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Barriers and Levers in the Development of the PGS (Participatory guarantee system) Organic Vegetables in Northern Vietnam

Prepared for :

International Potato Center (CIP)

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INITIATIVE ON
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PROJECT REPORT

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Abbreviation

ALiSEA	Agroecology Learning Alliance in Southeast Asia
CARES	Center for Agricultural Research and Ecological Studies
CIP	International Potato Center
FAO	Food and Agriculture Organization of the United Nations
FiBL	Research Institute of Organic Agriculture
IFOAM	Organics International
Nafosted	Vietnam National Foundation for Science and Technology Development
PGS	Participatory Guarantee System
RBQ	Rank Based on Sum
SNSF	Swiss National Science Foundation
TCVN	Vietnamese Technical Standards
VND	Vietnamese Dong (currency)

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1. Introduction

1.1 Rationale of study

As an official definition in 2008, Participatory Guarantee Systems (PGS) are locally focused quality assurance systems that certify producers based on active participation of stakeholders and are built on a foundation of trust, social networks, and knowledge exchange". In each PGS, member's activities are self-governed and linked with IFOAM or other standards (Loconto & Hatanaka, 2018). Based on trust and monitoring through social networks, PGS offers a lower-cost alternative to third-party organic certification, while providing quality assurance in local value chains. It promotes fair prices, lower dependence on external inputs, and interactions between buyers, growers, and other stakeholders (Home, Bouagnimbeck, Ugas, Arbenz, & Stolze, 2017). As such, PGS supports the diffusion of agroecology in places where third-party certification for organic agriculture is less developed and expensive. In the year 2022, a total of 323 PGS initiatives were recorded in 76 countries, with around 1.3 million producers certified, managing close to 1 million hectares of land (Willer, Schlatter, & Trávníček, 2023).

In Vietnam, PGS is considered as the first and most notable standard and is increasingly used as a certification tool. PGS certification exists alongside a variety of international third-party standards (like USDA and JAS) as well as the public third-party organic standard (TCVN 11041-1 issued in 2017). The National Food System Action Plan (NaFSAP) of Vietnam (Decisions 885/QD-TTg and 300/QD-TTg) specifies a target of 2.5% – 3.0% of total agricultural land used for organic farming practice and the cultivation area of organic vegetables around 20,000 ha by 2030. Policies encouraging organic agriculture[1] have been issued in Decree 109/2018/ND-CP on August 29, 2018 and its elaborated Circular 16/2019/TT-BNN. These provide state management and policies for production, certification, labeling, logo, traceability, sale, and state inspection of products from organic agricultural products (including cultivation, husbandry, forestry, and aquaculture).

The research project named "Agro-econvert Project: Agroecological Transition and Organic Certification in Vietnam to Empower Rural Communities" hereby, called Agro-econvert Project[2], has been run by CARES (Center for Agricultural Research and Ecological Studies) and FiBL (Research Institute of Organic Agriculture) with financial support from Nafosted-SNSF. The main aim of the Project is to analyze the economic and social constraints to the development of organic vegetables and then realize the potential support of farmers to enhance organic vegetable practice based on agroecological principles. One of the outcomes focuses on impact of PGS certified organic vegetables. This found that vegetables PGS farmers age more than 55 years-old have an average 0.15 ha of land, which accounting for 30% of total cultivation land per household (Grovermann et al., 2024). The PGS-certified production of organic vegetables in Vietnam shares several major benefits, but also challenges in organic practices as in other countries. The quantitative analysis shows improved gross margins and better agroecological

[1] Detail is available at Decree 109/2018/NĐ-CP; Circular 16/2019/TT-BNN (Circular 16/2019/TT-BNNPTNT); Decision 885/QD-TTg on the approval of Organic Agriculture Development Project 2020 - 2030 and Decision 300/QD-TTg approves the National Action Plan on Food Systems Transformation toward Transparency, Responsibility and Sustainability in Vietnam by 2030.

[2] Brief introduction of Agro-econvert Project is available at: https://cares.vnua.edu.vn/en/projects/agro-econvert-project-agroecological-transition-and-organic-certification-in-vietnam-to-empower-rural-communities/

performance but lower crop yields, and higher labor requirements of organic production. PGS-certified farmers growing vegetables have received a lower labor-day income (equaled to 70% of that of conventional farmers) in the recent survey crop (Grovermann et al., 2024).

Although the outperformance of PGS-certified farmers in social, economic, and environmental, there are challenges to the involvement of farmers, especially youth in such sustainable farming practices. The number of vegetable PGS farmers is getting reduced. There is thus a need to explore reasons, in a larger socioeconomic and policy context, that could contribute to providing practical recommendations for Vietnam in promoting PGS organic vegetables. This assignment aims to answer the following key research questions: 1) What are the changes in the operation of the PGS certification system in the past 5-10 years? What causes? Gender-based constraints and reasons, if existed?; 2) How influences of socio-economic factors (market context and policy) and climate/technical changes to the development of PGS organic vegetables?; 3) What are the key factors influencing the changes (up and down) of PGS organic vegetables? How? And what shall be local solutions? The findings of the study shall provide some support to stakeholders with suggested solutions to promote PGS organic vegetables.

1.2 Objectives

The purpose of this assignment is to conduct an in-depth qualitative assessment of the socioeconomic and policy context to find out barriers and levers in the development of PGS organic vegetable production in the North Vietnam. Objectives of the task are: i) Evaluating the operation of PGS organic vegetable production and its changes (with possible enablers and barriers) over time, ii) Assessing socio-economics and geographical conditions (that maybe associated with climate changes) and prioritizing market context and policies influencing PGS organic vegetable production, and iii) Specifying key (f)actors influencing the changes (up-down) of PGS production.

The findings of the study shall be used to provide stakeholders, including policy makers, with suggested solutions in promoting PGS organic vegetable production. *Firstly,* to provide recommendations for policy makers of the various departments of the MARD (Agricultural Extension Departments to design their practical activities), local government (in Hanoi, Hanam, Hoabinh and other provinces) in carrying out the Decree 109/2018/ND-CP on promoting organic agriculture in Vietnam. The results will be distributed through existing ALiSEA network (i.e., presentations at thematic meeting), policy workshop (organized by FAO at the end of 2024 for AgroEconvert project), and publications (for Vietnamese media and/or international ones integrated with results of AgroEconvert projects). *Secondly,* to provide recommendations for other stakeholders especially traders and producers (farmers and farmer's groups) in restructure and improve their organic vegetable production efficiency.

2. Research methods

2.1 Approach to conducting this assignment and study site

The research is pivoted on the recent identified 3 PGS organic vegetable farming constraints that are: (1) high labor input demand; (2) low vegetable yield; (3) organic market limitation (cf. Grovermann, Hoi et al. 2024).

To investigate changes in the development of PGS certification, the concept of the theory of change (ToC) (Taplin & Clark, 2012) and most significant change (MSC) (Davies & Dart, 2005) were applied for aligning the view of participants into several driven pillars of the changes in both production and consumption of PGS vegetable. The three pillars explored from the literature were investigated including high labor cost, low vegetable yield and reduced market demand.

Following the recent results of the Agro-econvert Project, a snapshot overview of the PGS vegetables value chain (VC) was made that included applicable legal documents on organic agriculture. Due to the critical roles in the VC, the following stakeholders were included: input suppliers, producers, PGS certificate body, collectors, retailing company (focusing on the brands like Tam Dat, Bac Tom, BigGreen, Soi Bien), consumers, supporters and governmental officials. We explored gender-based problems and reasons in the entire PGS vegetable VC through the approach of gender-sensitive VC (FAO, 2020). The application of this framework helped to find out gender-based constraints in the development of PGS vegetables. Study site for field survey was the target area of Agro-Enconvert project that included Soc Son (Hanoi), Luong Son (Hoabinh) and Duy Tien (Hanam).

2.2 Site selection

PGS organic vegetable production has been remained small for both production area and number of farmers participated in the 3 provinces: Hanoi, Hanam and Hoabinh. For this, PGS organic vegetable areas in all these 3 provinces were targeted for the study: Thanh Xuan PGS cooperative in Hanoi; Dong Suong PGS cooperative in Hoabinh; and Trac Van PGS cooperative in Ha Nam province

2.3 Data collection

By adopting the qualitative research approach, all questions of what, why, where, how, who, and whom… raised to different stakeholders are sticked to the 3 identified PGS organic farming constraints to further explore underlying reasons that caused and what could be solutions to handle these constraints. Different types and different levels of stakeholders were selected for the research. For this, it really took time to catch up and arrange meetings with these stakeholders. In addition, not all pre-identified stakeholders can be arranged to provide information for the research. In addition, because organic vegetable production is still very small in Vietnam, not many stakeholders do really have experience with it. Thus the research also relied on snowball sampling method to identify a number of suitable KIs for data collection.

The research team was consisted of 4 persons including 3 experienced researchers at VNUA who have good experience in doing qualitative research and in vegetable production and marketing sector and 2 staff of CARES to provide admin supports. In addition, and 1 MSc student and 1 BSc advanced student were involved into the research for their graduation theses.

Questionnaire and checklists for data collection are prepared by 3 experienced researchers. The 4 young research members were trained for interview skills, escorted for a number of interviews, and followed by technical back-up provision by experienced researchers. Ranking among criteria and pillars were the main focus in this study. However, in the interviews with

farmer, we additionally utilized rating format for asking respondents assigns a score to each item (ranging from 1-lowest influence to 10-highest influence). When a score was provided, enumerators asking for ranking from highest priority *1* to the lowest *k*-ranked order to each item. This additional rating technique helped farmers easier to rank among options.

Data collected during this task is checked and pooled together then shared among Project members. The consultant team ensured the availability of manpower and uploaded data on time. The backup numerators ware also recruited and trained necessary knowledge and skills. The project leader and investigator guided and supervised the enumerators.

A fieldmission, based on the list of target respondents (see Annex 1) was taken from Mar to June, 2024 in the 3 provinces. In each province, the work was consisted of discussion with farmers groups (practicing PGS organic vegetables and stopped-farming), followed by interviews with randomly selected farmers and other stakeholders such as government officials responsible for organic farming management, extension, food safety management… organic vegetable traders/retailers/consumers, and representatives from research institutions and NGOs...Information of KIs selected and interviewed for the research is presented in Table 1 and more detail is presented in Annex 2.

A small number of KIs listed in the target respondents were not included in the research such as input suppliers (there is no specific input suppliers for PGS organic vegetables such as (raw) manure/compost, biopesticides…..since PGS farmers are self-producing most of their farming needs). Other stakeholders were all included in the research mainly through direct interviews/discussion, some through online interviews, and some through checklist fill-in (see Annex 2).

Table 1. Information on KIs of the research

KI types	No. of participant	No. of Female
Individual PGS farmers (existing, 3 sites)	38	31
Individual PGS farmers (stopped, 3 sites)	9	7
FGDs: PGS Farmer's group (existing, 3 sites)	18	17
FGDs: PGS farmer's group (stopped, 2 sites)	11	11
Local collectors	2	0
Traders	6	5
Consumers (6 retailing PGS vegetable shops crossing Hanoi)	30	30
NGOs/Researchers	2	1
PGS certification bodies	3	2
Governments	6	3

Semi-structured questionnaire were developed for survey of farmers and consumers whilst different checklists were developed for other stakeholders (see Annex 3-6).

2.3 Data quality control and analysis

Data quality control

For group discussions with local farmers, gender-issues of participants were considered and open questions were adopted to make sure that information gathered is representative as much as possible. In fact, organic farming is labor-intensive, thus most daily farming activities are taken by women. For this, most of farmers engaged in group discussion were women.

For other stakeholders, open and cross-checking questions were raised to enable KIs' active involvement in sharing their experience and ideas related to PGS organic vegetable production and marketing.

Descriptive analysis

Descriptive statistics was mainly used to describe the basic features of the dataset as it can provide quantitative descriptions in manageable forms. For the single variable, its distribution (frequencies, range of values), tendency (mean, median, mode), and dispersion (min, max, standard deviation, variance, etc.) ware examined. In showing the relation of a variable to another, crosstab analysis was utilized.

Ranking technique

We mixed both quantitative and qualitative data analysis in this study. A quantitative method was used to rank-order the stakeholders' perceptions on the constraints and opportunities of vegetable production. We considered various techniques for ranking such as Henry Garett Ranking (HGR) (Jayaprada, Lavanya, & Rathod, 2023), RBQ, Rank Based on Sum (RBS), or Wilcoxon sign-rank test depending on the measurement approach (Hong, Fan, & Luo, 2021). To rank the constraint of agricultural production, while Thulasiram & Alagumani, (2018) utilized HGR, Tuyen, Sirisupluxana, Bunyasiri, & Hung (2022a) applied RBQ.

In this study, the RBQ method was selected because it was widely applied and more concise than others (Tuyen, Sirisupluxana, Bunyasiri, & Hung, 2022b). In the RBQ technique, firstly, the main constraints of PGS vegetable production were ordered by each respondent (or individual) within the group of PGS or non-PGS farmer. For both cases, the most was ranked 1st, and the least was ranked last. Secondly, we calculated the RBQ values of each constraint, sub-constraints and opportunity by the following formula given by (Sabarathnam, 1988).

$$RBQ = \frac{f_{ri}(k + 1 - r_i)}{N * k}$$

where r_i was the r-th rank of the i-th factor and its sub-factor, k was the number of ranks, f_{ri} was the frequency of the respondents giving r-th rank to the i-th factor or sub-factor. In this study, the number of ranks equaled the number of factors (k = 4), and N was the sample size (N = 31 for PGS farmers, and N=9 if farmers stopped PGS practice. Finally, each factor and sub-factor were ranked descending using the RBQ values; the highest RBQ received the 1st position. A qualitative approach was used additionally to reveal insights into the respondents' views. This was also useful for understanding and deepening the findings from the quantitative data.

