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vitamin, trong đó vitamin B1 cao gấp
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Tính thích ứng nổi trội: Cao cây,
cứng rạ, chống chịu hạn tốt.

Cid Ryan P. Manalo • Normita G. Ignacio

• Plant Variety Protection in Practice in Vietnam: The Pains in the Gains Achieved



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SACRIFICIO QUARESIMALE



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Cid Ryan P. Manalo

Normita G. Ignacio

Plant Variety Protection in Practice in Vietnam: *The Pains in the Gains Achieved*
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ABOUT THE COVER PHOTO

Rice is one of the most important crops in Vietnam and all of Southeast Asia. Its continuous development is extremely critical for the food and nutrition security of the entire region.

Acknowledgement

This publication is rooted on our genuine intention of contributing to the continuous development and empowerment of communities in Vietnam. Our utmost gratitude to our partners for the inspiration for this work – Dr. Huynh Quang Tin, Ms. Nguyen Hong Cuc, MDI-CTU, our district and provincial partners in Vietnam (seed centers, extension centers and DARD). Most especially, we take our greatest inspiration from our equally passionate farmer partners and members of seed clubs who continually teach us lessons on genuine partnerships that has lasted time. Our partnerships are a testament that a work built on mutual trust and respect - from farmers, government institutions and CSOs, result to sustainable and resilient seed systems which contribute to food and livelihood security of farming households while conserving agricultural biodiversity.

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List of Acronyms

AGI	Agricultural Genetics Institute
ASINCV	Agricultural Science Institute of Northern Central Vietnam
ASISOV	Agricultural Science Institute for Southern Coastal Central of Vietnam
ASEAN	Association of Southeast Asian Nations
CLRRI	Cuu Long Rice Research Institute, also Mekong Delta Rice Research Institute
DARD	Department of Agriculture and Rural Development
DCP	Department of Crop Production
DUS	Distinctiveness, Uniformity, Stability
FAVRI	Fruit and Vegetable Research Institute
FCRI	Field Crops Research Institute
GDP	Gross Domestic Product
GSO	General Statistics Office
HEI	Higher Education Institutions
IAS	Institute of Agricultural Sciences for Southern Vietnam
MARD	Ministry of Agriculture and Rural Development
MRI	Maize Research Institute
NHAHO-RICOTAD	Nhaho Research Institute for Cotton and Agriculture Development
NOMAFSI	Northern Mountainous Agriculture and Forestry Science Institute
PRC	Plant Resources Center
PVP	Plant Variety Protection
PVPO	Plant Variety Protection Office (Vietnam)
R&D	Research and Development
RDI	Research and Development Institutions
SEARICE	Southeast Asia Regional Initiatives for Community Empowerment
SOE	State Owned Enterprise
SOFRI	Southern Horticultural Research Institute
SRI	Sugarcane Research Institute
UPOV	International Union for the Protection of New Varieties of Plants
VAAS	Vietnam Academy of Agricultural Sciences
Vinaseed	Vietnam National Seed Corporation
WASI	Western Highland Agro-Forestry Science Institute





Executive Summary

Vietnam's agricultural development in the past three decades since opening up its economy has been very promising, as the government pursued a set of comprehensive measures to support its agricultural sector. It is therefore necessary to describe this development in terms that we can easily comprehend, so that other countries, especially its developing contemporaries, can learn from Vietnam's experiences. However, this exercise must be done without committing the common mistakes of making false claims and blanket generalizations. **The main finding of this research is simple: while plant breeding is necessary, it must be made clear that a draconian plant variety protection (PVP) law is not a fundamental prerequisite to agricultural development.** The following are some key findings of this study:

1. **The Plant Variety Protection (PVP) Law has marginal effects on crop development.** Vietnam's agricultural development cannot be attributed to its PVP Law, but rather to a complex interaction of various interventions by the government which evolved over time. Vietnam's crop development in particular, and agricultural development in general is primarily due to its groundwork, pursuing policies and implementing programs on land management, cooperative system, water management, rural development, among many others. There are still gaps and emerging issues similar to other developing nations, but we can see the potential of the governments to take on the leading role in pursuing holistic policies to drive the agricultural sector.
2. **The International Union for the Protection of New Varieties of Plants (UPOV)-style PVP Law is incompatible with Vietnam's seed system, is heavily focused on rice, and may even threaten research and development (R&D) on other crops.** Only a few actors from the domestic private seed sector in Vietnam are capable of pursuing R&D – most of them are limited to a few crops, and as such they are heavily focused on seed distribution. We can see an emerging trend of market concentration, increased activity in seed distribution, but a potential narrowing in R&D. Research and development activities in the country is still primarily pursued by various public R&D institutions (RDIs) which combine the pursuit of broad aspects of agricultural development with localized and targeted solutions. The implementation of the PVP Law indicates a path with irreversible changes and an incompatibility of the system

to the public RDIs and other institutions (e.g., seed centers and select departments under the Ministry of Agriculture and Rural Development/MARD) that are increasingly becoming dependent on private funding. Vietnam's agricultural policies, including the PVP Law, continue to be biased against, and threatens the existing farmers' seed system.

3. Finally, we expose the false and empty promises of the UPOV-style PVP Law.

A cross-sectional analysis of the implementation of the PVP Law in Vietnam is clearly directed at strengthening the private sector. While domestic companies dominate the number of applications for varietal protection, foreign companies far outnumber their domestic counterparts in terms of being granted PVP certificates and in retaining them. The public sector is put at a disadvantage, and the RDIs are particularly the hardest hit. The PVP in Vietnam has irreversible consequences on public research institutions, provides no real evidence of bolstering R&D for all crops, negatively impacts seed accessibility, and contributes to the further marginalization of smallholder farmers. Towards the end, we examine briefly another study, often quoted by proponents of the UPOV system, that emphasizes the role of the UPOV-style PVP Law in the country's agricultural development. We see that in this case, the unsubstantiated quantification of the benefits and their arbitrary attribution to the PVP Law are all exaggerated statements that tend to bolster the image of UPOV.

This study is primarily based on the data on PVP implementation from the Plant Variety Protection Office of Vietnam (PVPO). Interviews and focus group discussions (FGDs) with key stakeholders in Vietnam's seed sector were thematically arranged and analyzed to capture a holistic view of the implementation of PVP. Lastly, several academic researches and journals were used to supplement the analysis.

Introduction

A sustainable seed supply system is foundational to a sustainable agricultural production. In many countries, the adoption of a workable seed system remains a challenge. Dominant, conventional models drawn from the developed world inclined towards an industrial agriculture and free market approaches are arbitrarily exported to the developing world where there is an arguably more vulnerable agrarian population.

The challenge then for a viable seed system is more pronounced and often intertwines with other preexisting, pressing and complex political or socio-economic conditions in developing countries. The inappropriate policy impositions often packaged within trade agreements result in top to bottom supply chains with rigid and restrictive guidelines. These in effect cause irreversible changes to poorly adapted social and government institutions that further isolate the marginalized players in the agricultural sector. The over-concentration of efforts on the formal seed system in some cases neglect the needs of smallholder farmers, or worse, work against their interests.

The colonial importation of seed policies is not new, and the staggering

effects of such measures on developing countries have been thoroughly documented and studied, particularly on plant variety protection laws.¹ The same can be said elsewhere in the world, but its encroachment in the soils of developing Asian countries is provocative, takes on a complex form that requires a closer retrospection. We turn our attention to a socialist country with an impressive reputation in agricultural development and known strong government support – Vietnam. Vietnam has recorded one of the highest GDP growths in the Association of Southeast Asian Nations (ASEAN) region with an annual average of 6.6% from 2000 – 2018. Its agriculture sector continues to be a significant contributor to the GDP at 14.3%, and employs 41.9% of all workforce in 2016.²

The agricultural development of Vietnam is neither rocket science nor an overnight miracle. Contributory to its remarkable achievements are landmark policies on agrarian reform, pouring funds to support cooperatives, investments on infrastructure, irrigation, efficient transfer of technology, extension services and a strong regard for its farmers which took decades of work to thrive backed by a strong historical foundation. In recent years, the government has been continually adjusting its strategies,

¹ Coulibaly, de la Perriere and Sashikant. (April 2019). *A Dysfunctional Plant Variety Protection System: Ten Years of UPOV Implementation in Francophone Africa*. APBREBES.

² Association of Southeast Asian Nations (ASEAN) 2019. *ASEAN Key Figures 2019*. ASEAN Secretariat–Jakarta, Indonesia.

increasingly drawn to large scale production, development of the value chain of agricultural products, and production of high value crops primarily for export as the country seeks further gains from its initial successes.³

In reality there are multiple and interdependent indicators for agricultural development; their interactions and effects are not always straightforward, rather forming complex relationships that evolve over time. The incredible agricultural performance and complex interaction of indicators obscures the otherwise obvious outcomes and sectoral impacts of seed policies. Notwithstanding this, the cultivation of high yielding varieties continues to take the front seat in recent literature, considered by some as the driver of agricultural productivity usually packaged with the proposal to enact laws on PVP to encourage their further development.

In 2006, Vietnam enacted its PVP Law, paralleled to the 1991 Act of the Convention of UPOV, officially becoming its 63rd member. Since the PVP Law came into force, the Vietnamese government directives have been decisive – directing all public RDIs and research universities engaged in plant breeding to apply for plant protection certificates. The government has also actively facilitated the transfer of ownership of protected varieties or the right for their exclusive distribution from public

institutions to private companies. Opposition to the law has not always been obvious and often took a latent form through a lukewarm response to the call for PVP. A majority of the varieties' owners remain hesitant to comply with the policy, citing the cost of protection and the inefficiency of issuance of certificates as their main reasons.⁴

Therefore, it is imperative to sift through the facts and analyze the PVP in Vietnam. The two interrelated questions primarily raised by this study are: What has changed in the seed sector since Vietnam joined the UPOV and amended its own PVP law? How has this affected the seed supply system in the country? To accurately pursue these broad strokes, this report presents a comparison of the seed system prior to and after the enforcement of the law, its effects on the actors involved in seed development, and the intended versus the actual changes on bolstering innovation and R&D in Vietnam. The impacts of the implementation of the PVP Law are presented with evidence from the ground, supplemented by the narratives of the different sectors involved in the national seed development.

