progress, persistent and emerging problems remain: food safety risks, the triple burden of malnutrition, socio-economic inequities, environmental degradation, and climate change impacts. Overcoming these requires food systems governance to shift beyond single-sector interventions toward more holistic, coordinated approaches capable of pursuing multiple sustainability goals simultaneously. Such coordination is frequently undermined by critical disconnects that operate both horizontally (across production, distribution, and consumption segments) and vertically (between global/national and local scales). This thesis conceptualizes these disconnects as the "Missing Middle."

The thesis centers on understanding, analyzing, and addressing the Missing Middle in LMIC food systems. It adopts a dynamic perspective, viewing the Missing Middle as embedded within ongoing food system transitions and shaped by interactions among processes at different levels and segments. In analyzing the Missing Middle, the thesis employs two complementary theoretical lenses: Social Practice Theory (SPT), which focuses on micro-level changes in the everyday, routinized practices of food system actors, and Transition Theory - particularly the Multi-Level Perspective (MLP) and Strategic Niche Management (SNM) frameworks - which investigates macro-level dynamics across landscape (external pressures), regime (dominant incumbent systems), and niche (innovation-supporting networks) levels.

The research is based on case studies in Vietnam, with primary empirical fieldwork conducted between 2020 and 2023, mainly in Hưng Yên Province and Hanoi. It examines two major commodity chains, pork and vegetables, that are central to Vietnamese diets and rural livelihoods yet continue to face critical food safety challenges. Multiple methods were deployed to collect and triangulate data, including a scoping review and desk study, semi-structured interviews, survey, observations, and

stakeholder consultations. The thesis includes four empirical chapters, focusing on overall food system transitions (Chapter 2), changes in small-scale vegetable (Chapter 3) and pork practices (Chapter 4), and the development and diffusion of agri-food niches (Chapter 5).

Chapter 2 traces the the historical transition of Vietnamese pork and vegetable networks from 1975 to 2019, based on the data extracted from a scoping literature review. It applies the MLP together with the Multi-Pattern Approach (MPA). The MLP identifies decade-scale transition pathways, while the MPA disaggregates these into shorter-term patterns of network enpowerment, contraction, adaptation, or external intervention. The analysis delineates three main phases: (1) the collapse of collective farming and the rise of smallholder production (1975–1992); (2) rapid expansion of smallholders' production accompanied by the formalization of wet markets (1992–2008); and (3) partial modernization through supermarkets and certification schemes, alongside the continued dominance of traditional distribution networks (2009–2019). The Chapter argues that progress toward improved food safety remains slow and locked in, sustained by strong alignments among actors, practices, infrastructures, and cultural values that reinforce small-scale, fragmented systems.

Chapter 3 explores how vegetable producers and distributors have altered their practices over time, using desk study, interviews, surveys, and observations. Combining SPT and MLP, the analysis zooms in to examine shifts in practice bundles and their core elements (meanings, materials, competences), then zooms out to link these micro-level changes to broader regime and landscape dynamics, identifying key intersection points that block or enable system changes. Contrary to the common notion on few production changes, there are clear transition patterns of production practices: smallholders have increasingly adopted biopesticides, integrated pest management, crop rotation, organic fertilizers, and improved soil cultivation. These shifts arise from converging pressures around food safety concerns, labor shortages, and soil degradation. In contrast, distribution practices exhibit strong inertia, remaining anchored in informal trust-based relations and lacking formal safety controls, even as practices diversify in response to urbanization. The findings highlight that while

production-level changes are significant, persistent inertia in distribution continues to obstruct broader systemic transformation.

Chapter 4 examines pork production and distribution practices, with particular attention to biosecurity and food safety. In the same vein as Chapter 3, it deploys SPT and MLP and follows the 'zooming in/zooming out' approach, drawing on desk study, interviews, a survey and observations. Results indicate that producers have substantially strengthened biosecurity measures (disinfection, vaccination, quarantine), driven by a profound shift in meanings where biosecurity became vital for farm survival, along with enhanced access to materials and knowledge sharing. The African swine fever outbreak served as a triggering event that accelerated these changes, yet biosecurity adoption still relies on pre-existing material conditions and producers' perceptions of fatality and care. Food safety practices, however, evolved unevenly and remained context-dependent, i.e. rural and urban settings. The Chapter underscores that, despite overlapping concerns with hygiene and disease prevention, biosecurity and food safety have followed divergent trajectories, with the latter lacking sustained incentives for change, particularly in distribution practices.