3. Literature reviews

3.1 Overview of PGS certification in Vietnam

The Participatory Guarantee System (PGS) for organic vegetables in Vietnam has seen significant growth and development since its inception. Established in 2008 under the collaboration between the Agricultural Development Denmark Asia and Vietnam Farmers Union (ADDA-VNFU), PGS Vietnam started with a modest number of farmers and businesses. As of 2022, 230 farmers across three provinces (Hanoi, Hanam, and another) and seven businesses or cooperatives were actively participating in the system (Nhung, 2022).

PGS Vietnam's credibility and international recognition were bolstered in 2013 when it became a member of the International Federation of Organic Agriculture Movements (IFOAM). This milestone was pivotal in enhancing the system's standards and practices, aligning them with global organic agriculture norms. The expansion of PGS in Vietnam has been remarkable. By 2014, PGS was extended to 13 provinces, involving over 2,000 farmers (Nhung, 2022).

However, the most up to date data showed the list of 15 PGS organizations established by 2021 that distribute alongside the country and were facilitated mainly by the international partners (Binh, 2022). PGS products cover vegetables, followed by rice, local fruits and herbs (Table 2). PGS Vietnam is the first and largest organizations established under the collaboration between the Agricultural Development Denmark Asia and Vietnam Farmers Union - the ADDA-VNFU project. According to Nhung (2022), PGS Vietnam officially became a member of the International Federation of Organic Agriculture Movements (IFOAM) in 2013. This milestone was pivotal in enhancing the system's standards and practices, aligning them with global organic agriculture standards. As of 2022, there were 230 farmers in three provinces (Hanoi, Hanam and Hoabinh) and 7 businesses and/or cooperatives participating in the organization.

According to Rikolto (2022) PGS is now recognized as a certification system for safe vegetables in Hanoi and Vinh Phuc, Ha Nam, and Da Nang. As of 2021, PGS has been adopted by 43 vegetable cooperatives in Hanoi. In the City, PGS certification for organic vegetables is well-established with a particular focus on Thanh Xuan commune in Soc Son district. The PGS Thanh Xuan intergroup, a key component of this system, comprises 21 producer groups totaling 121 members. Each group, consisting of 3 to 9 farmers, operates as a certification unit under the management of PGS Vietnam’s General Coordination Board for northern Vietnam. Thanh Xuan is one of five such intergroup in the region. Their organic vegetable production adheres to the Vietnam PGS Organic Standards, which align with the Ministry of Agriculture and Rural Development's criteria and were recognized by the IFOAM Family of Standards in 2013. This adherence to strict standards has facilitated significant growth, with the certified organic vegetable production area expanding from 7.7 hectares to over 20 hectares by 2018 (Rikolto, 2019).

In Hoabinh, the PGS organic vegetable initiative is represented by the Luong Son intergroup. This group consists of 85 households organized into 17 smaller groups, collectively managing a certified organic vegetable production area of 9.83 hectares. The structured and community-focused approach of the Luong Son intergroup ensures that all member households adhere to the organic standards set forth by PGS Vietnam, promoting sustainable agricultural practices and enhancing the quality and reliability of their produce.

Table 2. List of PGS organizations in Vietnam by 2022

No	PGS organization	Province	Year of establishment	Sponsor(s)	Organic products
1	PGS Viet Nam	Ha Noi, Ha Nam, Hoabinh	2008	ADDA-VNFU	Organic fruits and vegetables
2	PGS Hoi An	Quang Nam	2014	Hoi An Economic Department	Organic fruits and vegetables
3	PGS Ben Tre	Ben Tre	2014	Seed To Table	Vegetables, coconuts
4	PGS Tan Lac	Hoabinh	2018	VECO/Rikolto Vietnam	Red grapefruit, fruit and vegetables, medicinal herbs
5	PGS Tuyen Quang	Tuyen Quang	2019	ADDA-MOAP project	Ham Yen orange, pomelo
6	PGS Phuc Son	Yen Bai	2019	World Vision	Organic Seng Cu rice, vegetables, medicinal herbs
7	PGS Kim Boi	Hoabinh	2019	Bread for the World	Organic vegetables, organic glutinous cucumber
8	PGS Cao Bang	Cao Bang	2019	Luxembourg	Organic vegetables, organic spices (chili)
9	PGS Van Ho	Son La	2020	GREAT & Forest and Farm Facility	Te Rau rice, vegetables and medicinal herbs
10	PGS Hue	Hue	2020	Luxembourg	Rice, vegetables, peanuts for oil, and organic watermelons
11	PGS Dong Thap	Dong Thap	2020	Seed To Table	School organic vegetable models
12	PGS Bac kan	Bac Kan	2021	Forest and Farm Facility	Nep Tai rice, fragrant squash, galangal, ginger, medicinal herbs
13	PGS Hoabinh	Hoabinh	2021	Forest and Farm Facility	Red grapefruit, ginger, medicinal herbs, honey, fruit trees, mushrooms
14	PGS Thach Thanh	Thanh Hoa	2021	Bread for the World	Areca nut rice, vegetables, melon, onion, garlic, chili
15	PGS Ke Sach	Soc Trang	2021	Actionaid Vietnam	Organic vegetables

Source: Compiled from (Binh, 2022)

The PGS Hanam initiative operates through the Trac Van intergroup in Duy Tien, Ha Nam. This intergroup is composed of 26 households divided into three production groups, collectively managing a certified area of 2.1 hectares. The Trac Van intergroup's commitment to PGS standards ensures that their organic vegetable production maintains high quality and environmental sustainability, contributing to the broader goals of PGS Vietnam in promoting organic farming practices throughout the region.

3.2 Policies for the development of organic vegetable and organic agriculture

Our team carefully searched and found 41 legal documents that mention organic agriculture, which covers PGS organic vegetables. At Central government, there are 9 notable documents.

Policies encouraging organic agriculture[3] have been issued in Decree 109/2018/ND-CP dated August 29, 2018. This provides state management and policies for production, certification, labeling, logo, traceability, sale, and state inspection of products from organic agricultural products (including cultivation, husbandry, forestry, and aquaculture). Decree No. 109/ND-CP is elaborated by the Circular 16/2019/TT-BNN. The encouragement framework involves three key ministries. Ministry of Agricultural and Rural Development (MARD) is in charge of state management for agro-food products. Ministry of Health (MOH) governs the production and sale of organic herbal ingredients, organic cosmetics, and organic foods. Ministry of Science and Technology (MOST) through its functional Department of Standards, Metrology, and Quality specify and issue public standards on organic products.

Article 16 of the Decree 109/2018/ND-CP emphasizes the prioritization of tailored policies for the development of organic agriculture. It highlights the allocation of funding for agricultural extension research and projects, particularly focusing on insect-resistant varieties, organic fertilizers, biological pesticides, and veterinary herbal drugs.

- First, the primary focus will be on allocating funding for scientific research and agricultural extension to carry out agricultural extension research or projects, with particular emphasis on insect-resistant varieties, organic fertilizers, biological pesticides, and veterinary herbal drugs.
- Second, producers and traders dealing in organic products or inputs for organic production are given priority for eligibility under tailored investment encouragement policies for agriculture and rural areas. These include support for small and medium enterprises, encouragement of investment in agriculture and rural areas, assistance for agricultural cooperatives, cooperation in production and sale of farm produce, building large scale fields, vocational training for rural laborers, credit policies for agriculture and rural development, granting loans to encourage investment in hi-tech and clean agriculture development, support for varieties, capital, and technology in the cultivation and harvest of herbal ingredients, assistance for trade promotion and trademark development, support for "Vietnam Green Label" attachment for environmentally friendly facilities, and other relevant policies. It's important to note that the same time, a beneficiary receives only one of the policies outlined.

The special policies on assistance for small enterprises, cooperatives, farms, households and groups of households producing organic products are specified in the Article 17 for the following points:

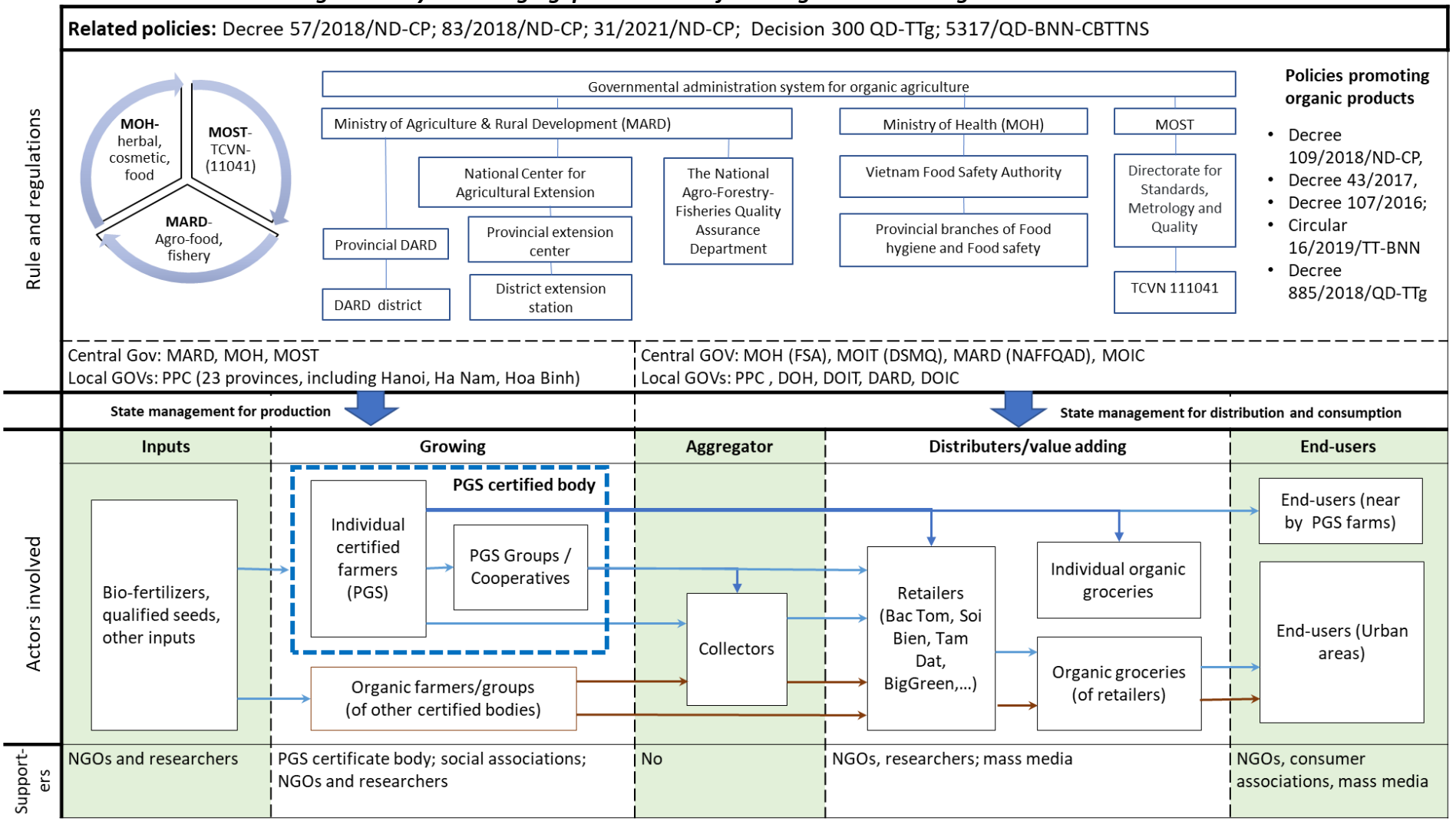
- Offer full assistance to cover all expenses related to determining areas eligible for organic production, including baseline survey, topographical survey, and analysis of soil, water, and air samples approved by the competent authority.
- Provide a one-time lump sum assistance to cover all expenses for applying for the issuance of the certificate of conformity with TCVN (applicable to the first issuance or reissuance of the certificate).
- For training in organic production, provide assistance in line with the Government's regulations on agricultural extension.

[3] Detail is available at Nghị định 109/2018/NĐ-CP (thuvienphapluat.vn); Circular 16/2019/TT-BNN Thông tư 16/2019/TT-BNNPTNT (thuvienphapluat.vn); Decision 885/QD-TTg on the approval of Organic Agriculture Development Project 2020 - 2030 and Decision 300/QD-TTg approves the National Action Plan on Food Systems Transformation toward Transparency, Responsibility and Sustainability in Vietnam by 2030

- For building and replicating organic production models according to TCVN, provide assistance to cover expenses for purchasing insect-resistant varieties, organic fertilizers, and biological pesticides for cultivation models; expenses for purchasing breeds, organic feeds, and permitted veterinary drugs for husbandry and aquaculture models; and expenses for replicating models in accordance with the Government's regulations on agricultural extension.