The first chapter expounds on the overall agricultural development in Vietnam, and highlights the trends, tracing the agricultural development vis-à-vis the main drivers of such development focused on crop production. This part of the report also

³ Several international organizations provide important insights on Vietnam's agricultural development, with cautious reading on their implied policy agenda, you may refer to: World Bank (April 2016). *Transforming Vietnamese Agriculture: Gaining More from Less*. Hong Duc Publishing House. Hanoi. & Japan International Cooperation Agency. (January 2013). *Agricultural Transformation and Food Security 2020: ASEAN Region with a Focus on Vietnam, Indonesia and the Philippines*. Vietnam Country Report.

⁴ Vietnam Net. (December 10, 2017). Only 270 plant varieties legally protected in VN in 13 years. <https://english.vietnamnet.vn/fms/science-it/188010/only-270-plant-varieties-legally-protected-in-vn-in-13-years.html>

seeks to explain the themes of Vietnam's success, the complexity of the interactions of its indicators, situating varietal development within the context of agricultural development without discrediting its role. This part of the report systematizes the findings of several researches.

The second chapter briefly discusses the seed supply chain of Vietnam. The structure and existing challenges are presented, as well as the situation of the country's agricultural R&D – its strengths, challenges, and potentials. The actors in the seed sector and their respective roles are presented, along with existing constraints to Vietnam's national seed development.

The third chapter centers on a critical assessment of the implementation of the PVP Law in Vietnam after 2006. The claims of implementation efficiency are discussed by scrutinizing the current statistics related to the law. A cross-section of the data allows for a deeper analysis on ownership across distribution by crops – whether private or public and foreign or domestic ownership dominates, the reasons for such dominance, and their implications. The analysis goes beyond the PVP system by testing its intended impacts, presenting the changes to the different sectors directly involved in or isolated from the seed development process.

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Chapter 1

A Critical Conjuncture in Vietnam's Agricultural Development

Vietnam is a net exporter country, composed of a young but increasingly productive population of 97 million (M). It has a land area of more than 330,000 square kilometers (km²) strategically located at the heart of Southeast Asia, sharing land borders with Laos, China, and Cambodia and maritime borders with Malaysia, Thailand, Philippines, Indonesia, and (again) China. Besides its ideal location, it is equally well-positioned economically, posing a year-to-year increase in gross domestic product (GDP) and recording a sharp decline in poverty rates – from more than 70% before 1986 to less than 6% in 2018 or a total of 42M people lifted from poverty in a little over three decades. Other indicators also show impressive developments through the implementation of a universal health coverage, support to public education, among many other social welfare investments by the state.⁵

Compared to the other members of ASEAN, Vietnam's GDP growth has been steady, consistently placing above the regional average with a notable 7.1% in 2018 compared to the regional average of 5.2%, while its unemployment rate of 2.2% is a regional median score. Agriculture remains a significant sector to the Vietnamese economy, contributing around 15% to its GDP. A large percentage of the working-class population remains

dependent on agriculture – with more than 21M or 41.9% employed by the sector in 2016. However, this figure shows a decrease from 55.1% in 2005 or approximately 2M people having switched jobs from agriculture to other sectors within an 11-year period.⁶

Vietnam also celebrated a 3.76% agricultural growth in 2019, its highest in 7 years, and is expected to exert more effort in boosting the sector. It is the global top exporter of cashew and black/white pepper, second in coffee, and rounding up the top third in rice, natural rubber, and fisheries. Over the last decade, the country has also shown a strong performance in wood and wood products, even fruits and vegetables, penetrating even the high standard markets.⁷

Although there are still gaps, the country had bright spots in continuing its to support to the agriculture sector. Vietnam has long been considered food self-sufficient, ensuring the production of key annual crops for its domestic consumption and exporting the surplus. Foundational to such food self-sufficiency are the government's holistic policies and rural development programs. The country also strategically uses its unique independent position in expanding its export market by establishing trade relations with the United States, European

⁵ Figures were sourced from the 2019 edition of the Statistical Handbook from the GSO of Vietnam cross referenced with databases from the World Bank and other institutions from United Nations like the Food and Agriculture Organization (FAO) which are all publicly accessible online. The publications and other statistics from Vietnam can also be accessed through the GSO website: <https://www.gso.gov.vn/>

⁶ ASEAN presents national statistics of its members, as well comprehensive comparative figures through ASEAN Stats which is accessible online, these are cross referenced with Vietnam's GSO Data.

⁷ Information are compiled from the Vietnam News and Hanoi Times based on the statement from the Ministry of Agriculture and Rural Development (MARD) in 2019, GSO's latest release, FAO's 2018, International Trade Center's 2019 and World Bank - World Integrated Trade Solutions' 2019 figures. You can also read a news article from: <https://en.nhandan.org.vn/business/item/7035502-2018-vietnam%E2%80%99s-agriculture-growth-hits-record-high-in-seven-years.html>

Union, and ASEAN, while continuing relations with China and Cuba.

Once paid little attention to by the world as a country ravaged by war and conflict with an uncertain future, Vietnam has now completely transformed its reputation to becoming one of the most promising economies in the world, setting

records of sustained economic and social development even amidst the current global pandemic. As the country navigates through its economic transition, it has to delicately balance the pursuit of agricultural development, without neglecting marginalized groups that are the most vulnerable.

The Factors of Vietnam's Crop Development

Vietnam has completely transformed itself to an agricultural export powerhouse from being a net food importer. The country has achieved food security in the early 2000s, although threats continue to exist in certain regions due to issues of access and other vulnerabilities.⁸ Many analysts attribute Vietnam's tremendous development to **Doi Moi**, or renovation, adopted in 1986. The transition from a command economy towards a socialist-oriented one was marked by a relative openness to the world and consequently further expansion which began only a few years afterwards.^{9,10} **Doi Moi's** historical and continuing relevance is undeniable. The development was sustained through a comprehensive set of programs covering land tenure and other enabling policies, infrastructure investments, development of farming systems, access to agricultural services, efficient technology transfer, among many others.

The decisive state-led land distribution and the eventual transition to household level production remain the cornerstone of Vietnam's eventual success in crop production. The state took on a supporting role and funneled support in credit,

agricultural inputs, tax breaks, and other services through government institutions and agricultural cooperatives, with the latter playing a key role in the delivery of services to improve socio-economic conditions of the farmers. Along with the voluntary cooperatives, the government invested heavily on irrigation and water management which were crucial in the intensification of farming.

Additionally, evidence shows that even though an overwhelming majority of Vietnamese farmers are smallholders, mechanization and increase in the use of farm inputs were possible and had critical contributions to crop productivity. However, we note that the intensified use of agricultural inputs such as fertilizers and pesticides has led to problems on environment degradation and pollution, to which the country continues to find viable alternatives. From intensification, the country is shifting its approach towards the promotion of more diversified farming systems, both as a response to emergent national needs, environmental degradation, and worsening effects of climate change on agriculture.

⁸ see Hoang Xuan Thanh, Truong Tuan Anh, Luu Trong Quang, Dinh Thi Giang and Dinh Thi Thu Phuong. *Food security in the context of Vietnam's rural-urban linkages and climate change*. IIED Country Report. London: IIED, 2013.

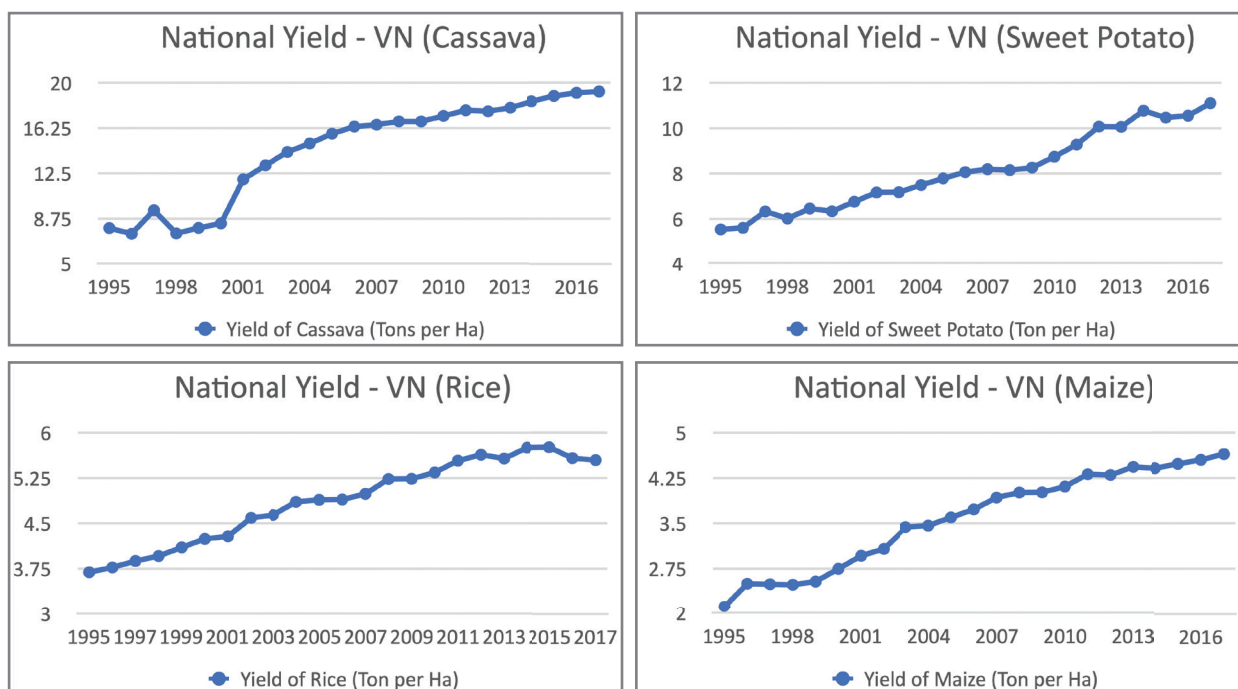
⁹ see World Bank. *Transforming Vietnamese Agriculture: Gaining More from Less*. Hanoi: Hong Duc Publishing House, 2016.