Chapter 5 investigates two certification initiatives, the grassroots Participatory Guarantee Systems (PGS) for organic vegetables and the state-run Vietnamese Good Animal Husbandry Practices (VietGAHP) for safe pork, through interviews and media analysis. Employing the Strategic Niche Management framework, it examines internal niche processes (envisioning, networking, learning) and external diffusion pathways (growth, replication, accumulation, translation). The two initiatives pursue markedly different strategies: VietGAHP relies on time-bound, project-based targets, state-centric networks, and technical training, whereas PGS emphasizes long-term organic visions, inclusive stakeholder networks, and reflexive learning. Despite different strategies, both face similar scaling barriers - informal market dominance, institutional fragmentation, and limited consumer familiarity - that constrain their growth and diffusion. The Chapter concludes that state-run initiatives can learn sigificantly from grassroots approaches, especially in reflexive learning and building networks, and that

enabling institutional and market environments are necessary for niche expansion beyond initial development.

In the concluding Chapter 6, I synthesized my findings to address the central research question. To deepen the understanding of the Missing Middle, I developed a typology of four Missing Middle mechanisms based on the empirical findings: (i) *Hiding*: key actors or infrastructure systematically overlooked in policy, exemplified by informal distribution networks; (ii) *Blocking*: systemic impediments resisting alternative solutions, driven by not only power consolidation but also power fragmentation; (iii) *Mismatching*: misalignments across divergent interpretations, incompatible institutional logics, and priorities; and (iv) *Depleting*: absence or erosion of crucial support structures, including limited resources and capacity, and weak coordination among sectors and levels. I also reflected on the uses of the two theoretical lenses – Transition Theory and Social Practice Theory – for analyzing the Missing Middle, with some reflections on their potentials and challenges. Lastly, I analyzed how the Missing Middle can be addressed in LMIC contexts, emphasizing the need for considering non-linearity, complexity, and political economy.

Overall, the thesis advances understanding of food system transitions in LMICs by revealing how disconnects emerge through complex interactions across levels and segments. Drawing on the Vietnamese cases, it offers several policy implications: recognizing the roles of smallholders and informal actors, supporting bundled practice changes, aligning values and expectations across sectors and governance scales, and co-developing monitoring and enforcement capacities through strong public–private coalitions. Crucially, the thesis argues that LMIC food systems need not replicate Western modernization trajectories; instead, they can and should pursue inclusive pathways that simultaneously advance healthy diets, environmental sustainability, and socio-economic equity for all food system actors.

WASS Education certificate

Quoc Nguyen
Wageningen School of Social Sciences (WASS)
Completed Training and Supervision Plan

Name of the learning activity	Department/Institute	Year	ECTS*
A) Project related competences			
A1 Managing a research project			
WASS PhD Introduction	WASS	2018	1
Writing research proposal	ENP, WASS	2019	6
Scientific Writing	Wageningen in'to Languages	2019	1.8
'Food safety, labour, or soil environment? Transitioning practices of vegetable small-scale actors in Hanoi, Vietnam'	XXIXth European Society for Rural Sociology Congress, Rennes, France	2023	1
'Missing middle in agri-food transitions: The case of safe food supplying in Vietnam'	Tropentag 2023, Berlin , Germany	2023	1
'Exploring the Missing Middle in Vietnamese food systems: Strategic niche development and smallholder pathways'	5th International Conference on Global Food Security, Leuven, Belgium	2024	1
A2 Integrating research in the corresponding discipline			
Systematic approaches to reviewing literature	WASS	2018	4
Sociological Perspectives on Environmental Change (ENP32806)	ENP, WUR	2019	6

Advanced Qualitative Research Design and Data Collection Methods (GEO56806)	GEO, WUR	2019	6
B) General research related competences			
B1 Placing research in a broader scientific context			
Introduction in R	WASS	2018	2
Food Systems for Healthier and Sustainable Diets (HNH36406)	HNH, WUR	2019	6
Research Ethics	WGS	2019	0.5
B2 Placing research in a societal context			
'Smallholders in food safety transition: Perspectives from vegetable supply chains'	Newspaper article, Tia Sáng magazine, 2025 May 1	2025	1
C) Career related competences/personal development			
C1 Employing transferable skills in different domains/careers			
Research Data Management	WUR Library	2018	0.45
Career Orientation	WGS	2023	1.5
Mindful Productivity for Scientists	WGS	2023	0.8
Total			**40.05**

*One credit according to ECTS is on average equivalent to 28 hours of study load

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