In addition, Decision 885/QD-TTg 2020 on approving the Organic Agriculture Development Project for the period 2020-2030 issued by the Prime Minister. The corresponding action plan of the MARD to implement Decision 885/QD-TTg was specified in the Decision 5317/QD-BNN-CBTTNS. In addition, Decision 300/QD-TTg approves the National Action Plan on Food Systems Transformation toward Transparency, Responsibility and Sustainability in Vietnam by 2030.

Figure 1. Key encouraging policies and influencing on the PGS vegetable value chain



4. A recession of PGS organic vegetable production

Through discussion with multiple stakeholders, it is clear that PGS organic vegetable growth has not been stable over the last 2 decades. It got a peak in area and production in 2015-16. As Chien (Bac Tom CEO) recalls, PGS organic vegetables were sold of up to 60-70 ton/month at 400-500 retail shops in Hanoi. At that time, Bac Tom had 27 vegetable retailing shops. The sector has started to face with stagnation and recession from 2018 through reduction of production area, number of farm members and retailing shops. For instance, Hong Thuy PGS organic group in Ha Nam province started with 6 members in 2013, increased to 14 in 2018, then reduced to 8 in 2021, and only 2 members remained working on PGS farm in 2023. For all PGS organic vegetables, farm members reduced from about 500 in 2018 to less than 150 in 2023 (Mrs. Nhung, chair PGS Vietnam). The recession of PGS organic production can be best reflected by the fact in Hanam province: "*Organic vegetable production was initiated in Hanam by the Provincial Women Union with 3 sites (Hung Cong, Phu Van and Trac Van) with area of 5ha in total (1ha for Hung Cong, 1ha for Phu Van and 3ha for Trac Van). The provincial government supported organic vegetable production for the first 2 years. Hung Cong then fully quit organic, Phu Van remained with 0.5ha, and Trac Van faced with serious reduction of farm members*" (Hanam agricultural official, personal interview in May 23, 2024). In similar trend, Bac Tom vegetable retailing shops reduced from 27 in the peak time to 17 shops in and after Covid-19.

As has been identified in our recent paper (cf. Grovermann, Hoi et al. 2024), PGS organic vegetables faces 3 major constraints that hinder its growth and efficiency. The most prominent challenge is labor consuming, which ranked at the first top among factors by all groups of farmers discussed in this research (Table 3-4). The similar important constraint is related to market outlet, followed by low vegetable yield constraint.

With reduction in retailer's demand on PGS organic vegetables, farmers' income from vegetables have been reducing. Farmers in Hanoi said that in good time, like in 2017, they earned up to VND8-10 mil./person.month, but now reduce to VND 4-5 mil./person.month. This is even worst in Hanam where farmers said that their present income from daily intensive organic vegetable production is less than VND3 mil/person.month. Reduced income was major reason that many farmers in Hanam province left their PGS farms in recent years (like the case of Hong Thuy farmer's group mentioned above). They said that they decide to stay home to take care of their nephew since the income from vegetables is not sufficient to pay for babytaker if adopted.

The recession of PGS organic vegetables since 2018 reflects a huge challenge for the sector development. What are underlying reasons causing such challenge? Following subsections will discuss on major existing constraints on the sector.

5. Major constraints of PGS organic vegetable systems

5.1 High labor cost

From producers' point of view, PGS organic vegetables faces several significant constraints that hinder its growth and efficiency. The most prominent challenge is labor consuming, which ranked at the first top among factors by all groups of farmers involving PGS (**Table 3**).

This is closely followed by the constraint in market outlet and one regarding low yield generated. Both existing- and stopped- PGS organic farmers agree with such order.

The primary root for the labor consuming nature of PGS organic farming is shown in Table 4. Accordingly, the main reasons come from the way of weeding. Farmers take a number of time eliminating weeds by hand as no tools or machines can effectively work in such the fragmented farming systems with multiple vegetable crops. Our focus-group discussions (FGDs) with organic farmers also prove such issue. The labor consuming is exacerbated by the need for extensive tillage practices, as land must be thoroughly prepared through deep plowing, hoeing, and regular cultivation. According to the farmer, thorough soil preparation is needed to eliminate harmful pests and diseases. *"Weeding must be done quickly, and it has to be done in time for the season, which is very labor-intensive. It can only be done by hand, requiring the removal of each node and root one by one. The weeds must be thoroughly cleaned to have good vegetables; if weeds are left, the vegetables will be poor, old, and the weeds will consume the nutrients meant for the vegetables. Thorough weeding results in tender vegetables." (FGDs with organic farmers in Trac Van –Ha Nam).* It is noted that around 40% of farmers reported that they are practicing minimum tillage. Thorough soil preparation is also necessary to eliminate harmful pests and diseases.

Hand-picking pest is the most applicable way in organic cultivation. When damage is caused by a a small number of insects, hand picking the culprits can be as effective and as fast. There is no potentially toxic pesticide is needed, thus, the impact on the environment is minimal. However, when there are hundreds of insects attacking a plant at the same time, hand-removal is such a time-consuming work. In this case, using sort of approved insecticidal spray may well be necessary. The problems was mostly reported in Trac Van (Hanam). In total, the area planned for organic cultivation is quite narrow and located an unfavorable natural conditions. As biological pesticides is unused and herbal pesticides slowly affected, farmers have to catch pests by hand. *Even in the more cooling place like Dong Suong (Hoabinh), in the 2024 summer crop, around 0.7 – 0.8 kg of worms were caught in a single night*.

Another labor burden come from the harvesting work. After receiving orders from the shops (around 2 p.m-5p.m everyday), farmers start the series of work from gathering, sorting, packaging and activating QR-code. This lasts around 3-4 hours in a dry day, and even up to 4-5 hours in the rainy or wet day. In such an extreme peak, the work is reported to be finished around 11 p.m. Unlike conventional vegetables, which are all harvested once for sales, period of picking PGS crop lasts longer. As a results, total labor spent increases for this job.

In addition, mixing organic fertilizers and watering are also taking time. Farmers in Thanh Xuan (Hanoi) purchased instant organic fertilizers (OM60 trade name, for example) but ones in Trac Van and Dong Suong made composts by themselves. Watering turns to be the hard work in annual summer crop, especially for households unequipped sparking system.

FGDs in Thanh Xuan spent sufficient time to discuss on how many units of labor (man-days) consume for a crop. Take white cabbage as an representative example, a more than 50 man-days amount is spent averagely during the crop, of which more than 50% of total labor used for controlling weed and pest; 30% use for harvesting; the rest spending for tillage and land preparation, fertilizing and watering. *"I can estimate the labor days for various tasks in*

planting, caring for, and harvesting organic vegetables as follows: 10 days for weeding, 18 days for pest control, 1 day for soil preparation, 15 days for harvesting, 1.5 days for fertilizing, 6 days for watering, and 1 day for setting up protective covers). (FGDs with organic farmers in Thanh Xuan, Hanoi).

In the view of labor typology, it is the self-hired labor or one that is exchanged among members of the PGS group. Women, who age more than 50 years-old, are mainly incharge of PGS vegetable production. Most of them have joined since the starting point of PGS group or inter-groups. As consuming women labor, gender characters are expressed clearly in the case of farmers who stopped PGS organic vegetable farming. The elder women, who became grandmother, would rather use their time for taking care of family, especially, ones have young children. The un-balancing in gender-based labor together with the structure changes in demographic characteristics of the family have put the PGS labor forces of a group or inter-group into a risky context. When the large number of PGS member exits due to such circumstance, the member fee become burden to the remainder that make the group collapse. *"I quit the group in year 2020 due to the collapse of the PGS group. At first, several member had existed for taking care of grandchildren. Reminder still kept group in the context that member fee shared was higher than it had been. In 2019-2020, there were more member additionally quit practices. I was the only one would continue practicing PGS. Mr. Hung has suggest me to change for organic TCVN"* (KI with organic farmers had quit PGS in Thanh Xuan, Hanoi).

Bac Tom CEO said that: "*for the last 15 years, PGS farmers have been older and many stopped working on farms. But no labor replacement has been happened since youth prefer to work for factories or services with better income. More non-farm opportunity and income for youth also affect their parents to quit working on farms."*

High labor demand and its causes naturally drives from the regulations of PGS standard set on farming practice. It is more rigid (strictly) than the organic TCVN-1411. There are three types of inputs list: soil fertility, inputs for the management of weed, pest and disease; products and methods of controlling insects in storage. These were introduced to the farmers for a nearly 10 year without updating list.[4] Details of farming activities and labor input requirement is presented in Table 3.

Table 3. PGS organic farming activities and labor input requirements

Farming activity	Details	Labor input requirement
Soil preparation	Regular careful soil preparation in farmers' perception and experience is a must for crop growth and productivity, even quality of vegetables. Soil preparation is taken for every vegetable crops, of up to 10 times in a year (including failed crops). It is estimated that soil preparation takes 1 labor day/sao by hows, or just 0.5 hour by machine. Soil is further disturbed by weed digging practices	**High**

[4] List of approved input list is available here List of Improved Inputs for Organic Production (vietnamorganic.vn) List of Improved Inputs for Organic Production (vietnamorganic.vn) (in Vietnamese, translation available pgs technical manual for trainers en.pdf (rikolto.org)

Farming activity	Details	Labor input requirement
Seed/seedling preparation	Farmers maintain seeds for a no. of vegetables such as kangkong, nalta jute, bassela, amaranth, gourds, pumpkin, beans, tomato.. Farmers have to buy seeds or seedlings for crops such as kohlrabi, cabbage, cauliflower, broccoli, lettuce, carrot... Owing to small production size, farmers often buy vegetable seedlings from wet markets nearby, instead of making nursery themselves. In organic production environment, vegetable crops are healthier and last longer. For instance farmers said that kangkong and bassela in PGS organic system can be still harvested after Sept or October when these in conventional system are often faded out.	**Low**
Weed control	Weed is heavily affecting vegetable growth and productivity. It is thus regularly controlled, in PGS organic production, by hands and simple tools. Herbicides are not allowed in this farming practices. Weed control is thus the most labor consuming practices in organic farming in farmers' experience. Farmers revealed that weed can not be effectively controlled by mulch or cover crops (!?). So far, careful soil preparation and regular weed uproot and/or digging are commonly weed control measurement applied by farmers. Soil preparation is considered as an important weed control by up to 84% of farmers interviewed, followed by soil cover, either by crop residues or plastics. Non-/less soil tillage is not clearly perceived by farmers as a way of weed control. Physically, weed is well removed after soil preparation. In fact, soil preparation causes a large impacts on soil properties and facilitate weed development. Interestingly, up to 45% of farmers are aware that non-/less soil tillage has a positive impact on weed control (in a medium and long run), but most of farmers have not yet applied non-tillage since they perceive that soil preparation is necessary to loosening soil that will support seed germination & seedling development. Crop integration and rotation are also way of weed control as perceived by small part of farmers interviewed. But large percentage of farmers are reluctant if these farming practices play a role in weed control	**Very high**
Pest control	Handly control and herb-pesticides are common pest control practices applied by PGS organic vegetable farmers. Farmers said that they often spray herb-pesticides for every 7-10 days but could not control flee beetle and fungicides. Bettle have been more serious in recent years. Growing some crops is becoming more difficult such as cucumber and tomato in hot	**High**

Farming activity	Details	Labor input requirement
	summer season. For instance, farmers in Trac Van said that they stopped summer cucumber crop since 2019.	
Irrigation	Irrigation is now relying on drill-wells with pumps for sprinkler irrigation in Dong Suong or flow irrigation in Trac Van and Soc Son. Farmers reveal that too much irrigation or too dry have negative impacts on vegetable crops. In many cases, before the crops, farmers submerge their field under water to control pests. This together with regular soil preparation and disturbance (i.e., through weed digging) makes a huge negative impact on topsoil structure. Farming on soil with damaged structure, in summer season, crops are often heavily damaged under hot sunlight shortly after heavy rains	**Very low**
Manure/compost application	Compost from a mix of cattle and small amount of chicken manure, soybean powder, fishes, snails, crop residues... is commonly applied by PGS organic vegetable farmers. It often takes farmers 3 months composting for compost to be ready for uses (fully composted: low moisture with no structure). Farmers are taught that fully composted materials can be quickly provide nutrients necessary for crops, adding OM to soil, killing pathogens and weed seeds. This is regulated by PGS Coordination Unit and organic standards. Farmers have no sense on how to nurture their soil. Farmers said the composting is less smell if they add effective microorganism. It is said that cattle manure is not good, and contain weed seeds; chicken manure is better but not allowed for chicken raised by industrial feeds. Farmers in Soc Son also composting fished in tank with salt water. They revealed that the fish composting added with salt (to control smell) was instructed by an expert who visited the few years ago, and farmers have good experience in impacts the liquid on vegetable growth. It is estimated that 0.2 kg of salt is used for a composting tank of 200 litter. Ecologically speaking, salty fish composting liquid could harm the soil properties if continuously used. In addition to self-produced compost, farmers sometimes also purchase organic fertilizers as suggested by Bac Tom and PGS experts. These are said expensive, farmers use often but with small quantity	**High**
Vegetable harvest and packages	Farmers said it is often that they receive vegetable orders (type and quantity) from retailers in early afternoon for the next day. At around 3-4pm, farmers start harvest, sorting, packages, and activate organic codes. Vegetable sorting takes time, i.e, 2-3 hours for about 20kg of vegetables, as revealed by farmers. It even takes farmers more time and efforts in humid days since farmers have to use fan to dry	**High**