¹⁰ There is a general agreement on the significant contributions of the Doi Moi Policy to the agricultural and over-all economic development in Vietnam from FAO and World Bank, as well as independent think-tanks. Several journal articles also corroborate to this general sentiment on the period of restoration and is repeatedly tackled in the references cited further below.

A Decisive Land Distribution and Spill-over Effects

Land tenure is one of the main drivers of agricultural development, and the government embarked on an extensive state-led land reform. Vietnam has the largest rural land titling program in the developing world, both in scale and speed of implementation, initiated after the first revision of its land law in 1993.¹¹ By 2000, 11M land titles were distributed to farming households. Land redistribution was seen as a great equalizer and foundational to all succeeding interventions, providing the poorest with a land to till which resulted in the expansion of land use rights and evening out of land distribution, slowly resolving landlessness.¹²

The state still primarily manages land use, and shows a trend of increasing its allocation for agriculture. Land devoted for fruits and annual and perennial industrial crops show the most remarkable change, with current figures almost quadruple compared to their allocation in the early 1990s. Although the government ensured land allocation to crops important for the country's food security, the general direction is an expansion of areas for crops with competitive advantage as the country reoriented itself towards export of agricultural products. However, an inconsistent trend is seen for sugarcane, groundnuts (peanuts), and cassava while a gradual decrease in land allocation for soybean, sweet potato, and cotton.¹³



Figures 1 – 4. National yield averages of cassava, sweet potato, rice and maize from 1995 – 2017
Source: General Statistics Office of Vietnam

¹¹ see Do, Quy-Toan and Lakshmi Iyer. *Land Titling and Rural Transition in Vietnam, Economic Development and Cultural Change*, 56, (3), (2008): 531-579

¹² see Raymond, Chad. "No Responsibility and No Rice": *The Rise and Fall of Agricultural Collectivization in Vietnam.* *Agricultural History* 82, no. 1 (2008): 43-61.

¹³ GSO. *Harvested Land Area, cross-referenced with FAO database. 1995-2017.*

Rice is critical both for food security and export as evidenced by land use. The crop takes almost 36% of total area devoted to agricultural production and 60% of total land allocation for annual crops covering 4.1M hectares according to its latest land use report in 2017.¹⁴ The total land harvested for rice has almost doubled to 7.7M hectares made possible by development of double and even triple cropping systems, recording a total annual production of 42M tons and a country average yield of 5.54 tons per hectare.

The national yield per hectare for rice from 1995 – 2017 shows a constant yearly growth, with the exemption of slight decreases experienced in 2013, 2016, and 2017.¹⁵ This pattern in yield increase is also evident in maize (corn). The most significant increase in productivity is seen in sweet potato and cassava, with yields per hectare in 2006 almost double compared to those of 1996 despite decreases in land use for these crops. While land tenure is clearly not the only driver of growth, it was a decisive factor that shaped the direction of the country's agricultural development.



¹⁴ GSO. Land Use Report, February 2017.

¹⁵ GSO. Crop Yield - Rice, cross-referenced with FAO database. 1995-2017.

Household Farming and the Evolution of Vietnam's Cooperative System

Vietnam owes its early economic takeoff to the recognition of the household as the primary unit of production from a full state control on crop production. In its early stages, a quota system in production was still in place and anything in excess is kept by the farmers; the system was completely abolished upon the implementation of Doi Moi. The move resulted in record productivity, with Vietnam starting to export rice as early as 1989. The country is continually working on the integration of farming households to commercial marketing channels to improve farmers' incomes.¹⁶

Vietnam's 2016 Rural Census reveals that households have continued to remain the primary units of production. These are mainly composed of smallholder farmers (those with 2 hectares or less), accounting for more than 85% of total production units.¹⁷ However, an ongoing program of farm consolidation is threatening to reverse the initial successes of the state-led land reform, since there is an indication that a significant number of households are starting to divest their farmlands. Farm consolidation is the process of exchanging and transferring land titles to reduce the land fragmentation that resulted from the

government's extensive land (re)distribution program. The extent of the effects of the farm consolidation program requires further investigation and is currently an active body of research.^{18 19}

As earlier discussed, the government provided a comprehensive set of programs and resources to support its farmers, channeled through government institutions as well as agricultural cooperatives.²⁰ While farmers took charge of the general production, agricultural cooperatives offered services in land preparation, irrigation, input supply, and marketing of products. The support to cooperatives is a harmonizing policy in crop production.

The government took steps in lifting the most vulnerable while ensuring a voluntary system, in place of the old system of aggressive collectivization. The first legal document on cooperatives was created late in 1996 (ten years after Vietnam adopted Doi Moi), which was subsequently amended in the same years as the land law was amended – in 2003 and in 2012. While the policy came late, the government was consistently engaged in the development of cooperatives although it was a very long process of trial and error.^{21 22} Although Vietnam already entered an era of focus on

¹⁶ see Liu, Y., et. al. *The intertemporal evolution of agriculture and labor over a rapid structural transformation: Lessons from Vietnam*. *Food Policy*, Volume 94, July 2020, 101913. <https://doi.org/10.1016/j.foodpol.2020.101913>

¹⁷ GSO. *Results of the Rural, Agricultural and Fisheries Census*, Hanoi, 2016.

¹⁸ see Markussen T., Tarp F., et al. *Inter- and intra-farm land fragmentation in Viet Nam*. Working Paper. United Nations University World Institute for Development Economics Research (UNU-WIDER). Helsinki, Finland. 2016.

¹⁹ see To, Phuc; Mahanty, Sango; Wells-Dang, Andrew. 2019. "From 'Land to the Tiller' to the 'New Landlords'? The Debate over Vietnam's Latest Land Reforms" *Land* 8, no. 8: 120. <https://doi.org/10.3390/land8080120>.

²⁰ see Sharma, Ramesh, and Jha, Praveen. *Land Reform Experiences Some Lessons from Across South Asia*. FAO, 2016.

²¹ Originally published in 1995, Kerkvliet's book provides guidance on how Vietnam fundamentally transformed itself. If interested on the historical importance of everyday politics and the Vietnamese people's role in pursuing these societal changes, you may also read on other books and articles published by the author. See Kerkvliet Benedict. & Porter, Doug. *Vietnam's Rural Transformation*. Taylor and Francis. New York: Routledge, 2018.

²² see Kirk, Michael & Tuan, Nguyen Do Anh. *Land-tenure policy reforms: Decollectivization and the Doi Moi system in Vietnam*. IFPRI discussion papers 927, International Food Policy Research Institute (IFPRI), 2009.

enterprises and increased production, it continues to support and recognizes the role of the cooperatives for rural development, pushing for increasing efficiency and profitability for the general welfare of its members.²³

In 2008, 44% of the cooperatives in Vietnam were working with agriculture, with more than 5M members across more than 6,000 cooperatives.²⁴ By 2018, agriculture-related cooperatives retained and even substantially increased their

stronghold, with 61% of the more than 22,000 cooperatives in operation.²⁵ The state formally recognized cooperatives with the same legal position as commercial enterprises, but provided clear directives on preferential treatment to the former, recognizing their unique structure, role, and relevance – this kind of support continues to this day. The improvement of operational efficiency of cooperatives remains an important agenda in Vietnam’s economic development.



²³ see Cox, Anne & Viet Le. *Governmental influences on the evolution of agricultural cooperatives in Vietnam: an institutional perspective with case studies*, *Asia Pacific Business Review*, 20:3, 2014 401–418, DOI: 10.1080/13602381.2014.931045

²⁴ see the unpublished report available online, Tu, Nguyen Minh. *Cooperative Development in Vietnam: Success and Challenges*. UN Expert Meeting on Cooperatives in Social Development. Mongolia, 2011.

²⁵ see Vietnam Cooperative Alliance. *Annual Report 2018*. Hanoi, 2019.

Irrigation and Water Management, A Key Driver of Crop Intensification

Government support on farming intensification across the country is evident in its infrastructure investments. Experts from the Field Crops Research Institute (FCRI), one of Vietnam's national research institutes located in Hanoi, cite the importance of state investments in irrigation and water management as the main driver of the increased productivity most apparent in rice, being a water intensive crop. The best irrigated regions in the country, the Red River Delta and Mekong River Delta, have been showing the highest production of rice and consequently recording rice yields above the national yield average. Irrigation paved the way for the development of double and even triple cropping systems which then enabled rice intensification, and later the diversification of farming systems making it possible for farmers to produce other key crops, livestock, and even engage in aquaculture.²⁶

Vietnam has a total of 4.6M hectares that are fully irrigated, which accounts for 49% of total land area used for crops. In the latest survey on water management by UN's Aquastat in 2012, Vietnam performed better than most developing countries. The country recorded one of the highest total cropping intensity at 190%, with a total of

8.7M hectares of harvested crop area²⁷ fully irrigated – with 7.7M hectares allocated for annual crops, and almost 1M hectares for permanent crops²⁸. The entire water management system is steadily being developed through the establishment of pumping stations, improvement of canal systems, and the decentralization of its management down to the commune level. In its most recent Rural Census in 2016, almost 67,000 km or 34% of all canals for the entire country were already in concrete, an increase from 40,000km or 23.2% in 2011 and 18.6% in 2006.²⁹

Experts from the Mekong Delta Region, Vietnam's rice basket that produces more than half of the country's entire rice production and accounts for more than 90% of its total rice exports, agree with the above findings. They explain that expansion in irrigation, alongside the use of high yielding varieties and intensification of agricultural inputs, enabled increased crop intensity and land area harvested for rice with spill-over effects to other crops. Area harvested increased annually by 1.4%, from 3.2M ha in 1995 to 4.3M ha in 2016; on the other hand, production increased from 12.8M tons in 1995 to 24.2M tons in 2016, an impressive annual increase of 3.2%.

²⁶ see Cramb, Rob (Ed). "White Gold: The Commercialisation of Rice Farming in the Lower Mekong Basin," Springer Books, Springer, number 978-981-15-0998-8, January 2020. In particular, you may read on Nguyen Van Kien, Nguyen Hoang Han and Rob Cramb. Chapter 17, Trends in Rice-Based Farming Systems in the Mekong Delta and Dao The Anh, Thai Van Tinh and Nguyen Ngoc Vang, Chapter 18, The Domestic Rice Value Chain in the Mekong Delta.