Farming activity	Details	Labor input requirement
	vegetables before packaging. It is said that farmers often complete all the work at 10pm, and sometimes up to 11pm. For this reason, in some cases, farmers not report certain vegetables to retailers, otherwise, it will be very hard for them to complete the work very late in the midnight. Farmers also said that very often some vegetables are rejected by retailers and shifted back to farmers. The rejected vegetables account for ~5% of total vegetables daily delivered to retailers PGS farmers revealed that in recent years, Bac Tom purchase less vegetables from them. In the past, like before 2018, almost vegetables harvested were purchased by Bac Tom, at the present, just ~50% of vegetables harvested. Bac Tom also supports farmers in selling part of the rest vegetables at lower price, i.e., 10,000 VND/kg. Often 20-30% of vegetables is sold to other market channels such as supermarkets, wet-markets, or even used for animal feeds and/or composts when vegetables are cheap	

Table 4. Ranking constraints for PGS organic vegetable productions

Constraints	Trac van				Dong Suong				Thanh Xuan				Total			
	PGS (N=11)		Stopped PGS (N=2)		PGS (N=15)		Stopped PGS (N=3)		PGS (N=14)		Stopped PGS (N=4)		PGS (N=31)		Stopped PGS (N=9)	
	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank
a) Labor consuming	90.6	1	75.0	2	76.7	1	100.0	1	80.0	1	75.0	2	86.3	1	83.3	**1**
b) Low vegetable yield	71.9	3	50.0	4	61.7	2	75.0	3	52.5	3	68.8	3	65.3	3	66.7	3
c) Products incompletely outleted via PGS channel	75.0	2	87.5	1	53.3	3	83.3	2	75.0	2	81.3	1	69.4	2	83.3	**1**

Source: Data survey

Table 5. Subranking constraints of PGS organic vegetable production

Constraints	Trac van				Dong Suong				Thanh Xuan				Total			
	PGS (N=11)		Stopped PGS (N=2)		PGS (N=15)		Stopped PGS (N=3)		PGS (N=14)		Stopped PGS (N=4)		PGS (N=31)		Stopped PGS (N=9)	
	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank
Labor consumption																
1. By-hand weed control	96.9	1	87.5	1	85.0	1	100.0	1	95.0	1	100.0	1	96.8	1	97.2	**1**
2. Pest control	71.9	3	75.0	2	58.3	3	66.7	2	52.5	4	68.8	3	63.7	3	69.4	3
3. Tillage & soil preparation	75.0	2	75.0	2	60.0	2	66.7	2	77.5	2	75.0	2	73.4	2	72.2	2
4. Watering	40.6	4	37.5	4	33.3	4	41.7	4	65.0	3	56.3	4	47.6	4	47.2	4
Causes of low vegetable yield																
1. Attack of pests & diseases	85.4	2	83.3	2	63.3	2	94.4	1	78.3	2	62.5	3	78.0	2	77.8	2
2. Too much weed	68.8	3	66.7	3	51.1	4	66.7	3	75.0	3	70.8	2	66.7	3	68.5	3
3. Improper practices	45.8	5	50.0	4	45.6	5	16.7	6	61.7	4	50.0	5	53.8	5	38.9	5
4. Lack of allowed fertilizers	50.0	4	50.0	4	62.2	3	66.7	3	53.3	6	62.5	3	60.2	4	61.1	4
5. Water shortage	33.3	6	16.7	6	21.1	6	38.9	5	56.7	5	37.5	6	37.1	6	33.3	6
6. Unfavorable climate	91.7	1	100.0	1	80.0	1	94.4	1	86.7	1	100.0	1	90.3	1	98.1	**1**
Causes of market constraints																
1. Not eye-catching	85.0	1	80.0	2	64.0	2	86.7	2	82.0	1	85.0	1	79.4	2	84.4	**1**
2. Undiversified in types	80.0	2	90.0	1	78.7	1	80.0	3	76.0	2	55.0	5	83.2	1	71.1	4
3. Not qualified testing	42.5	5	20.0	5	46.7	5	66.7	4	74.0	3	60.0	4	57.4	5	55.6	5
4. Unqualified product size	55.0	4	70.0	3	52.0	3	66.7	4	70.0	4	80.0	2	61.9	3	73.3	3
5. Inefficient link to buyer	75.0	3	70.0	3	48.0	4	93.3	1	60.0	5	80.0	2	61.9	3	82.2	2

Note: Factor may have similar ranking due to the same score. *Source: Data survey*

Table 6. Ranking the reasons for working on PGS organic vegetable production

Reason for continuing PGS	Trac van		Dong Suong		Thanh Xuan		Pooled	
	RBQ	Rank	RBQ	Rank	RBQ	Rank	RBQ	Rank
O1. Secure income and health	100.0	1	83.3	1	100.0	1.0	98.4	**1**
O2. Secure consumers' health	90.6	2	63.3	2	52.5	4.0	71.0	2
O3. No desire for change	59.4	3	58.3	3	75.0	2.0	67.7	3
O4. Cheered by family & peers	53.1	4	51.7	4	60.0	3.0	58.1	4
Subranking								
O11. Income higher than convention	70.8	2	60.0	3	87.5	2.0	74.2	2
O12. Secure family health	100.0	1	82.2	1	97.5	1.0	96.8	**1**
O13. Improve social network	66.7	3	62.2	2	75.0	3.0	68.8	3
O21. Secure consumers' health	81.3	2	66.7	2	100.0	1.0	85.5	2
O22. Benefits to environment	87.5	1	83.3	1	97.5	2.0	93.5	**1**
O31. Acquainting with PGS	75.0	1	53.3	1	90.0	1.0	71.0	**1**
O32. No alternative	12.5	2	26.7	2	67.5	2.0	32.3	2
O41. Motivated by community	95.8	1	73.3	1	100.0	1.0	69.4	**1**
O42. Motivated by family	62.5	2	58.3	2	85.0	2.0	63.7	2
O43. Scare of being separated	40.6	3	25.0	3	77.5	3.0	39.5	3

Source: Data survey

5.2 Market constraints for PGS organic vegetables

Market constraints from the view of farmers refer to the incompleteness of products sold via PGS organic vegetable channel. PGS channel means products go to the retailers such as Bac Tom, Soi Bien, Tam Dat and Big Green under the brand of PGS organic vegetables. When organic produces are sold as the conventional in traditional market, they got no premium price. Farmer expect that all vegetables should be given to the PGS and/or organic marketing channel. The key buyer, Bac Tom, cannot buy all products harvested daily. The problem was found through FGDs at all 3 communes, but the one taken in Thanh Xuan was one of the most emerging issues. *"Before 2018, almost vegetables harvested were purchased by Bac Tom. Currently, organic vegetables are sold as follows: one-third (maximum around 50%) through a contract with a safe food store via the PGS chain, one-third to supermarkets, and the remaining one-third at traditional outdoor markets." (FGD with organic farmer in Thanh Xuan, Hanoi).* However, we analyze this constraint from different views of the producer's, trader's and consumers' side.

It is largely recognized that farmers also face difficulties in selling all their organic vegetables through PGS channels due to the poor appearance/less freshness of the produce and a limited variety of vegetables. Our FGDs revealed that some vegetable varieties such as bok choy, Chinese cabbage, and Chinese broccoli with high demand cannot be produced under organic method because they are easily damaged by yellowmargined leaf beetles (*Microtheca ochroloma)*. Also, it is very difficult for farmers to grow organic cucumbers to meet high market demand as this vegetable variety is killed by pests since its early growth stage. In addition, off-season vegetables are often have a high market demand, unluckily they are largely impossible to organically produced given no chemical inputs are allowed to use to keep crops survival under unfavorable growing conditions.

From the producer's side, the difficulties in selling product to PGS channels due to the following ordered reasons: 1) undiversified in types; 2) Poorly eye-catching of vegetables, 3) inefficient connection to the retailers, 3) unqualified product's size, and 5) The unpassed testing (cf. Table 5). The fewness of produces was ranked as the first top reason. This refers to the cases when retailers require for off-seasonal products, special vegetables, or sometime the orders for spices or herbs that are not grown in the PGS production areas. It is well noted that, in the Northern Vietnam, cropping seasons are mainly divided into summer (April to September) and winter seasons (October to next March) with staple products varied (Table 7). "*In Northern Vietnam, types of vegetables sold depend on season. In summer, there are around 16 (up to around 22) types of vegetables selling per day. Of which, the key types include long beans, malabar spinach, sour gourd, bok choy, and water spinach. The winter season has an additional 6-8 types more than the summer's. The cool weather is suitable for growing the staple vegetal produces such as cabbage, napa cabbage, kohlrabi, green onions, cauliflower, spinach, watercress. In summer days, consumers may order winter vegetables such as kohlrabi, cucumber, tomato. There is also need for species like lemongrass, lemon fruits every time, but we do not grown such products in the large area"* (FGD farmers in Dong Suong-Hoabinh).

In addition, increasing difficulties in farming production associated with soil degradation, PGS organic vegetables have been experiencing with reduction in quantity and remain in vegetable diversification limitation. Given the farming difficulties and no chemicals allowed, PGS farmers often chose to grow easy crops. For instance, very hard to sort cauliflower, broccoli and katuk, even in main cropping season since these are difficult crops. PGS kangkong in early or late growing season is very poor in quality (not tasty). This maybe caused by farming practices (using old vegetable stems, not seed).

Table 7. List of the main vegetables growing in the PGS areas by season

No.	Vegetable type	Key type	Winter			Summer						Winter		
			1	2	3	4	5	6	7	8	9	10	11	12
1	Bottle gourd		x										x	x
2	Tomato	K	M	M									L	L
3	Eggplant		x											
4	Long Eggplant	K	x	x	x									x
5	Chrysanthemum	K	x	x	x					x	x	x	x	x
6	Wax gourd	K	x	x	x				x	x	x			
7	Green beans	K	x	x	x	x	x	x						
8	Curly lettuce	K	x											
9	Red lettuce		x											
10	Basil		x					x	x	x	x	x	x	x
11	Cucumber	K	x	x					x					x
12	Watermelon			x										
13	Long beans	K		x	x	x	x	x						
14	Malabar spinach	K		x	x	x	x	x						
15	Bitter melo			x	x				x	x				
16	Sour gourd	K		x	x	x	x	x						
17	Katuk	K		x	x	x	x			x				
18	Okra			x	x	x	x	x	x					
19	Pumpkin			x					x		x			
20	Bok choy	K		x	x	x	x	x	x	x	x	x	x	

No.	Vegetable type	Key type	Winter			Summer						Winter		
			1	2	3	4	5	6	7	8	9	10	11	12
21	Green cabbage			x	x	x	x	x						
22	Choy sum			x	x	x	x	x						
23	Bok choy			x	x	x	x	x						
24	Lettuce			x	x	x	x	x			x	x	x	x
25	Malabar spinach					x	x	x	x					
26	Water spinach	K				x	x	x	x	x				
27	Fish mint					x	x							
28	Radish					O	O	O			M	M		
29	Amaranth					x	x	x	x					
30	Chili							x	x	x	x	x	x	x
31	Cabbage	K							E	M	M	M	L	L
32	Nappa cabbage	K							E	M	M	M	L	L
33	Apricot cabbage								x	x	x	x	x	x
34	Cocktail cabbage								x	x	x	x		
35	Kohlrabi	K							x	x	x	x	x	x
36	Coriander, dill								x	x	x	x	x	x
37	Onions, garlic	K										x	x	x
38	Zucchini									x	x			
39	Currant turnip									x	x	x	x	
40	Winged beans									x	x	x		
41	Cauliflower	K								x	x	x	x	x
42	Onion									x				
43	Spinach	K								x		x		
44	Watercress	K											x	x

Note: K- key produce; O- offseason; E,M,L are early, main and late season, respectively; X- cultivating time
Source: Compiled from crop growing calendar in Dong Suong Cooperative (Hoabinh province)

Beside the seasonal and technical barriers, farmers are not motivated to grow the difficult types, special vegetables, herb or spices. This roots from the way retailers paid to farmers. Bac Tom company, for example, pays a fixed price per kilogram of vegetable groups rather than specific type of produce. Vegetable unit price was simply specified into 4 groups: cabbage (16,000 VND/kg), stems and root vegetables (carrot, potato, gourd, etc.), leafy vegetables (18,000 VND/kg), and spices (green onion, coriander, dill, etc. 25,000-26,000 VND/kg) (see Table 8). Differences in price between the herbs and cabbage is 10,000 VND/kg. As a results, growers optimize income by cultivating less cost vegetables that yields high quantity like root and stems categories rather than herbs, spices, or leafy vegetables. This procurement policy also indirectly create the excess supply of cabbage or stem and root vegetables if the previous crop those were sold completely. "*Last year, all members grew cabbages with high yield. We, the intergroup, forecasted before the crop that the amount of cabbage will excess the demand for that product. We advised farmers to change this for other plants but few of them had transferred a part of area to the other root/stem categories. They knew that, it was the easy and high productivity product that can maximize their income. As a results, in that certain crop, a haft amount of cabbage were put into discount campaign or sold via the wet market".* (FGD and KI with head of the intergroup in Trac Van, Hanam).

Table 8. The fixed prices paid for PGS farmers per kilogram of vegetable produces

	Unit price ('000 VND)	Cabbage	Leafy vegetables	Root & stems vegetables	Herb produces
1	Bac Tom, before 2019	13	12	15	26
2	Bac Tom, since 2019	16	15	18	26
3	Super market (AEON)	21	20	22	30

Source: Compiled from farmers' FGDs and KI collectors

From the view of traders, they have their own view on the shortages of vegetables types. Retailer claims that undiversified vegetable types in PGS practices create the deficiency in the order. *"PGS farmers chose to grow easy crops rather than difficult crops such as cauliflower, broccoli and katuk, even in main cropping season. PGS kangkong in early or late growing season has poor quality (not tasty). This maybe caused by farming practices (for example using old vegetable stems in stead of seed for cultivating). We used to order leafy and root vegetables for 25 and 20 kg each type, respectively. However, what we did received was only 2 kg of celery. For the sufficient replacement, our shop then purchased VietGAP vegetables from Sa Pa (Bac Ha Brand), which was not cheaper than PGS organic vegetables (as high transportation fees)"* (KI a independent retailer in Hanoi).

From the view of consumers, interestingly, they do not put the appearance characteristics (eye-catching, size of items) or types of vegetables as the top-first priority of purchasing organic produces (Table 9). Consumer trust in the shop/shop chain accessed rather than pay attention on the single name appeared on the packaging. We will discussion further this finding in the next marking section.

Another issue in PGS organic vegetable value chain is related to power relationship between farmers and traders/retailers. These traders / retailers blame that given the poor farmers' coordination for vegetable production and harvest, some delay in harvesting time will reduce vegetable quality. It is said that farmers are weak, thus sometimes face trouble of bad debts or even lost for their vegetables supplied to retailers. Since their business is taken unofficially (i.e., using unofficial invoice) then local governments can not help farmers to claim debts from retailers. These bad experience exaggerates difficulties between farmers and traders for a common effort in making the whole PGS system working better and more effective.

Regarding the quality testing methods, both farmers and retailers pay attention and keep control on this works as it is the backbone of organic PGS vegetables. Farmers are confident to pass the test for qualifying organic produces. Retailers agree that the internal controlling system via the fields-supervision staff have worked well. As a shop manager said: *"For the last 10 year, violation of PGS production at farm level has been reduced thank you to the activation of technical monitoring staff. Recently, after testing samples from an PGS product, we found pesticides. we had stopped buying products from such group for 4 months. This is necessary to ensure the quality of organic product. PGS organic retailing system is characterized by "true" value, true in vegetable quality, true in message to consumers, and true in behavior*" (KIs shop manager in Hanoi).

In a summary, market constraints for PGS organic vegetables are thus very much related to farming practices, distribution and marketing system, not to market demand itself. It is all agreed by traders that market demand on organic vegetables has kept increasing especially after Covid-19 when consumers pay more attention to their family health.

5.3 Low cropping yield

Even though weed and pest are the two major farming constraints that take much farm labors, unfavorable climate is considered the important constraint, followed by weed and pest pressure that affect vegetable productivity. Farmers find their farming with increasing difficulties/risks, and often related to climate conditions as the cause of their farming troubles, like the case of summer cucumber and tomato in Trac Van as abovementioned.

A farmers shared that low yield of organic vegetables is caused by pests: *"No effective treatment for insects such as striped flea beetles or thrips is available. Actually, there are some biological pesticides but spraying them seems ineffective. The red pumpkin beetles (found on green squash, pumpkin, and cucumber in January and February) destroy all the leaves and plants. This issue has been reported to the PGS managers, but no treatment has been found. Yellowmargined leaf beetle suck the plants and cause them to die, which affect various types of vegetables like cabbage and napa cabbage. All these insects are harmful: half of the bed she planted was destroyed before it could be harvested, resulting in no yield at all." (FGD with organic farmers in Thanh Xuan – Hanoi).*

With more than 10 years of experience on organic farming, all farmers are confident on organic farming techniques as well as compliant with organic standards, except a part of farmers blame for constraints regarding manures to be allowed for their vegetable production. In the past, chicken manures collected from industrial farms were allowed, but not so anymore from 2016. Even though local chicken manures are still allowed to use, but quantity is small. Farmers have often to purchase cow manures for their crops, and blamed that: cow manures are less in nutrition and more risk in weed seeds included as compared to chicken manures.

Chinese cabbage is severely damaged by Yellowmargined leaf beetle in Thanh Xuan – Hanoi

With technical farming confidence, farmers are likely not to link the increasing farming troubles to their daily practices, i.e., soil protection, irrigation schemes, compost uses, or crop diversification. This makes farmers not understand on what is wrong with their existing farming practices. For instance, head of farmer's group in Trac Van revealed that: "*we started PGS organic production in 2013, with only organic inputs used, but our soil not really improved – it is still compacted that causes crop failures especially in hot and rainy summer seasons*." With this way of thinking, as abovementioned, farmers refer to climate changes – an external factor - as the most important constraints for their farming practices.

5.4 Drivers for the development of PGS from the view of farmers

With reduction in retailer's demand on PGS organic vegetables, farmers' income from vegetables have been reducing. Farmers in Hanoi said that in good time, like 2018, they earned up to VND8-10 mil/person.month, but now reduce to VND 4-5 mil/person.month. This is even worst in Hanam where farmers said that their present income from daily intensive organic vegetable production is less than VND3 mil/person.month. Reduced income was major reason that many farmers in Hanam province left their PGS farms in recent year. They said that they decide to stay home to take care of their nephew since the income from vegetables is not sufficient to pay for babytaker.

6. Organic vegetable markets: prospective

6.1 Consumer shopping practices

By randomly interviewed consumers of the PGS vegetable in the grocery shop, 23 of a total 30 respondents were the loyal clients of the shop. Thus, they were classified into the loyalty and transferable group to investigate the differences in ranking shopping practice. Both groups prioritize to purchase organic vegetables from retailing stores, followed by supermarkets, vendors and wetmarkets. The order has kept for the last 5-10 years. This means they have consumed organic vegetables for at least 5 years without changing the top-ordered purchasing place (see Table 9).

Consumers buy organic vegetables in the shops because they trust in the shop/shop chains rather than the single brands or production origin or the “true quality” itself. Trust in retailers has been remained the most important driver of consumers in purchasing PGS organic vegetables. Brand of the retailer is considered a guarantee or assurance for truly of organic vegetable quality. Tracking QR for information origin is initially important to the new consumers to start believe in the brand and shop. Regular consumers don’t scan QR when they fully trust the retailer. Grocery’s staff may suggest or consult their clients to chose vegetable brands among ones displayed on the shelves with different trust levels (see Figure 2). KI with a manager of a shop revealed that she can redirect up to 80% of consumers for their second best choice if the first ordering is unavailable. The findings is recent not new as (Lang & Conroy, 2022; Hoi, Mol, & Oosterveer, 2009) have explored the relations in the last two decades. This reflects that the trust in the food system has been unable to build upon the case of organic vegetables. Efforts in controlling markets of governments and other market stakeholders, including certification bodies has yet to be successful.

PGS organic vegetables targeted in as sufficient market segment of the high income and/or special health concerns. Price of organic produces is high for most of Vietnamese consumers. An agricultural official even said that in her office *“most staff are not afford for organic vegetables”.* By survey time, farmgate price of PGS organic vegetables ranges 16,000-26,000 VND/kg depending on type and retailing price is doubled. However, owing to high production cost especially labour cost, PGS organic farmer’s income is remained low, just around 3-4 mil. VND/person.month for daily intensive involvement into farming activities, depending on locations. Not only facing difficulties in selling off their vegetable harvest, especially in winter season, but also in farming techniques, even though farmers often claim that they are technically rich in experience and master of farming practices. Technical solutions to reduce labour costs and enhance input efficiency are badly needed. By doing so, vegetable production

cost will be reduced that help lowering vegetable retailing price to the point accessible by more regular Vietnamese consumers. These technical solutions, will thus create a new motor for PGS/organic vegetable production in Vietnam.

Figure 2. Trust dimensions of PGS vegetables

Level of trust in certification:

1. International certification (USDA, JAS, EURO): Dai Ngan ***organic vegetable*** for example
2. Domestic community based certification: PGS ***organic certification***
3. Domestic 3 party certification for ***safe vegetable***
4. Non certification: specific brand name for ***safe vegetable***

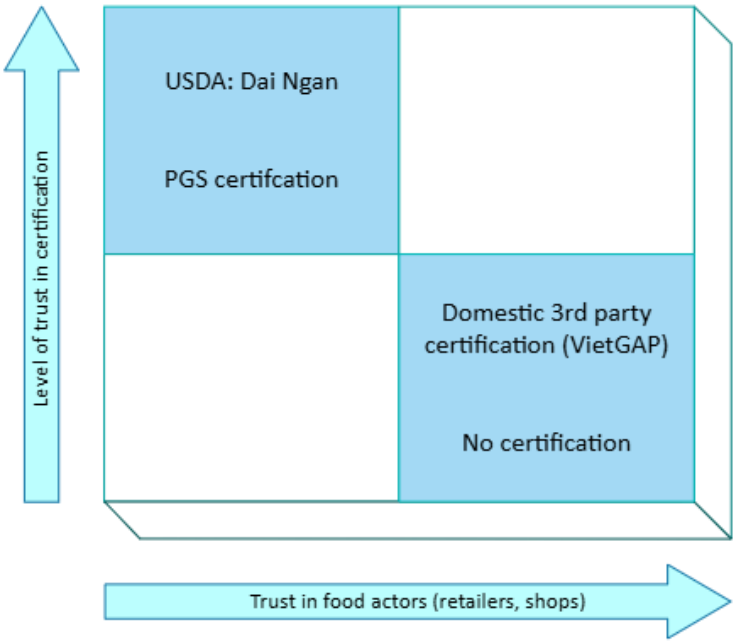


Table 9. Consumers' ranking of the reasons and benefit of consuming PGS vegetables

Reasons	Loyalty group (N=23)		Transferable group (N=7)		Pool (N=30)	
	RBQ	Rank	RBQ	Rank	RBQ	Rank
Ranking the most frequent place of buying vegetables (in general)						
1. Mobile vendor	53.3	4	57.1	4	54.2	3
2. Retail vendor at open/local market	63.0	3	60.7	3	48.3	4
3. Supermarket	72.8	2	64.3	2	55.8	2
4. Organic PGS vegetable store	98.9	**1**	100.0	**1**	75.8	**1**
Why do you buy PGS organic vegetables?						
1. Belief in the high quality of product	72.8	2	67.9	3	71.7	2
2. Trust in the seller (i.e the store/shop)	81.5	**1**	82.1	**1**	81.7	**1**
3. Trust in the place of production (on label)	39.1	4	25.0	5	35.8	4
4. Convenience (easy to access)	67.4	3	75.0	2	69.2	3
5. Less effort in preparation	29.4	5	35.7	4	30.8	5
The main benefits when you switch to consuming PGS organic vegetables						
1. Health benefits	100.0	1	100.0	1	100.0	1
2. Environmental benefits (no chemicals used)	75.0	2	78.6	2	75.8	2
3. Benefits for producers	71.7	3	67.9	3	70.8	3
The main difficulties in developing the PGS organic vegetable market						
1. Higher vegetable prices	96.7	1	92.9	1	95.83	1
2. Vegetables is not eye-catching	54.4	4	39.3	5	50.83	5

Reasons	Loyalty group (N=23)		Transferable group (N=7)		Pool (N=30)	
	RBQ	Rank	RBQ	Rank	RBQ	Rank
3. Undiversified in types	60.9	3	53.6	2	59.17	3
4. Few stores/shops (inconvenient access)	52.4	5	53.6	2	52.50	4
5. Consumers untrust the truly organic quality	68.5	2	50.0	4	64.17	2

Source: consumers' KIs

During our survey on retailers and consumers, we also check QR of 1-5 packages of different vegetable available in the 9 shops, of which 3 shops have no QR on vegetable packages, 4 shops with QR of 1-5 vegetable packages not being activated/worked; 1 shop with QR of 2 vegetable packages being activated but with wrong vegetable names; and 4 shops with 1-5 vegetable packages with well working QRs (only 2 shops with all 5 vegetable package QRs worked correctly). Our research team can not determine where the QR problem come from. But this QR problem is clearly having impacts on consumers' trust on vegetables if they take few seconds to scan QR of their purchased vegetables.

Prioritized on vegetable quality, consumers do expect health benefits are the most driver for them to switch to consuming PGS organic vegetables, followed by consumers' concern on environmental benefits. It also needs to add here that convenience is not the top priority but it does not mean it is unneeded. Retailers reveal that digital supports for vegetable and food purchasing increase. *"We deliver up to 60% of vegetables to consumers through online request in a radius 10 km distance from the shop"* (KI shop manager). This reflects a positive foresee for organic vegetable market development in future if retailers are well adaptive and prepared for digital purchasing market.

6.2 Organic market competition

All traders and retailers agreed that market demands on organic vegetables have kept increasing, at about 10-20% per year.