²⁷ Land area and harvested land area are different concepts. In crop statistics, land area (sometimes referred to as crop area) is the surface of land where crop is grown. Harvested crop area on the other hand, is the total surface of land where the crop is actually harvested. The latter is usually a larger figure than land area since there are field crops that may be harvested twice or thrice a year. In some instances, crops are sown but no harvested due to natural calamities or other economic considerations (lack of capital, no market for crops) this affects the harvested crop area figures.

²⁸ see FAO. AQUASTAT Country Profile – Viet Nam. Rome, 2011; see also, FAO. Irrigation in Southern and Eastern Asia in figures AQUASTAT Survey – 2011. Rome, 2012; see also, Cuong Viet Nguyen, Tung Duc Phung, Van Khanh Ta & Dat Tho Tran. The impact of rural roads and irrigation on household welfare: evidence from Vietnam, International Review of Applied Economics, 2017. DOI: 10.1080/02692171.2017.1324408

²⁹ GSO. Results of the Rural, Agricultural and Fisheries Census. 2011 & 2016.

Mechanization and Intensification of Agricultural Inputs

Increased mechanization in crop production and intensive use of agricultural inputs such as fertilizers and agrochemicals have been observed. Several theoretical studies have linked mechanization rates with farm size. The Mekong Delta continues to hold the highest mechanization rates due to its relatively larger farm sizes, although regions with relatively smaller farms are not far behind. The studies also found that machine rental markets emerged rapidly, filling the gaps to serve the smaller farms. Although 50% of total labor is still manual, increased mechanization is observed with more than 70% of land preparation already being mechanized. An analysis of the subject using data from 1992 – 2016 noted that small farmers reportedly benefitted from mechanization by renting equipment, showing rates that utilization have more than tripled during the period mentioned.^{30 31}

More widespread use of agrochemicals was also notable. Large farms were initially twice as likely to use pesticides, but by 2012 there was little observable difference (in agrochemical use between large and small farms); more than 80% of farms regardless of size were using agrochemicals. Fertilizer use has likewise become widespread through the 1992–2016 period. Back in the 1990s, 85% or more of farms of all sizes used chemical fertilizers. Fertilizer use likewise intensified regardless of farm size, with more than 85% introducing fertilizers in production.

Over time, the trend showed an observable reduction of fertilizer use in

small farms.³² By 2012 and 2016, farms in the lower half of the farm size distribution were becoming less likely to apply chemical fertilizers, leading to the emergence of a more pronounced, positive farm size-fertilizer use gradient. The data do not permit us to establish what caused the divergent paths in the fertilizer and pesticide gradients across the farm size distribution. But these patterns are consistent with farmer response to increasing real wage rates. However, it must be noted that the intensified use of agricultural inputs being promoted also led to problems in environment degradation and pollution that Vietnam continues to find alternatives for. The trend on the increased use of agricultural inputs (although with an observable reduction from smaller farms over the past decade) was driven by the obsession to increase yields that negated the broader aspects such as ecological soundness.³³



³⁰ see Liu, Y., et. al. *The intertemporal evolution of agriculture and labor over a rapid structural transformation: Lessons from Vietnam*. Food Policy, Volume 94, July 2020, 101913. <https://doi.org/10.1016/j.foodpol.2020.101913>

³¹ see presentation, Vietnam Institute of Agricultural Engineering and Post-Harvest Technology (VIAEP). *Vietnam's Agricultural Mechanization Strategies*. Regional Forum on Sustainable Agricultural Mechanization in Asia and the Pacific. Qingdao, China. 2013

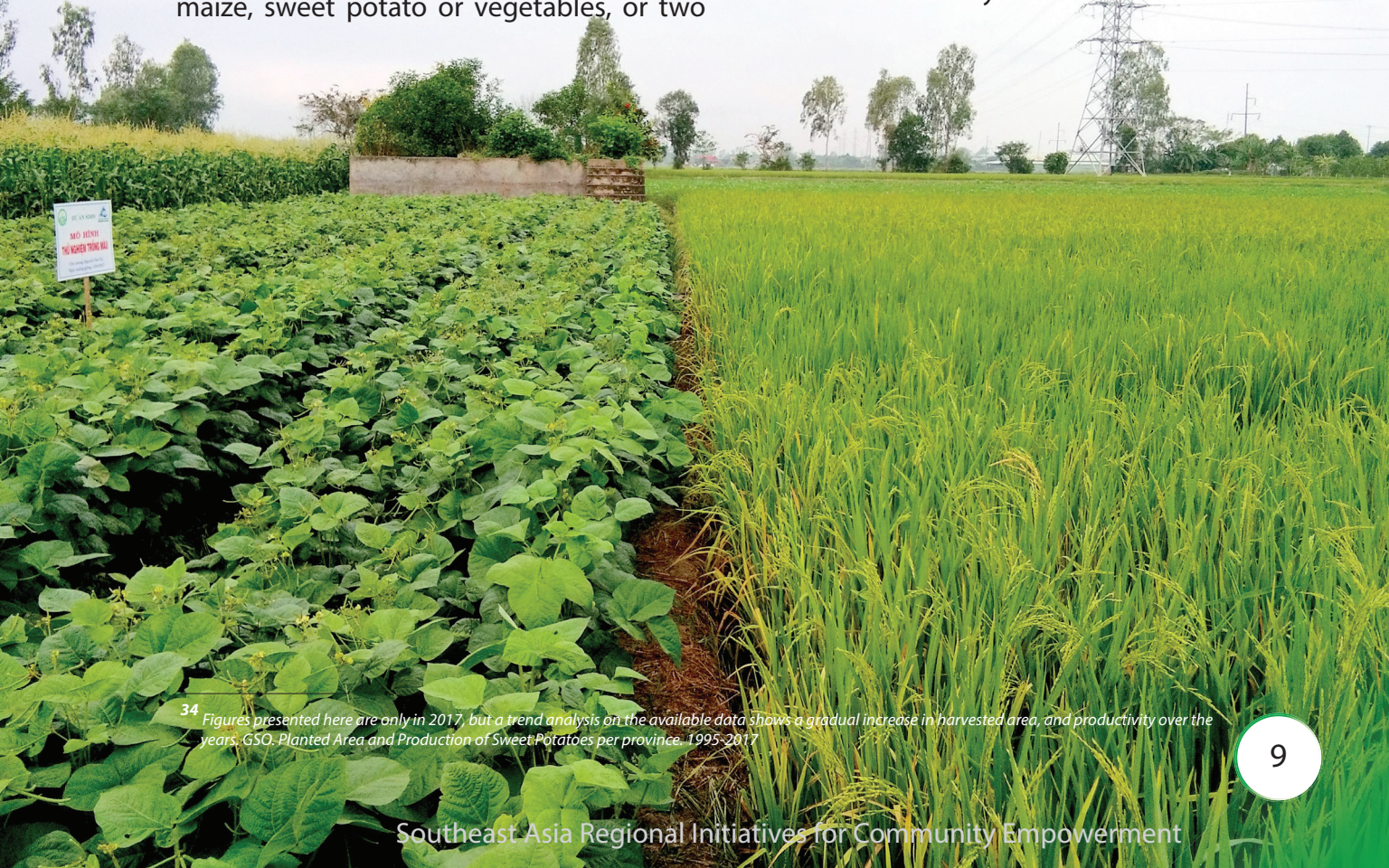
³² see note 16

Gradual Shift from Cropping Intensity to Crop Diversification

Due to the cropping intensity afforded by the expansion of irrigation, rice production rose steeply and its effects extended to the cultivation of other crops and the further development of other aspects of Vietnam's agriculture. Through the support of local governments, a new wave of farming systems was developed that encouraged the adoption of crop rotation and diversification. Farming communities that were traditionally focused on rice gradually responded by alternating their usual rice with a combination of upland and high value crops (maize, vegetables, and flowers), planting fruit trees in flood-protected areas, raising livestock, and transforming extremely flooded plains for aquaculture. The two most common systems being practiced are one cropping season of rice, two cropping seasons for maize, sweet potato or vegetables, or two

cropping seasons for rice and the third for either of the three crops mentioned.

The effect of crop diversification can be clearly seen in the data on the cultivation of sweet potato using regional comparisons. Although the Mekong Delta Region only accounts for 19% of total harvested area, it registered 40% of the total national production for sweet potato in 2017.³⁴ The changes in farming systems also served as climate adaptation strategies to the problems of intense flooding of rice fields and saline water intrusion which limited rice production – especially relevant in major rice production areas like the deltas. The success in these strategies prompted the government resolution to relax the restrictions on land allocation for rice to further encourage crop diversification across the country.



³⁴ Figures presented here are only in 2017, but a trend analysis on the available data shows a gradual increase in harvested area, and productivity over the years. GSO. Planted Area and Production of Sweet Potatoes per province, 1995-2017



Chapter 2

The Structure and Challenges of Vietnam's Seed Sector

In much of the developing world, around 70% – 90% of seeds used in crop production comes from the farmers' seed system.³⁵ The remaining 10% – 30% of the seed supply comes from the formal seed system that distinguishes itself by a seed supply chain composed of four distinct stages: plant breeding, seed production, seed conditioning, and seed distribution.

The farmers' seed system, also known as local, informal, or traditional seed system, is the system wherein farmers obtain their planting materials by saving seeds from their own harvest, exchanging or bartering with relatives and neighbors, or purchasing them from local sources or other farmers. The wide range of food crops available today and the remarkable variability within it is largely due to the increasing sophistication with which farmers have learned to manage their seed systems. The farmers' seed system is incredibly important in Vietnam's agricultural sector whose structure is mainly composed of smallholders who make up more than 80% of total farmers engaged in production.³⁶

The term "formal seed system" on the other hand, refers to a seed supply system which has been set up since the 1950s to enhance the quality of seeds and deliver improved and modern varieties to farmers. It generally consists of research institutions

(mainly public), private seed production and marketing agencies, and seed control organizations.^{37 38} In Vietnam, the formal seed system can be classified into government and private entities. Under the government are gene banks, research institutions, academic institutions, and seed centers. Private entities constitute of seed companies including those of farmers and cooperatives. The intricate linkages of the formal and farmers' seed system are summarized below in Figure 5.