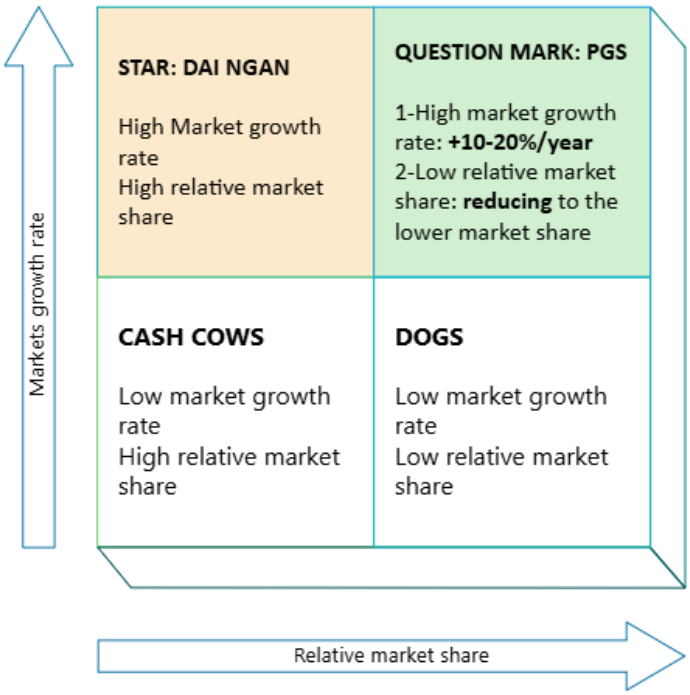
PGS organic vegetable production got a peak in area and production in 2015-16, then started to reduce in 2017-18 and the decline has been continuous for the last 7 years, despite efforts PGS organic stakeholders such as PGS Coordination Units, retailers like Bac Tom. For instance, as Bac Tom CEO recalls, PGS organic vegetables were sold of up to 60-70 ton/month at 400-500 retail shops in Hanoi. At that time, Bac Tom had 27 retailing shops, the reduced to 17 shops since 2018. At the present, In average, Bac Tom retails 15-20 tons of organic vegetables per month, and PGS organic vegetables account for less than 10% even though Bac Tom is seen as the largest retailer for PGS organic vegetables in Hanoi. A large part of vegetables sold by Bac Tom come from Dai Ngan organic company and those are safe vegetables (VietGAP) certified. Chien estimates that at the present, sold of PGS organic vegetables is just 1/3 of its peak in 2016.

As estimated by CEO Bac Tom, market share for PGS organic vegetables has kept reducing which is said to be caused by poor coordination and technical capacity of farmers for vegetable production. These have made PGS organic vegetables less competitive as compared to those of private companies such as Dai Ngan, Valley Farm, HBO, Tue Vien, Green Xanh…. Especially in term of freshness and packages. For instance, it it said that in hot summer, Dai Ngan

company harvests vegetables in the early morning, with better sorting practices. Vegetables are thus look fresher and cleaner than PGS organic vegetables which were harvested in the afternoon of the previous day. Even with retailing price higher at 50-100% as compared to price of PGS organic vegetables, more consumers prefer to buy Dai Ngan vegetables. Bac Tom also tried to motivate PGS groups to adopt vegetable harvesting and sorting practices of Dai Ngan company, but PGS farmers did not reach an agreement for a common effort in adopting such practices especially in hot and humid summer season.

Bac Tom was the first and largest contractor of PGS organic vegetables. This company enjoyed an easy exploring market before the peak 2018. In the last 5 years, Bac Tom has been facing with competition form grocery store chains (i.,e from Soi Bien, Big Green, Tam Dat), small vegetable shops, and online sellers…Those competitor include organic product in their shelves. *"Organic vegetables of Dai Ngan, certified by USDA, look fresher with better package, but lesser taste as compared to PGS organic vegetables, as revealed by consumers"* (KI shop manager). PGS products remain the core value of the "true and natural tastes", which is the strong narrative and message for communication. Figure 3 presents matrix of PGS organic vegetable market share & competition.

Figure 3. BCG Matrix analysis of PGS vegetable market share



Position: PGS vegetable is in "**Question mark**" corner:
Strategy required: extensive investment and resources to increase market share.
Main competitors: organic brands with international certification (USDA, JA, EU): Dai Ngan, Valley Farm, HBO, Tue Vien, Green Xanh
Core comparative value: Strong and sweet taste
Key tools: skillful sale staff at shop with digital skill (social media, online pick-delivery) and communication skill

***Note**: the BCG matrix is an essential tool for making market strategy of a company. BCG matrix includes 4 parts representing for different market share and growth. Products assigned in the "Question marks" corner refers to one with high market growth but a low market share. "Stars" corner is for Products with high market growth and a high market share. "Dogs" is the market, where products with low market growth and a low market share. "Cash cows" is used to illustrate Products with low market growth but a high market share.*

Bac Tom is trying to be a professional food retailer. Last year, he changed layout of the shop, packages and QR code for vegetables, and uniform for staff. However, function of a traditional grocery store has been modified. Vegetable shops is not only a food store where vegetables

and food displayed but also is a picking-up and center for online service. As an retailers said "*Our store displays both food and vegetable, of which 80% of organic vegetable on shelves. We also do online services (accounting for 60% of vegetable supply daily, around radius 10 km from the shop). Consumers even organize each other into groups for daily order of vegetables from our shop. Online services cause more cost (selecting, weighting, packaging, and shipping vegetables…) but it increases especially after Covid-19"* (KI shop manager). Thus, one the essential tools for competition is the digitalization of the grocery chains to fit online service.

In the modified grocery model, success of retailing system depends on retailing staff who daily serve consumers at the shop. As story mention above that a sale staff can redirect up to 80% of consumers on their second order if the first order is unavailable at the shop. Consumers are likely increasing care of vegetable true quality, keep asking retailing staff for origin of vegetables, organic standards. Their concerns about price, taste experience, often feedbacks to retailers' staff, and sometimes negative feedbacks (for instance water after boiling vegetables looks dark…). Thus, training for the staff with digital and communication skill is badly needed.

7. PGS organic vegetable farming constraints: views of non-farm stakeholders

Poor farming practices are major constraint of PGS organic vegetable development. For instance, on the day of interview, a retailer said that she ordered about 25kg of PGS organic leafy vegetables & 20 kg of roots, but she received only 2 kg of celery from PGS organic provider. She has to purchase VietGAP vegetables from Sa Pa (Bac Ha producer), and VietGAP vegetables from Sapa are not cheaper than PGS organic vegetables (because of transport cost from Sa Pa to Hanoi).

Even though PGS organic production is said to be organized into farmer's groups, farmers are farming individually, thus seriously motivated by high cropping yield. Without a good agricultural planning and collective commitment, farmers face with a high competition, even for those within a farmer's group, especially when there is too much surplus of certain vegetables. Even though at a certain level, competition between and among farmers, farmers' groups is good. However, the difficulties are related to: (1) quality control for disperse & small-scale vegetable production areas; (2) coordination on vegetable types and growing areas that minimize risk of harvest shortage or surplus of certain vegetables. No solution have been effectively taken.

PGS farmers in Hanoi and Hoabinh are farming individually. Even though at the beginning of the vegetable seasons, retailers like Bac Tom also provides farmers some suggestion for vegetable production (types and growing areas). However, farmers often decide themselves, and usually prefer easy vegetables such as cabbage and kohlrabi in winter, bassela and kangkong in summer. Vegetable retailers, like Bac Tom, adopts a one farm-gate price for all leafy vegetables (i.e,. VND16,000/kg of vegetables at the present). This is likely a factor constraining farmers from growing less-easy crops that again help diversifying crops necessary for boosting ecological effects as well as minimize risks on market demand and labor shortage.

Challenge is related to coordinating farmers' groups for following market-directed vegetable production plans provided by traders in which types of and growing area for each vegetables

are better planned. Members of PGS Coordination Units have been mainly working part-time so they are lacking of capacity and creativity for enforcing the local taken of these suggested farming plans.

8. Reflection on farming constraints from agroecological views

Even though when interviewed, famers are likely to be confident on their knowledge and capacity in farm management, often evoked that they have a long farming experience, in fact, they seriously lack of awareness and knowledge on soil ecology – from which farmers can better and more effectively operating their farms, especially in soil ecosystem quality management.

Labour intensive farming practices coupled with increasing labour cost, farmers have changed their farming practices to reduce labour inputs, for instance: direct seeding on the field instead of adoption of nursery production for seedlings (even for gourds, cucumbers, bassela...). For direct seeding practices, farmers tend to do more soil preparation to facilitate seed germination as well as suppress weeds (in a short time). However, ecologically speaking, more soil preparation has caused more trouble for soil ecosystem and facilitate weed development, especially for those multiplied by stems/roots. Field environments and tending practices on large production area can not be as good as in small-scale and well protected nursery. For these, seed germination and seedling development through direct seeding will not as good as those in nursery. Unequal growth of vegetable plants will last cropping cycle longer, and harvest reduction. As revealed by head of Trac Van farmer's group, they started working on PGS organic vegetable production since 2013, but the soil quality has not been improved. Topsoil remains compacted (see Picture below). Farmers revealed that after enjoyed some farming easy in initial years after moving from rice to organic vegetables, farming has been harder with more risks now – more weed and pest pressure, more crop failure which might be caused by impacts of climate changes. A farmers in Dong Suong said that "*this cropping season, her French beans are not fruited despite of a lot of flowers, Japanese and local luffas are also not well fruited, just 1/10 of harvest as compared to the previous year.*"

Ecologically, soil ecosystem is key for effective and sustainable agriculture. Degraded soil certainly lead to constraints and risks in farming practices, effectiveness and farmer's income because degraded soil is associated with reduced water/nutrient holding capacity, reduced soil biodiversity and increased soil-born diseases, increased farming risks especially in hot and rainy summer in the North Vietnam. For this farmers need to be aware that any bad action taken by farmers on soil ecosystem today will cause farming troubles tomorrow. Better awareness of agroecological principles will effectively support farmers in design and operate PGS organic farms.

Soil remains compacted after 10 years adoption of PGS organic farms in Hoabinh

The labor shortage in PGS organic vegetable farming, primarily due to the labor-intensive nature of weed control, can be significantly alleviated through the adoption of minimum

tillage practices. Research indicates that minimum tillage in organic farming can maintain, if not improve, vegetable yield compared to traditional maximum tillage methods. Additionally, integrating other agronomic practices such as mulching, intercropping, and crop rotations can enhance weed management efficiency. These techniques create a more resilient farming system that suppresses weed growth naturally, reducing the need for manual labor and thus addressing the labor shortage issue effectively.

Similarly, the labor-intensive task of pest control in PGS organic farming can be mitigated by employing minimum tillage, utilizing new biopesticides with higher efficacy, and combining these with mulching, intercropping, and crop rotations. Minimum tillage helps maintain soil structure and health, which can enhance pest resistance. New biopesticides offer targeted solutions that are more efficient and less labor-intensive than traditional methods. When combined with mulching, intercropping, and crop rotations, these practices create a more integrated pest management system, reducing the overall labor required for pest control.

Addressing the issue of low yields caused by adverse weather conditions and pest infestations requires the development and adoption of new vegetable varieties with higher yields and enhanced resistance to prevalent insects and diseases. These improved varieties can withstand challenging environmental conditions and pest pressures, ensuring more stable and higher yields. By incorporating these resilient varieties into their farming systems, PGS organic farmers can mitigate the impacts of negative weather and pest outbreaks, thereby enhancing productivity and sustainability.

9. External supports on PGS organic vegetable systems

9.1 Government supports

More priority has been given to safety in agricultural sector by governments: from safer pesticides to more manures to be used instead of chemical fertilizers. However, prevention of pest and disease remains important to farmers. For instance, if farmers are informed that coming days will have frog and high humidity, experienced farmers will spray to prevent diseases on cucumbers, tomato…Prevention is said of having more effectiveness and cheaper than spray to control diseases. Toxic pesticides are also suggested by technical PPD staff in case of high pest and disease risks that (conventional) farmers encountered. This means that saving crops is the first priority in government agricultural development strategies, which reflects a minor importance of organic agriculture in overall agricultural development scheme in Vietnam. In another word, local governments have been thus largely remained out of organic production scope, leaving the organic compliance monitored by mainly farmers and retailers.

One of the important existing constraints in organic agriculture is related to lack of inputs certified for organic production. That causes low organic farming productivity, estimated to be less than 60% of conventional farming. So far, MARD has not issued list of inputs to be used for organic production, especially bio-composts and biopesticides. At the present, provincial government units have to count on certification bodies for inputs allowed to use in agriculture. Without legally certified inputs, it is not only a serious constraint for farmers, but also for local governments in providing supports to farmers.

Local room and motivation for innovation is likely limited. As revealed by an agricultural official that "*her department staff and local farmers are hardly developers of farming innovation. All farming innovation must come from research institutes, then transfer to local stakeholders*." Training courses on organic agriculture have been mainly on organic awareness and regulations, not really technical farming practices, especially those adapted with local contexts.

Success of organic agriculture requires planning of a large production area. Lost of constraints for operation of organic farming in small and disperse areas, i.e., in terms of polluted water (penetration or spillover) and pesticide drifts. Farming environment has been largely polluted in Vietnam. Famers also lacks of facilities and financial capacity to analyze vegetable products for organic standards. Similarly, provincial extension center does not have sufficient capacity (land area, money) to implement trials on organic or other forms of vegetable production.

Organic certification has some constraints in complying with regulations. For instance, organic TCVN requires analysis of Dioxin, DDT, 666 which are not only very expensive, not many labs capable for analysis these chemicals, but these chemicals are largely not found in Hanoi agricultural soil. Recently, the Center also suggested to Dept of Crop Production (MARD) for removing these chemicals from the list of chemicals to be assessed for organic production. Degree 109 on organic agriculture: 1st assessment includes heavy mentals, microorganism, chemical residues; follow-up monitoring assessment: includes heavy mentals, microorganism; 2nd assessment: not require to reassess soil samples, only test vegetable samples (cost ~50% compared to 1st assessment).

During our research, it was reported that Hanoi government issued policy to support organic farmers 100% of organic certification application cost; 50% of seed cost and facilities necessary for organic farming conversion; 50% of participation cost for product show events and/or marketing promotion; Hoabinh government approved organic development program towards 2030 with financial and technical supports for organic sector; and (in Hanam) Duy Tien district government supported organic farmer's teams vegetable sorting house and small tractors in 2016. The district Women Union supported farmers irrigation system (value at VND 90 mil.) and loans with low interest rate (VND 10mil./farmer for 2 years).

Last but not least, one of the most important policy for the development of PGS organic vegetables production is the government's masterplan for organic production (following Decree 109/2018/ND-CP dated August 29, 2018 or any other governmental/local land use policies). Based on the area planned for organic production, all other state supports may have a base for kick-off.

9.2 Other supports

In Hanoi, farmers reported that they initially received supports from ADDA including: technical training. drill-well, fencing the organic production area, and connected farmers with retailers, until 2012. District government also provided some supports on technical training, nethouses, facilities, and market promotion.

In Hanam, farmers reported that the local government supported them in developing the

production area, some net-house, irrigation system and facilities, and small tractor. Bac Tom also provided farmers a small net-house and a tractor.

10. Conclusions and recommendations

10.1 Conclusions

PGS organic production have been taken at small scale by several small farmer's groups in Hanoi, Hanam, and Hoabinh province since the 2010s. As recognized and revealed by farmers and other survey stakeholders, the farming practices have shown multiple benefits: labor absorption and increased overall farmer's income; more diverse vegetables for farmer's diets; increased farmer's social and technical capacity; improved farming environment. PGS organic vegetables are being mainly retailed at retailing chains such as Bac Tom, Soi Bien, BigDream.

It is also widely accepted that PGS organic vegetable production facilitates local community development, conservation of agricultural environment, and provision of high quality vegetables to the markets. However, the production is disperse and small-scale in the form of small farmer's groups. In addition, an advantage of PGS farmers is to effectively harness family available labors whenever needed that private companies don't have. Farmers are definitely more committed to their vegetable production. The most disadvantage of PGS farmers is related to their poor capacity in adopting and/or making technical innovations to improve their vegetable production. A good leader for each farmers' group is necessary to help improve capacity for farmers as group.

Despite that fact that PGS Coordination Units and local governments have made continuous efforts to promote PGS organic production, for instance: provision of technical training to farmers; supports farming facilities such as small tractors, instalment of irrigation system, construction of net-houses...PGS organic vegetable production and market have been drastically reduced since 2018, mainly caused by 3 existing constraints as have been identified in our earlier research (Nafosted-SNSF) and further explored in this research: (1) high labour cost; (2) low vegetable yield; and (3) insufficient market.

10.2 Recommendations

Synthesized from lessons learnt from diverse stakeholders and our own agroecological knowledge and experience for the 3 major farming constraints, we propose some recommendations that can be considered and applied by different stakeholders directly or indirectly, as follow:

- ***To reduce labor inputs and increase vegetable yields***: Increasing adoption of agroecological practices especially regrading soil ecosystem management. Better soil ecosystem management, started from application of less/non-soil tillage, is a wise direction towards agroecological farming practices which then help enhancing input and farming efficiency and even more effective weed control. To make this possible, farmers need to apply nursery for production of healthy seedlings. Transplantations of healthy vegetable seedlings will bring multiple benefits to farmers: enhancing crop survival, development, and capacity to suppress weeds; increasing land-use index through shortening cropping cycles; and reducing negative impacts on soil ecosystem. These are 2 keys to be started with for changing existing PGS organic farming practices towards more effective, productive and sustainable farming system.

Alternative farming practices in main vegetable season when farmers have more surplus of vegetables to be sold through PGS market channel – cold winter – rotated with soil fertility enriching crops (legume) will also help enriching soil quality and overall local ecosystem services.

Technically, more and better training should be provided to farmers. Training courses should cover the integration of complementary techniques to mitigate the effects of weed growth and reduce pest infestations. Farmers can benefit from learning how to effectively apply mulching, intercropping, and crop rotations within their organic farming systems. These practices work synergistically to create a more resilient and sustainable agricultural environment, reducing the need for intensive manual labor and enhancing crop health. Through comprehensive training programs, farmers can develop a more holistic understanding of these methods and how to implement them effectively on their farms.

- ***Promotion of market for PGS organic vegetables***: Adoption of different vegetable price at farmgate as important incentives for investment and enhance of crop biodiversity. This is a drastically need in existing PGS organic farming practices through diversifying types of vegetables and planting time that can guarantee a continuous flow of diverse types of vegetables with good quality (right harvest time and package) supplied to retailers. Different vegetable price at farmgate is strongly suggested to organic traders like Bac Tom, Soi Bien, GreenXanh…, to motivate farmer's creativity and diversification of vegetables and

  PGS farmer's groups should also consider to adopt vegetable harvesting practices in early morning on (only) hot days in summer season to improve vegetable freshness, not only to increase market access for PGS organic vegetables, but also to keep consumers' good image on PGS vegetables.

  More home delivery practices have been requested by consumers and promoted by organic vegetable retailers. This trend could likely keep growing in future, creating a good opportunity for PGS organic value chain development with less cost. It is thus feasible to promote vegetable online delivery services at both retailing and lead service (like Bac Tom) level but the delivery will be taken through Bac Tom Vegetable Delivery Central (instead of individual retailers as has been), to more effectively meet vegetable diversification under consumers' requests, to better save vegetable freshness in hot summer, and to minimize overall transaction costs in the whole Bac Tom operational system.

  A careful and practical market strategy is needed for the key player like Bac Tom retailer to improve competition. The traditional physical store of grocery shop should be modified and digitalized to fit online request and delivery. Training (digital) communication skill to the grocery staff is also badly needed.

Besides, engaging the youth in organic farming is another strategic approach to ensure the long-term sustainability of PGS organic vegetable production. Educating young people about the health and environmental benefits of organic farming can attract a new generation of farmers who are committed to sustainable practices. Schools, agricultural extension programs, and community initiatives can play a vital role in promoting organic farming as a viable and rewarding career path.

Annex 1. List of target stakeholders for data collection

Input suppliers	Producers	Traders/consumers	Supporters (NGOs/researchers)	Government
Key informant interviews (KIs) + Hanoi: 3 + Hanam: 3 + Hoabinh: 3 + Target: dealer of fertilizer and pesticide	**KIs (PGS farmers)** + Hanoi: 10 + Hanam: 10 + Hoabinh: 10 + FGD: 3 (with 5-7 farmers) **KIs (farmers who stopped/quit PGS):** 10 + FGDs: 2 (5-7 farmers)	**KIs** - Traders : 10 - Consumers: 30	**KIs** - NGOs: 5 - Researchers: 5	**KIs** - Ministry level: 3 - Provincial level: 3 - District level: 3 - Communal level: 3

Annex 2. List of KIs interviewed/discussed

KI types	Name of KIs/farmers' group	Name of organization	Adds	Email/phone	Data collection method	No. of participant	No. of Female
Individual PGS farmers (existing)	Dong Suong	Dong Suong Cooperative of organic PGS vegetables	Dong Suong, Luong Son, Hoabinh	Mrs. Nguyen Thi Duong - Vice Director of Dong Suong Cooperative: 0984614690	Direct interview	13	9
	Thanh Xuan	Thanh Xuan Cooperative of organic PGS vegetables	Thanh Xuan, Soc Son, Hanoi	Mrs. Nguyen Thi Tuyen - Thanh Xuan Cooperative: 0985669384	Direct interview	17	15
	Trac Van	Trac Van Cooperative of organic PGS vegetables	Trac Van, Duy Tien, Hanam	Mr. La Ngoc Anh - Head of Trac Van organic inter-group: 0968055508	Direct interview	8	7
Individual PGS farmers (stopped)	Dong Suong	Dong Suong Cooperative of organic PGS vegetables	Dong Suong, Luong Son, Hoabinh	Mrs. Duong: 0984614690	Direct interview	3	1
	Thanh Xuan	Thanh Xuan Cooperative of organic PGS vegetables	Thanh Xuan, Soc Son, Hanoi	Mrs. Tuyen: 0985669384	Direct interview	4	4
	Trac Van	Trac Van Cooperative of organic PGS vegetables	Trac Van, Duy Tien, Hanam	Mr. Anh: 0968055508	Direct interview	2	2
FGDs" PGS farmer's groups (existing)	Dong Suong	Dong Suong Cooperative of organic PGS vegetables	Dong Suong, Luong Son, Hoabinh	Mrs. Duong: 0984614690	Direct interview	5	5
	Thanh Xuan	Thanh Xuan Cooperative of organic PGS vegetables	Thanh Xuan, Soc Son, Hanoi	Mrs. Tuyen: 0985669384	Direct interview	7	7
	Trac Van	Trac Van Cooperative of organic PGS vegetables	Trac Van, Duy Tien, Hanam	Mr. Anh: 0968055508	Direct interview	6	5
FGDs: PGS farmer's groups (stopped)	Thanh Xuan	Thanh Xuan Cooperative of organic PGS vegetables	Thanh Xuan, Soc Son, Hanoi	Mrs. Tuyen: 0985669384	Direct interview	5	5
	Trac Van	Trac Van Cooperative of organic PGS vegetables	Trac Van, Duy Tien, Hanam	Mr. Anh: 0968055508	Direct interview	6	6
Local collectors	Ngo Van Nghi	Thanh Xuan Cooperative of organic PGS vegetables	Thanh Xuan, Soc Son, Hanoi	0981593043	Direct interview	1	0
	Hoang Van Tan	Director of Dong Suong Cooperative of organic PGS vegetables	Dong Suong, Luong Son, Hoabinh	0384711687	Direct interview	1	0
Traders	Tran Manh Chien	Head of the Coordinator PGS Vietnam	Ton That Thuyet, Cau Giay district, Hanoi	0915559870	Direct interview	1	0

KI types	Name of KIs/farmers' group	Name of organization	Adds	Email/phone	Data collection method	No. of participant	No. of Female
	Ms. Ngoc	Bac Tom Clean Food	6 Nguyen Cong Tru, Hai Ba Trung district, Hanoi		Direct interview	1	1
	Ms. Mo	Bac Tom Clean Food	11 Hoang Van Thai, Thanh Xuan district, Hanoi		Direct interview	1	1
	Tran Thi Dung	Bac Tom Clean Food	38 Lang Ha, Dong Da district, Hanoi	0396612182	Direct interview	1	1
	Nguyen Thi Hanh	Soi Bien Clean Food	Luu Huu Phuoc St., My Dinh District, Hanoi	0363966145	Direct interview	1	1
	Nguyen Thi Hang	Tam Dat Organic	150 Tran Binh, My Dinh District, Hanoi	0973646633	Direct interview	1	1
Consumers	Bac Tom Clean Food	Bac Tom Clean Food	6 Nguyen Cong Tru, Hai Ba Trung district, Hanoi	Ms. Ngoc-Store manager:	Direct interview	10	10
	Bac Tom Clean Food	Bac Tom Clean Food	11 Hoang Van Thai, Thanh Xuan district, Hanoi	Ms. Mo-Store manager:	Direct interview	5	5
	Bac Tom Clean Food	Bac Tom Clean Food	38 Lang Ha, Dong Da district, Hanoi	Tran Thi Dung - Store manager: 0396612182	Direct interview	7	7
	Bac Tom Clean Food	Bac Tom Clean Food	Hoang Cau, Dong Da district, Hanoi	Nguyen Khoi - Store manager: 0987763279	Direct interview	5	5
	Tam Dat's consumer	Tam Dat Organic	150 Tran Binh, My Dinh District, Hanoi	Nguyen Thi Hang - Store manager: 0973646633	Direct interview	2	2
	Tam Dat's consumer	Tam Dat Organic	G3 Greenbay, Nam Tu Liem district, Hanoi	Nguyen Giang - Store manager: 0334486267	Direct interview	1	1
NGOs Researchers	Vu Duy Hoang	Centre for Organic Agriculture Promotion and Studies	Trau Quy, Gia Lam district, Hanoi	0981852119	Direct interview	1	0
	Nguyen Thi Den	Rikolto	Thuy Khe St., Tay Ho district, Hanoi	0989864424	Online interview	1	1