As Vietnam undergoes economic transition, it aims to intensify its farming productivity to remain on top of global crop production and the government strengthens its support to the formal seed sector. An assessment of the seed supply chain reveals that Vietnam's formal seed sector is composed of several small and micro enterprises whose activities are geared towards the seed distribution side of the chain, with only a few of them capable of genuinely contributing to varietal development. Most of the domestic companies with the capacity to engage in varietal development are focused on rice and marginally on other crops. Due to their comparative advantage in terms of capital, foreign companies dominate in several other crops like maize, vegetables, among many others.

³⁵ In this research, the term "seeds" always include all plant materials or vegetative parts of plants intended for the propagation and production like tubers, cuttings, bulbs, etc.

³⁶ GSO. *Results of the Rural, Agricultural and Fishery Census 2016*. Hanoi, 2016.

³⁷ Almekinders and Louette in Huynh Quang Tin, *Impacts of Farmer-Based Training in Seed Production in Vietnam* (The Netherlands. Wageningen University, 2009), 4..

³⁸ Louwaars in Louise Sperling, et al., *Integrating Seed Systems* (Planning for Scale Brief # 3). <https://seedssystem.org/wp-content/uploads/2014/03/Integrating-Seed-Systems-.pdf>

This situation highlights the significant role of RDIs in the future of Vietnam's varietal development. The government shows a robust structure where such institutions involved in plant breeding are geographically distributed across the country, with notable achievements over the years dating back to *Doi Moi*. The institutions are largely shaped by the local ecological conditions and socio-economic realities, which then define their research direction. Since RDIs in Vietnam are deeply embedded within their respective localities, it is observable that they have overlapping crop specializations and are simultaneously

involved in broad aspects of agricultural research.

The underinvestment by the state in agricultural R&D remains the biggest limitation that curtails the ability of RDIs to maximize their contribution. Vietnam moves to grant the operational autonomy of its RDIs, along with their fiscal independence. While there are gaps within its system, Vietnam has the capacity to genuinely pursue a robust and holistic seed system oriented on the immediate needs of the agriculture sector.

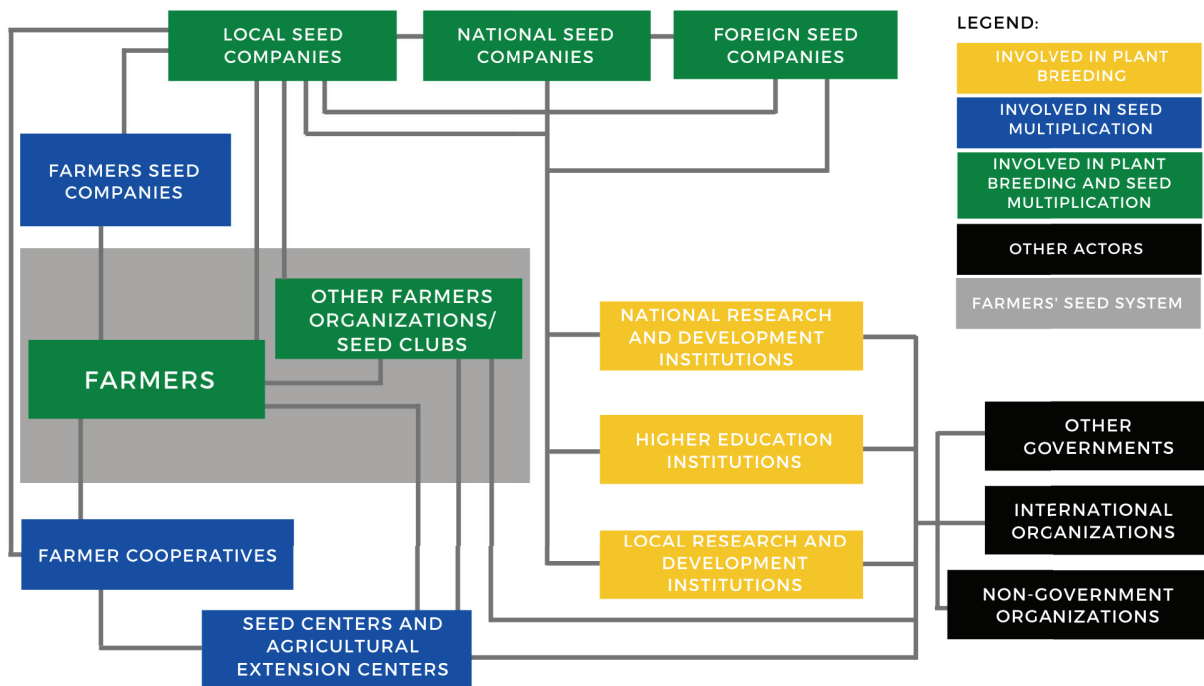
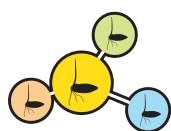


Figure 5. Summary of the linkages of the actors in the seed supply system in Vietnam



STRUCTURE OF THE SEED SECTOR IN VIETNAM

I. The Formal Seed System

The formal seed system is characterized by the four distinct stages in its supply chain: plant breeding or varietal development, seed production, seed conditioning, and seed distribution. The general assumption is that as the system is strengthened either through privatization or by providing an enabling policy environment for business,

efficiency is achieved along with spillover effects to the entire seed supply chain and to other sectors involved. Exploring Vietnam's formal seed system which is composed of the private sector, the public R&D institutions, and the provincial seed centers allows us to reexamine this assumption.

A. The Private Sector

In Vietnam, only a limited number of private enterprises with enough capital to invest in resources from plant breeding to seed distribution captures the entire chain. A significant proportion can be categorized as seed merchants that do not participate in plant breeding activities; they simply rely on the larger firms and the public seed sector for their supply. Vietnam mirrors the

structure in most of developing countries with plant breeding undertaken mainly by the public sector, and with private enterprises capturing the rest of the supply chain. Understandably, Vietnam's private sector focuses its varietal development on a limited number of crops that would gain the most profit and then invest heavily in marketing and distribution of seeds.

1. A Limited Number of Domestic Companies Engaged in Plant Breeding

The country's largest domestic seed company is the Vietnam National Seed Group Joint Stock Corporation³⁹ or Vinaseed Group, which was a state-owned enterprise (SOE) until its complete privatization in 2003.⁴⁰ Currently, Vinaseed has five subsidiaries; 90% of its stocks is reported to be domestically owned, with Vietnam's Pan Group taking more than 50% of the company's stake since 2014.^{41 42} Vinaseed

and its subsidiary Southern Seed Corporation (SSC) were both previously state-owned, with the former operating mainly in the North and the latter in the South of Vietnam, which even expanded its market to neighboring countries Laos and Cambodia.⁴³

The privatization of these SOEs is part of an ongoing and larger scheme of the

³⁹ Publicly available data, and reported in its own website, Vinaseed Group has majority holdings in Ha Tay Seed JSC, Southern Seed JSC or SSC, Ha Nam High Tech Agricultural Development and Investment JSC, Quang Nam National Seed JSC and Vietnam Rice Limited Company (Vinarice)

⁴⁰ Vinaseed. History. Accessed October 2020: <http://www.vinaseed.com.vn>

⁴¹ Vietstock. Vietnam National Seed Group JSC. Accessed October 2020: <https://finance.vietstock.vn/NSC-ctcp-tap-doan-giong-cay-trong-viet-nam.htm>

⁴² Vietnam's Pan Group is a mix of shareholders domestic and multinational companies; you may see the details of the shareholder structure: <https://thepangroup.vn/investor-relation/the-pan-group-profile/shareholding-structure/>

⁴³ Southern Seed Corporation (SSC). History. Accessed October 2020: <http://www.ssc.com.vn/>

government of slowly loosening its control on various sectors of the economy. Vinaseed has a self-declared share of 20% of the entire formal seed market in Vietnam, with a portfolio highly concentrated on rice and maize seeds, but has recently started diversifying into the vegetable seed market and other agricultural products. According to its subsidiary SSC, around 70% of all products from the company's portfolio are company-developed, while the remaining 30% are supplied by partner institutions – a combination of foreign companies and public RDIs.⁴⁴

This pattern of concentration on specific crops in plant breeding but diversification in seeds for distribution is observable in various other companies of large-scale operation. This can be easily seen in the portfolio of products available in the websites of Vietnamese seed companies. Loc Troi Group, a plant protection company equitized in 2004, is using the same model. It conducts plant breeding in rice, successfully releasing its Loc Troi varieties, but also distributes rice varieties developed by Cuu Long Rice Research Institute (CLRRI) and other crop seeds from Syngenta and Bioseed.⁴⁵ CLRRI is known for its Omonrice varieties, or simply OM. Another one is Thai Binh Seeds which successfully bred six nationally certified rice varieties and the groundnut variety TB25; it also expanded its seed distribution in maize and soybean

through partnerships with RDIs.⁴⁶ Domestic seed companies, mostly family-owned which include Phu Nong Seeds, Tan Nong Phat Seeds, Trang Nong Seeds, and Long Hoàng Gia Seeds claim to be undertaking plant breeding for certain vegetables and fruits.⁴⁷ Viet Nong (Vino) Seeds, established in 2006, also performs plant breeding and has been a distributor of vegetable seeds from East West Seeds Group since 2009.⁴⁸

As of 2018, Vietnam reports that an overwhelming 96% of the 49,600 enterprises involved in agriculture, forestry, and fisheries are small and micro enterprises with limited capital, with an overwhelming majority of the businesses involved in agricultural processing and distribution.⁴⁹ This is consistent with numbers from 2016, which show that only 13%, or around 5,700 of all firms are directly involved in crop production; therefore, an even lower number are engaged in seed production and development.⁵⁰ The formal seed supply chain in Vietnam then can be categorized as largely small-scale, with strong competition in the distribution side of the equation. Majority of the local seed companies are dependent on larger firms and RDIs for their seed supply. This implies that the private sector is concentrated on seed distribution, and has limited capacity in genuinely contributing to plant breeding activities. This is further discussed below.

⁴⁴ see an accompaniment reading to this material, Tin, Huynh Quang, et al. *Prospects for Scaling Up Crop Breeding Capacities of Seed Clubs in Vietnam*. Philippines: Southeast Asia Regional Initiatives for Community Empowerment. 2020.

⁴⁵ Loc Troi's portfolio includes OM Rice Seeds, Syngenta Vegetable Seeds and Bioseed Maize seeds. You can see their portfolio in their website <https://www.loctroi.vn/cau-chuyen-lich-su>

⁴⁶ Thai Binh's include maize from Maize Research Institute and Soybean selection from Institute of Agricultural Sciences for Southern Vietnam. <https://thaibinhseed.com.vn/en-us/san-pham.aspx?page=2>

⁴⁷ reports are from company websites. Long Hoang Seeds is family company based in Ho Chi Minh City with specialization in cucurbits, also reports plant breeding self-reports more than 90% of seeds for export.

⁴⁸ VINO Seed Company. History. Accessed October 2020: <http://www.vino.com.vn/lich-su-hinh-thanh-cong-ty-vino.html>

⁴⁹ <https://vov.vn/kinh-te/so-luong-doanh-nghiep-dau-tu-vao-nong-nghiep-chi-co-8-793803.vov>

⁵⁰ see Diem, H. and Thuy, D. Chapter 5, *Investment in Agriculture in Recent Times: The Case of Vietnam*, in Sakata, Shozo (ed.) *New Trends and Challenges for Agriculture in the Mekong Region: From Food Security to Development of Agri-Businesses*, BRC Research Report, Bangkok Research Center, JETRO Bangkok/IDE-JETRO, 2019.

2. An Increasing Presence of Foreign Companies with Captured Markets

Foreign seed companies have long operated in Vietnam. Some of them established local representative offices, others conducted joint ventures with domestic companies until full acquisition, or otherwise established their own subsidiaries. These companies have their own specializations, capturing specific markets in Vietnam's formal seed system. They either operate dually through their local subsidiaries or by partner with large domestic companies for seed distribution. For the maize seed market, companies Bayer-Monsanto, Syngenta-Chem China, and Bioseed are the main players.

Bioseed boasts of being the first foreign company in the country dealing with agriculture. Bayer-Monsanto started with Bayer Agritech Saigon in 1994 as a joint venture with a domestic company before eventually establishing a wholly owned subsidiary in 2002. Besides maize, Bayer-Monsanto concentrates on plant protection products, and has started to compete in the rice seeds market.⁵¹ The recently merged Syngenta Group claims that it began its operation in the country in the early 1990s; with its main product maize, it currently distributes tomato and watermelon seeds.⁵²

Locally known as Nong Hu Seeds, Known-You Seeds whose parent company is in Taiwan started in 1994; it specializes in vegetable and horticultural seeds production.⁵³ Also engaged in vegetable seeds, East West Seeds or Hai Mu Ten Do (Two Red Arrows, based on its logo), started its business operations in 1997 in Ho Chi Minh City (HCMC), made the domestic company Vito Seeds its distributor in 2009, and has built a production facility in Binh Duong in 2012.⁵⁴

In the early 2000s, many more foreign companies ventured in Vietnam's seed market as the country gradually eased restrictions on foreign enterprises, with one case of a complete acquisition of a domestic company. Japanese firms also officially established their local offices in the country to compete in the seed market – Takii Seeds and Sakata as early as 2014.⁵⁵ In 2015, Vilmorin and Cie through its subsidiary HM Clause acquired Tropdicorp, a domestic family-owned company based in HCMC. Tropdicorp used to belong to the top three domestic vegetable seed companies in terms of domestic sales prior to the acquisition, and has a specialized R&D in cucurbits.⁵⁶

⁵¹ Although the merger was already completed, Bayer and Monsanto continue to operate as separate entities in the country <https://www.cropsience.bayer.com.vn/vi-VN/About-us/Historty-Bayer-Vietnam.aspx>; Monsanto has offices in Hanoi and HCM under the name, Dekalb Vietnam Company Limited. Bayer Vietnam on the other hand has 4 offices in the country with head office in Dong Nai Province east of HCM.

⁵² Syngenta Group was a result of the consolidation of assets of Sinochem and Chemchina, two state-owned petrochemical companies. Chemchina acquired Adama (an Israeli company) in 2016 and Syngenta (a Swiss company) in 2017. Prior to these round of consolidations and acquisitions, Syngenta was the result of the merger of AstraZeneca and Novartis in 2000s. For the history of the company and the list of products in Vietnam, you may access the website: <https://www.syngenta.com.vn/>. For the information about consolidation and mergers: <https://www.reuters.com/article/us-chemchina-sinochem-syngenta-idUSKBN1Z40FZ>; <https://www.chemanager-online.com/en/news-opinions/headlines/chemchina-and-sinochem-merge-agrochemicals>

⁵³ Nong Hu Seeds Vietnam whose parent company is in Taiwan, does not conduct plant breeding in the country; only seed production and distribution. Its head office is also in Dong Nai Province. <http://www.knownyou.com.vn/>;

⁵⁴ East West boasts itself as an innovator and claims on involving smallholder farmers. However, this may already be in the seed production and or multiplication stage of the varietal development. Its R&D is performed in several country offices. There has been no actual disclosure of plant breeding activities in Vietnam. <https://vi.eastwestseed.com/what-we-do/rd-and-innovation>

⁵⁵ The actual foray to Vietnam market is unclear but it has been noted that this occurred as early as 2014. Local seed companies lose ground to foreign giants in Vietnam. Retrieved: <http://news.agropages.com/News/NewsDetail---13156-e.htm>

⁵⁶ The acquisition has been officially reported by Reuters: Seed group Vilmorin to enter Vietnam in emerging market push October 2014. <https://www.reuters.com/article/us-vilmorin-vietnam-idUKKCNOHX15C20141008>; Gide advises Limagrain / Vilmorin & Cie on the acquisition of Tropdicorp. March 2015. <https://www.gide.com/en/news/gide-advises-limagrain-vilmorin-cie-on-the-acquisition-of-tropdicorp>

3. Market Concentration of Seeds in Vietnam

The complex nature of business operations and cooperation between domestic and foreign companies, along with the unavailability of reliable information and the non-disclosure of seed sales make it difficult to accurately estimate the market concentration of the formal seed sector.⁵⁷ However, we can see a pattern emerging from the seed supply chain and the general direction that varietal development in Vietnam is headed. Plant breeding is an elaborate and labor-intensive process which requires the extensive use of capital.

Cost efficiency is the main reason of the private sector for concentrating investments on varietal development of specific crops. It

is a rational choice for firms with limited capital to focus on the distribution of seeds and leave the business of plant breeding to other companies with the capacity to undertake R&D. Since an overwhelming majority of enterprises are involved only in seed distribution and marketing, the formal seed system is becoming constricted and dependent on a handful of entities with the capacity to develop their own plant varieties.

Domestic players who are engaged in large-scale seed production have the upper hand in varietal development in rice, which is apparent in the large number of seed companies willing to invest in and focused on developing rice. On the other hand, foreign companies with access to capital and established R&D on certain crops have been increasing their dominance on specific segments of the seed market by utilizing the established channels and distribution systems of their domestic counterparts, and thus, already have their captured markets.

Given the structure of the private seed sector just described (i.e., limited domestic companies involved in varietal development with the exception of rice and foreign companies dominating plant breeding and the market for crops), Vietnam's formal seed system is subject to fundamental criticism due to its impact on varietal development. Market competition applies only to certain crops, so innovation in variety development is selective and even suppressed in some areas.



⁵⁷ A recent study called *Access to Seed Index* attempted to provide a glimpse of seed markets in Vietnam and other regions of the world but the data used isn't conclusive. With cautious reading on the agenda, and references used, you may find and explore their presentations and analysis on their website.

B. The Public Research and Development Institutions

Varietal development in Vietnam is mainly undertaken by the public sector in almost all crops.⁵⁸ The country has specialized national RDIs and higher education institutions (HEIs) as well as efficient provincial research institutions, all simultaneously taking part in plant breeding activities with overlaps on specific crops due to the diverse ecological conditions and distinctly different farmers' preferences. Varietal development is highly integrated with other interventions, which has been proven key to the high adoption rate of improved varieties in the country.⁵⁹ RDIs were originally mandated to undertake researches on all crops, pursue broad aspects of agricultural development, and have the capacity to link the formal and farmers' seed systems.

Of the 19 institutions under the Vietnamese Academy of Agricultural Sciences VAAS,⁶⁰ 14 are actively engaged in plant breeding activities (See Fig 6). The Plant Resources Center (PRC) whose primary task is the collection, use and conservation of plant genetic resources in the country also conducts plant breeding using

traditional and indigenous varieties – the source of important traits of all crop varieties being cultivated today. PRC's gene bank receives around 1,000 requests for accessions each year, 90% of which are for public sector researches from HEIs and other partner RDIs, and the rest are from commercial firms and private individuals.⁶¹

The national plant breeding institutes are strategically located in various parts of the country faced with different ecological and socio-economic conditions – six work closely in Northern Vietnam, four in the Central Region and another four in Southern Vietnam.⁶² These RDIs have overlaps in breeding for several crops and in fact, only three of them are focused on working on a single crop.⁶³ Each research institute has a long history of development prior to becoming a national RDI under VAAS – many evolved from local R&D organizations that have increased their capacity and efficiency over time; some of them became independent institutions from being research centers of other RDIs; while others evolved from SOEs that continue to support them even after their autonomy.

⁵⁸ see again, JICA. *Agricultural Transformation and Food Security 2020: ASEAN Region with a Focus on Vietnam, Indonesia and the Philippines*. Vietnam Country Report, 2013.

⁵⁹ see Tran, Ut & Kajisa, Kei. *The impact of Green Revolution on rice production in Vietnam*. *The Developing Economies*. 44. 167-189. 2006.