KI types	Name of KIs/farmers' group	Name of organization	Adds	Email/phone	Data collection method	No. of participant	No. of Female
PGS certification bodies	Nguyen Thi Hai Xuan	QUACERT - Vietnam Certification Centre	8 Hoang Quoc Viet St., Cau Giay district, Hanoi	0985892039	Online interview	1	1
	Luu Ngoc Phuong	REFERENCE TESTING & AGRIFOOD QUALITY SERVICES CENTER (RETAQ)	5B Highway Hanoi-Haiphong. Gia Lam , Hanoi	0936275242	Online-questionnaire fill-in	1	1
	Do Duc Nam	Hanoi Agricultural Products Quality Certification and Analysis Center	143 Ho Đac Di St., Dong Da district, Hanoi	0989723787	Direct interview	1	0
Governments	Le Thi Kim Oanh	Plant Protection Department Hanoi	149 Ho Đac Di St., Dong Da district, Hanoi	0915323957	Online-questionnaire fill-in	1	1
	Nguyen Phung Chinh and Mr. Khai	People's Committee of Lien Son Commune	Lien Son commune, Luong Son district, Hoabinh	Nguyen Phung Chinh: 0913935598	Direct interview	2	0
	Nguyen Thi Trang	Plant Protection Department Hoabinh	Tran Quy Cap, Hoabinh city, Hoabinh province	0974805291	Online-questionnaire fill-in	1	1
	Tran Thi Nga	Department of Plant Protection of Hanam	Ly Thuong Kiet St., Phu Ly city, Hanam province	0972805402	Direct interview	1	1
	Nguyen Van Cua	Extension station of Hanam	Ly Thuong Kiet St., Phu Ly city, Hanam province	0982126246	Direct interview	1	0

Annex 3. Checklists for farmers' group discussion

				(+ / - = increase/decrease; 1 = minimum, 5 = maximum; local definition, if any)		
				Labor costs	**Yeild**	**Veg. consumption market**
PGS's farmer						
Changes in the last 5-10 years ***Attached are questions for further understanding:*** • How? • Where? • When? • Why? • Who? ***Select the main variables (at the +/-) level to determine:*** • Key factors • The solution • Why? ***The future of PGS:*** • *How to grow PGS organic vegetables?* • *Why*	Input supply	Fertilizer	XYZ			
		Pesticides	XYZ			
		Cultivar	XYZ			
		Equipment	XYZ			
	Vegetable production system	Design/structure	Crop rotation			
			Intercropping			
			Attractive-repellent plant			
		Practice	Tillage			
			Nursery			
			Planting			
			Care (fertilizer, plant protection, weeding, irrigation...)			
			Harvest			
			Consumption			
	Support services	PGS system	Technique			
			Monitor			
			Market			
			Rewards and punishments			
		NGOs/College	Technique			
			Market			
	Policy	Increased capacity	XYZ			
		Facilities/equipment	XYZ			
Quit PGS's farmer						
Why did you give up organic PGS? ***Attached are questions for further understanding:*** • How? • Where? • When? • Why? • Who?	Input supply	Fertilizer	XYZ			
		Pesticides	XYZ			
		Cultivar	XYZ			
		Equipment	XYZ			
	Vegetable production system	Design/structure	Crop rotation			
			Intercropping			
			Attractive-repellent plant			
		Practice	Tillage			
			Nursery			
			Planting			
			Care (fertilizer, plant protection,			

				(+ / - = increase/decrease; 1 = minimum, 5 = maximum; local definition, if any)		
				Labor costs	**Yeild**	**Veg. consumption market**
Select the main variables (at the +/-) level to determine: • Key factors • The solution • Why? ***The future of PGS:*** • *How to grow PGS organic vegetables?* • *Why*			weeding, irrigation...)			
			Harvest			
			Consumption			
	Support services	PGS system	Technique			
			Monitor			
			Market			
			Rewards and punishments			
		NGOs/College	Technique			
			Market			
	Policy	Increased capacity	XYZ			
		Facilities/equipment	XYZ			

Annex 4. Questionnaire for farmers (existing and stopped PGS practices)

I. GENERAL INFORMATION

Full name:
Gender:
Address:

II. DEGREE OF INFLUENCE OF FACTORS ON ORGANIC PGS VEGETABLE PRODUCTION

2.1. Arrange in order of priority the following main causes

Cause	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Non-consumption all by PGS channel	o	o	o	o	o	o	o	o	o	o
Takes a lot of labor	o	o	o	o	o	o	o	o	o	o
Low yield	o	o	o	o	o	o	o	o	o	o
Process of the production is strictly	o	o	o	o	o	o	o	o	o	o

2.2. Within each cause, please arrange the subsections in order of priority

*a) With regard to the problem of "**Non-consumption all by PGS channel**", please give the specific reasons*

Specific causes	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Bad form	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Limit choices (less variety)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Quality not assured (according to test results)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Size not reached	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Connection to retailers (e.g. Shrimp Company) is inefficient										
Other specific reasons: stated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

*b) With regard to the problem of **"Takes a lot of labor"**, please give the specific reasons*

Specific causes	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Weed prevention and control (hand-made)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pest prevention	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tillage	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sprinkler	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other specific reasons: stated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

*c) With regard to the problem of **"Low yield"**, please give the specific reasons*

Specific causes	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Many harmful pests	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Many weeds	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
The cultivation technique is not adequate.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lack of organic fertilizer	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Lack of water	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Unfavorable weather	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other specific reasons: stated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

*d) With regard to the problem of "**Process of the production is strictly**", please give the specific reasons*

Specific causes	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Regulation on the use of fertilisers (Eg: do not use industrial chicken manure)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Regulations on the use of biological pesticides	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Regulations on the supervision of production	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Daily order and receipt announcements	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Formulation, packaging and activation of the stamp	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other specific reasons: stated	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

2.3. State and local support factors with participation in PGS organic vegetable production

Please indicate the extent to which each of the following policies influenced the decision to grow PGS vegetables

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Supporting equipment for the production of organic vegetables (plowing machines, well drilling, supplies, etc.)	○	○	○	○	○	○	○	○	○	○
Technical training support + team management	○	○	○	○	○	○	○	○	○	○
Support for connecting organic vegetable consumption	○	○	○	○	○	○	○	○	○	○
Good control of the market	○	○	○	○	○	○	○	○	○	○
Consumer education	○	○	○	○	○	○	○	○	○	○
Policy support for certification services	○	○	○	○	○	○	○	○	○	○

2.4. Level of mastery of PGS organic farming techniques and practices

Factor	The level of mastery (1 = minimum, 10 = maximum)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Seed/plant sowing + Sowing density	○	○	○	○	○	○	○	○	○	○
Fertilizer + dose of fertilizer	○	○	○	○	○	○	○	○	○	○
Pest management	○	○	○	○	○	○	○	○	○	○
Frequency of irrigation	○	○	○	○	○	○	○	○	○	○
Other techniques (confidence, initiative) ……	○	○	○	○	○	○	○	○	○	○

2.5. Are you taking precautions, except for what weed? (multiple options are available)

1- Non-tillage: ☐ 2- Covered ☐ 3- Intercropping ☐ 4-Crop rotation ☐ 5- Other ☐

2.6. What is your level of agreement with the following weed control and eradication solutions?

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
The soil must be well prepared: ploughed, plowed, plowed regularly	○	○	○	○	○	○	○	○	○	○

Non- tillage (plow upstream only, do not till the soil frequently)	o	o	o	o	o	o	o	o	o	o
Covered by a coating (straw, felt, nylon)	o	o	o	o	o	o	o	o	o	o
Intercropping legumes	o	o	o	o	o	o	o	o	o	o
Crop rotation	o	o	o	o	o	o	o	o	o	o
Other measures……..	o	o	o	o	o	o	o	o	o	o

2.7. What is your level of agreement with the following pest control solutions?

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Using the old biological pesticides, but at higher doses and frequencies	o	o	o	o	o	o	o	o	o	o
Need new biological pesticides that are more potent and more effective than the old ones.	o	o	o	o	o	o	o	o	o	o
The soil still needs to be prepared to eliminate harmful insect germs	o	o	o	o	o	o	o	o	o	o
Other measures……..	o	o	o	o	o	o	o	o	o	o

III. QUESTIONS FOR FARMER WHO ARE GROWING ORGANIC PGS VEG.

3.1. Why you're still producing PGS certified organic vegetables.

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Ensuring personal income and health	o	o	o	o	o	o	o	o	o	o
Ensuring benefits to society (consumer)	o	o	o	o	o	o	o	o	o	o
Habits and fear of change	o	o	o	o	o	o	o	o	o	o
Encouraged by family and group	o	o	o	o	o	o	o	o	o	o

3.2. For each of the above reasons, please rank the most important

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1- Ensuring personal income and health										
Manufacturing still has more profit than normal manufacturing	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Ensuring personal income and health	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Expanding social connections	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2- Ensuring benefits to society										
Ensuring the health of consumers	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Positive effects on the environment, ecology	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
3- Habits and fear of change										

I used to organic farming and they I want to switch to conventional vegetables.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
No other choice.	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
4- Encouraged by family and group										
The motivation of the organization (Cooperative, Farmers Union, Women's Union, Groups...)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Motivated by Family	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fear of alienation from team members if production is abandoned	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

3.3. How satisfied are you with your decision to pursue PGS vegetable production?

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
I've always felt that my decision to grow my own PGS organic vegetables was the right one.	o	o	o	o	o	o	o	o	o	o
I'm willing to give up other jobs that pay better to continue growing PGS vegetables.	o	o	o	o	o	o	o	o	o	o
My family and I are happy and satisfied to grow organic PGS vegetables.	o	o	o	o	o	o	o	o	o	o

IV. QUESTIONS FOR FARMER WHO GIVE UP GROWING PGS ORGANIC VEG.

4.1. When did you stop growing PGS organic vegetables? ……

4.2. Why you stopped growing PGS organic vegetables

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Switching to a better job (with more attractive pay, more free)	o	o	o	o	o	o	o	o	o	o
Changing to a different vegetable type	o	o	o	o	o	o	o	o	o	o
Health and personal reasons	o	o	o	o	o	o	o	o	o	o

4.3. For each of the above reasons, please rank the most important

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1- Switching to a better job										
Non-agricultural jobs with better income and more leisure	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other agricultural activities with better incomes and more leisure	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2- Changing to a different vegetable type										
Growing common vegetables	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Growing safe vegetables, GAPs	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

3- Health and personal reasons										
Personal health	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Caring for family	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

4.4. Please indicate your level of agreement with the following statements

Factor	Degree of influence of factors (1=least important /true/relevant, 10=most important /true/relevant)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
I've always found the decision to stop to be appropriate and not regrettable.	○	○	○	○	○	○	○	○	○	○
My family's income improved when I left PGS organic vegetable production.	○	○	○	○	○	○	○	○	○	○
Not producing PGS organic vegetables is undesirable.	○	○	○	○	○	○	○	○	○	○
I'm going back to PGS organic vegetable if I can get the time and the conditions right.	○	○	○	○	○	○	○	○	○	○

Annex 5. Questionnaire for organic vegetable consumers

Have you ever bought/have you bought organic vegetables? Y / N (Y=continue)
<u>Remark:</u> If each question has multiple answers, rate it by scale: 1-most important, 5-least important

Date: …… Add: ……
Full name:…… Age:…… Sex: Male/Female/Unknown

1. Where do you usually buy vegetables (estimated for 1 week or 1 month)

	Present		**In the past 3-5 years**
	Peddler		Peddler
	Retailer in local market		Retailer in local market
	Supermarket		Super market
	Organic PGS vegetable store		Organic PGS vegetable shop

2. Why do you buy organic PGS vegetable?

	Believe that organic PGS vegatables are quality and safe
	Believe the seller (store)
	Believe the place of production (according to information on the label)
	Convenient for travel
	Save on preliminary processing
	Other:

3. Do you believe that organic PGS vegetable are really safe?

	Completely believe (all of vegetables)
	Moderate believe (some vegetables)
	Little trust (safety due to accident or weather)
	Distrust

4. List the main benefit when you eat organic PGS vegetable?

	Health benefits
	Environment benefits (no chemicals)
	Benefits for producer (high price, stable)
	Other:

5. List the main difficulties in developing the PGS organic vegetable market?

	High price
	Bad form
	Low species diversity
	Few stores (no convenient for travel)
	Consumers do not really believe in the quality of organic PGS vegetables
	Other

6. Will you continue buy organic PGS veg. if

	Vegetable prices are higher than they are now (…….%)
	Store has other certificed vegetables available and veg. Price cheaper than organic PGS veg. (VietGAP, safe vegetables)
	Income declines (due to degrad economy)
	Limit choices (less variety, bad form)
	Other

7. Would you buy more organic PGS vegetable if the store had a discount?
   Y / N (how)
8. Have you ever visited a place where organic PGS vegetables are produced?
9. Y / N (where)

10. Have you ever learned information about where organic PGS vegetables are produced?
    Y / N (how)

Annex 6. Checklist for other stakeholders (Government, NGOs, Researcher, Traders…)

1. Why is the yield of organic vegetables low?
    a) Why?
    b) Changes over time?
    c) Role and impact of the authorities (policy/project/support) **– emphasis on organization (of the individual being interviewed)**
    d) Role and impact of other organisations (project/support) **– emphasis on organization (of the individual being interviewed)**

2. Why does organic vegetable production require labor?Tại sao?
    a) Why?
    b) Changes over time?
    c) Role and impact of the authorities (policy/project/support) **– emphasis on organization (of the individual being interviewed)**
    d) Role and impact of other organisations (project/support) **– emphasis on organization (of the individual being interviewed)**

3. Why is the organic market so hard to grow?Why?
    a) Changes over time?
    b) Role and impact of the authorities (policy/project/support) **– emphasis on organization (of the individual being interviewed)**
    c) Role and impact of other organisations (project/support) **– emphasis on organization (of the individual being interviewed)**

4. Assumptions about local production and consumption of organic vegetables in the future and why?

5. Ideas for developing production and consumption of organic vegetables locally?

6. The role of agencies/individuals in promoting the development of organic vegetables locally in particular and Vietnam in general, includes advantages and disadvantages.

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