⁶⁰ At the start of this research, there were only 18 constituent institutes reflected in the VAAS website. This has been since updated and included the Nhaho Research Institute for Cotton and Agricultural Development as the recent addition. Nhaho RICOTAD was transferred from the Ministry of Trade and Industry in 2017. Primarily working on cotton, it also performs varietal development of grapes.

⁶¹ see Tin, Huynh Quang, et al. *Prospects for Scaling Up Crop Breeding Capacities of Seed Clubs in Vietnam*. Philippines: Southeast Asia Regional Initiatives for Community Empowerment. 2020.

⁶² From the Vietnam Academy of Agricultural Sciences, and consolidated the information from individual websites of the organization within its wing.

⁶³ Three institutes are focused on a single crop - Maize Research Institute (MRI) in the city of Hanoi, Sugarcane Research Institute (SRI) in Binh Duong Province and Cuu Long Rice Research Institute (CLRRI, also Mekong Delta Rice Institute) in the city of Can Tho. Just recently, MRI started to conduct activities on other crops which can be planted alongside or rotated with corn due to the government's directive on promotion of crop diversification. For

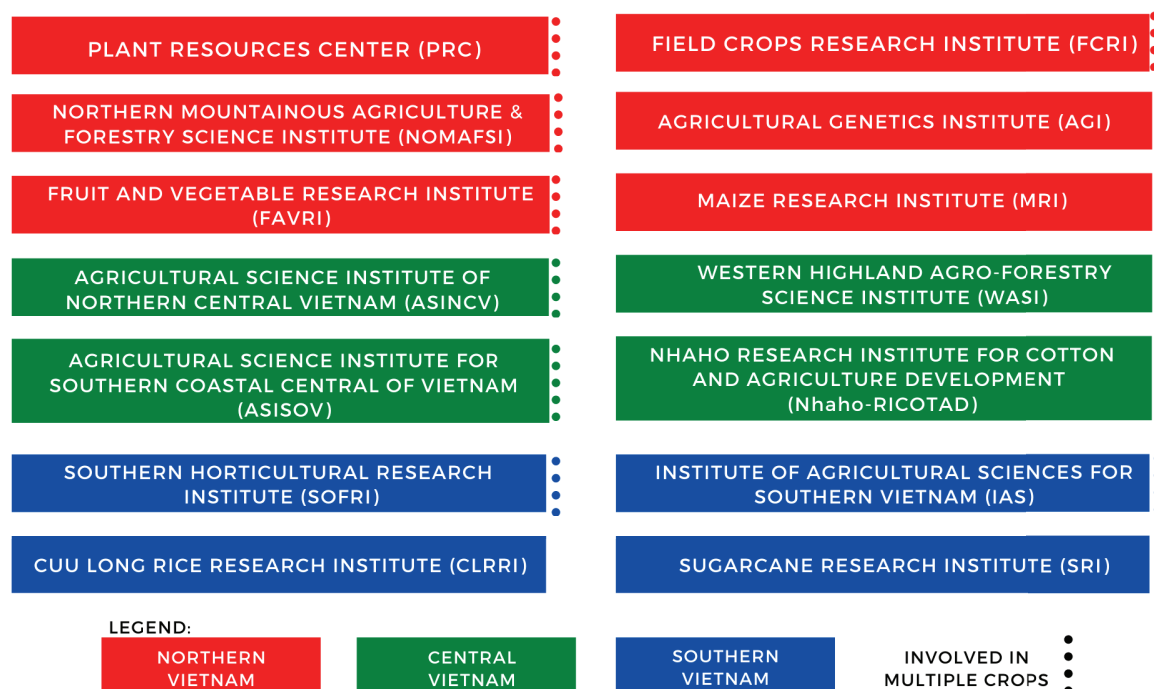


Fig 6. Summary of national RDIs conducting varietal development

1. Varietal Development Focused on Local and Immediate Needs

The Institute of Agricultural Sciences for Southern Vietnam (IAS) headquartered in HCMC has one of the longest histories. Currently operating with five agricultural research centers under its wing, IAS performs breeding work and has successfully introduced varieties from a wide variety of crops that include rice, maize, root crops and other tuberous roots, cashew, soybean, mung bean, and other vegetables. As a multi-disciplinary research institution characteristic of Vietnam's RDIs, IAS is also involved in soil research, plant protection, crop diversification or the development of agricultural systems, and technology transfer.⁶⁴

Besides developing numerous varieties for general cultivation, IAS's recent achievement includes breeding rice varieties VN 121, DTM 126, and DTM 14-258 that are grown in areas with acid sulfate soils

and limited water access in the region. It has also successfully introduced new cassava varieties covering 85% of total cassava production area in the Southeast, and released new cashew varieties which are an important crop in the Southeast and Central Highlands.⁶⁵

The Northern Mountainous Agriculture and Forestry Science Institute (NOMAFSI) primarily located in Phu To Province, a transitional area to the Northern part of Vietnam, has a research station in the mountainous province of Lao Cai; this institute also has a long history of development and reflects the same strategy as IAS. As NOMAFSI works mostly in mountainous geography of Northern Vietnam, it specializes in agro-forestry. It has a special department on post-harvest technologies and has four attached research centers focused on tea, fruit trees, temperate

⁶⁴ For complete information on IAS, its activities and achievements, you may visit their website: <http://iasvn.org/en/>

⁶⁵ For NOMAFSI, you can access them here: <http://www.nomafsi.com.vn/en/main.html>

plants, and coffee. The institute maintains a collection of germplasm in its headquarters and performs plant breeding with perennials. It has an impressive germplasm of 170 varieties of tea, 270 for fruits from 13 different species, 150 rubber varieties, and even aerobic rice varieties in its current collection.

The Western Highland Agro-Forestry Science Institute (WASI), located in Dak Lak Province in Central Vietnam, also works with perennials and specializes in coffee, pepper, mulberry, cacao, and fruit trees. These crops are the main drivers of economic productivity in Central Vietnam as well as other provinces in the Southeast. WASI has three special research centers: Eakmat Coffee Research and Technology Transfer Center (ECRTTC), Pepper Research and Development Center, and the Lam Dong Agro-forestry Research and Development Center (which was previously focused on just mulberry but has since expanded its scope). Coffee and pepper are high value crops that significantly propelled the country's agricultural exports. While the country is known for its Robusta variety, ERTTC has been exploring the development

of Arabica. Fruit bearing trees like avocado, durian, and other plants which can be utilized for animal feed and intercropped with other trees are included in the center's R&D priorities.⁶⁶

There are two institutes specializing on the development of fruits and vegetables in Vietnam, one in the South and another in the North. The Southern Horticultural Research Institute (SOFRI) is located in Tieng Giang province in Mekong Delta and the Fruit and Vegetable Research Institute (FAVRI) is in Hanoi. SOFRI and FAVRI have impressive achievements in the breeding of annual vegetable crops such as tomatoes, cucumbers, peppers, peas, beans, okra and bitter gourd, as well as fruits such as longan, lychees, mangoes, dragon fruit, various citrus fruits, among many others. These two institutes work closely with others that are into developing main food crops, following the direction of crop diversification in the entire country. Nha Ho Research Institute for Cotton and Agriculture Development (Nhaho-RICOTAD) in Ninh Thuan Province, which transferred to VAAS in 2017 works primarily on cotton but has also developed promising grape varieties.⁶⁷

2. A Strong Regard for Farmers' Preferences

The strong regard for farmers' preferences in Vietnam is manifested in the direction of plant breeding in the public sector. On rice seed production for example, farmers from the Mekong Delta Region prefer and almost exclusively use open-pollinated varieties (OPVs) and reject the use of hybrids. CLRRRI reflects this preference of the region's farmers in its varietal development program. CLRRRI performs plant breeding exclusively on rice, and is famous for its OM rice varieties. The Agricultural Genetics Institute (AGI) and the

Field Crops Research Institute (FCRI) are its counterparts in the North. AGI also specializes on rice and uses advanced methods in breeding, including genetic engineering technology. FCRI which is based in Hanoi has successfully released various rice varieties – both hybrid and inbred – for use in the North. It has also actively pursued plant breeding in other important crops such as cassava, sweet potato, groundnuts, soybean, and various fruits and vegetables.⁶⁸ Generally, farmers have become more open to the use of

⁶⁶ You can also explore other achievements of WASI here: <http://wasi.org.vn/en/>

⁶⁷ For more information, visit their pages: <https://sofri.org.vn/> & <http://www.favri.org.vn/index.php/vi/>; for Nhaho-RICOTAD you may find them here: <http://viennhaho.org.vn/>

⁶⁸ For FCRI, <http://fcri.com.vn/>; for CLRRRI, <http://www.clrri.org/ver2/>; and for AGI, <http://www.agi.gov.vn/>

improved varieties from the RDIs, In the North, even hybrid rice seeds are widely accepted due to the active promotion of the government although the use of these seeds has also seen a steady decline over the years.⁶⁹

Unlike other countries whose plant breeding institutions are defined by specificity in crop specialization, Vietnam's strategy in varietal development is localized and targeted, but at the same time deeply embedded in the broader aspects of the

country's agricultural development. The structure and strategies of the R&D institutions shape and is continually being shaped both by the ecological conditions and the socio-economic realities present in their respective geographic locations. These institutions pursue plant breeding while simultaneously ensuring the efficient transfer of technology and the adoption of these technologies by farming communities in their region, which is the ultimate litmus test of their varietal development efforts.

C. The Provincial Seed Centers

While varietal development is performed by RDIs, seed distribution is carried out by the seed centers. Seed centers are a unique institution in the agricultural system of Vietnam whose aim is to ensure the accessibility of seeds of important crops in their respective localities. These centers are directly under the Department of Agriculture and Rural Development (DARD). There are 63 of them across the country, one for each of the 58 provinces and 5 municipalities. Also called plant variety centers, they focus on the distribution of seeds for crop production, with varied strategies including the provision of government subsidies on seeds. Seed centers also undertake programs on varietal development in coordination with national and regional RDIs to ensure the ecological suitability of seeds. Moreover, some centers operating in the Mekong Delta conduct participatory variety rehabilitation and plant breeding with farmers.

The seed centers are crucial in bridging gaps and bringing targeted solutions, and have historically been entirely funded by the Vietnamese government. They are important nodal points of the government

service delivery system. The specialized role of the seed centers provides a unique opportunity for the linkage and integration of both formal and farmers' seed systems by allowing for the robust localized varietal development. Recognizing and supporting the existing farmer's practices and preferences, they work closely with agricultural extension services to improve adoption.

Seed centers can also provide subsidies to indigent farmers for their preferred plant varieties, ranging from 30% – 70% of the seed prices.⁷⁰ In provinces within the Mekong Delta Region, seed centers have a critical role in the development of farmers' seed system and promotion of farmer-developed varieties. Despite facing budgetary constraints, the centers were able to provide technical assistance to farmers who have been receiving national certification for the varieties that they developed. This proves that with adequate assistance and empowerment, farmers are able to produce quality seeds and work toward ensuring a sustainable local seed supply.

⁶⁹ see Vien, TD & Nga, NTD. *Economic Impact of Hybrid Rice in Vietnam: An Initial Assessment*. J. Sci. Dev. 2009, 7 (Eng.Iss. 2): 258 - 272 Hanoi University of Agriculture; MARD. Government to fund more research projects on domestic hybrid rice cultivation, production. 2012. Retrieved from: <https://www.mard.gov.vn/en/Pages/government-to-fund-more-research-projects-on-domestic-hybrid-rice-cultivation-production-808.aspx>

⁷⁰ see again, Tin, Huynh Quang, et al. *Prospects for Scaling Up Crop Breeding Capacities of Seed Clubs in Vietnam*. Philippines: Southeast Asia Regional Initiatives for Community Empowerment. 2020.

II. Farmers Seed System Remain Under Utilized

By the early 2000s, Vietnam already had a flourishing local seed development system. The distinction of stages in seed production spells the main difference between the formal and the informal or farmers' seed system. For the latter, the entire seed supply chain is integrated with and organized through informal linkages and networks controlled by the farmers and farmers' groups, in some cases with the assistance of local government institutions or nongovernment organizations.

Due to the prevailing policy direction for seed development that focuses on the formal seed system, the farmers' seed system remains under-researched and under-recognized in Vietnam. The very few researches that attempt to estimate its relevance to farming communities show that a significant percentage of the seed supply, particularly rice, originates from the farmers' seed system. For instance, in the Northern Region of Vietnam, the certified varieties from the farmers' seed system accounted for around 80% of the local seed supply as early as 2002. One province, Binh Xuyen, even reported that 99% or nearly all of the seeds were supplied by local seed networks.⁷¹

In the Mekong Delta Region in the south dubbed as Vietnam's rice basket, several groups of farmer breeders and seed producers known as Seed Clubs have been actively engaged in rice breeding and seed distribution. In 2008, the seed clubs supplied 16% of the total requirement of the region amounting to 83,000 metric tons (MT) of good rice seeds.⁷² Since then, the amount of

rice seeds they produced and the corresponding area of production have consistently increased over the years, and by 2017, the estimated contribution of the seed club networks more than doubled to 35% of the total seed requirement.⁷³ It must be noted that most of the seed supply have largely remained farm-saved seeds. This simply reflects research findings that farmers in this region are partial to using open-pollinated rice varieties. These findings are consistent with those for other crops such as cassava, which reveal that majority of the requirements for planting materials is produced and supplied through complex, informal systems at various scales.⁷⁴

To bridge the gap in research, a recent SEARICE publication summarized the successes and the potential of the local or farmers' seed systems in Vietnam. It highlighted these seed systems' capacity to improve the accessibility of seeds and the farmers' socio-economic status. The seed club experience in the Mekong Delta is also a good example of the participatory and collaborative process between farmers and key government institutions. For instance, the original four seed clubs established in the early 1990s to address the shortage of supply of rice seeds in region has grown to 325 in all provinces of the delta. Today, the seed clubs collectively play a major role in ensuring the supply of locally suited rice varieties. Should national priorities and resources align towards the development of such local seed systems, it will not be impossible to envision a robust and dynamic seed system that extends beyond rice.⁷⁵

⁷¹ see Anh Le Thu and Pinners. *Good seed from the informal rice seed sector. A study on the local rice seed sector in northern Vietnam*. 2003.

⁷² see Huynh Quang Tin, Nguyen Hong Cuc, Tran Thanh Be, Normita Ignacio & Trygve Berg. *Impacts of Seed Clubs in Ensuring Local Seed Systems in the Mekong Delta, Vietnam*, *Journal of Sustainable Agriculture*, 2011. 35:8, 840-854

⁷³ see Tin, H.Q., Nguyen, H.D., Thanh, H.H., Tam, P.T., Dang, B.V. and Giang, N.T.T. *Impacts of community-based seed production and supply towards sustainable agricultural production in An Giang province*. *Can Tho University Journal of Science*, 2016. Vol 3: 120-125.

⁷⁴ see Delaquis E., et. al. *Raising the Stakes: Cassava Seed Networks at Multiple Scales in Cambodia and Vietnam*. *Front. Sustain. Food Syst.* 2018. 2:73. doi: 10.3389/fsufs.2018.00073

⁷⁵ see SEARICE. *Securing the Local Seed System: The Journey of Farmers' Seed Clubs in Vietnam Southeast Asia Regional Initiatives for Community Empowerment*. 2019. 44 pp.





CONSTRAINTS OF THE SEED SECTOR IN VIETNAM

There are glaring gaps in the seed sector of Vietnam that needs to be addressed. Aside from the tendency to concentrate on specific crops, Vietnam is drawn to continue placing its bet on the private sector not only for seed supply but also for varietal development. While its RDIs have the potential to mitigate these effects, they remain underfunded despite the level and scale of advancement in the country's agricultural development. The move for operational and fiscal autonomy unintendedly pulls the goals of these

institutions towards the reliance on the market and the agenda of the private sector. To make matters worse, the important role of seed centers as nodal points of both the formal and the farmers' systems is slowly being distorted as they undergo restructuring, turning them into private entities forced to compete in the market. With these changes, the farmers' seed system is placed in an incredibly disadvantageous position – not only does its potential remain largely untapped, but its future becomes uncertain.

1. Placing the Bet on the Private Sector

The government continues to rely on the private sector for improving the seed supply in the country. With the aim of boosting the seed supply chain, the government through the Ministry of Interior issued a decree in 2007 institutionalizing the Vietnam Seed Trade Association (VSTA), a non-profit organization seeking to further improve seed accessibility through partnerships with the private seed sector. VSTA closely works with MARD and seeks to modernize the country's seed industry through improvement of technology; standardizing guidelines on testing and trade of plant varieties; building economic alliances; and enhancing relationships with the agricultural extension centers and seed enterprises.⁷⁶

In 2006, Vietnam became a member of UPOV 1991 and implemented its Plant Variety Protection Law, an amendment to its 2004 Seed Ordinance. This was meant to “spur” the seed market and encourage investments from both domestic and foreign companies, and supposedly to support plant breeding activities in the country. Vietnam has become the poster child of UPOV to convince the other countries, possibly other developing countries in Asia, to enact similar laws. The effects of the UPOV 1991-inspired PVP is discussed in the next chapter.

⁷⁶ As of 2018, VSTA has 137 members, 100 of which are private enterprises of different scales, followed by government seed centers with 31, 4 government research and development institutions and 2 individual members. 65 members are from the Northern Region with a majority coming from the Red River Delta, 21 are from Central Region, and 51 from Southern Region.

II. RDIs Navigating Through Budgetary Constraints

As presented previously, Vietnam's varietal development remains concentrated in the public sector, amidst attempts to encourage innovation from the private sector. International observers^{77 78} were concerned by the overlapping functions and goals of RDIs in the country, citing possible inefficiency. The government immediately responded by embarking on a series of restructuring of RDIs under the umbrella organization and research arm of MARD, the VAAS, which started in 2005. The move is said to be aimed at developing the operational efficiency of RDIs – encouraging their independence in pursuing organizational goals and even fiscal autonomy.

The effects of reorganizing the RDIs is yet to be proven, but the main problem is not in the institutes' structure. The most pervasive issue is their consistently low budget allocation, despite a rapidly expanding human resources in R&D and an ever-growing number of specializations to keep up with the country's agricultural development. The perennial underfunding in agricultural research is one big handicap. Confronted with budgetary constraints and while competing for a slice of the national budget for agricultural R&D, RDIs actively seek for international funding and partnerships with the private sector to enable them to continue pursuing their programs and activities.⁷⁹

⁷⁷ see JICA. *Agricultural Transformation and Food Security 2020: ASEAN Region with a Focus on Vietnam, Indonesia and the Philippines*. Vietnam Country Report, 2013.

⁷⁸ see World Bank. *Transforming Vietnamese Agriculture: Gaining More from Less*. Hanoi: Hong Duc Publishing House, 2016.

⁷⁹ In 2011, budget allocated for the entire agricultural R&D was estimated at 31.5M dollars, with 81% of the funds under the control of MARD. While emphasizing that there are no one size fits all formula for all countries, citing the experience of Brazil, existing researches and policy recommendations from the UN support at least 1% of the agricultural GDP be devoted to agricultural research and development. Asia collectively performs well in this indicator, but Vietnam's state expenditure remains significantly smaller as compared to its peers from Asia and belongs to the lower tier in the region when it comes to public agricultural R&D budget.

Assessing figures from 2000 to 2017, Vietnam continues to underinvest in R&D allocating less than 0.3% of its Agricultural GDP (AGDP) – peaking in 2006 then continued to decline until 2017. From its initial gains, in 2010 this slid down to 0.18% of the AGDP and since then has not passed the 0.2% mark. In comparison to its peers in Asia, Vietnam still belongs to the lower tier of spenders in terms of agricultural R&D, and in the ASEAN, over-all it edges out only Laos PDR and Cambodia. In an analysis of indicators for its agriculture growth and prospects for its future, Vietnam's insufficient R&D funding can be its biggest setback, as it is crucial for sustaining the remarkable gains it has already achieved in agriculture over the years. See the following references:

JICA. *Agricultural Transformation and Food Security 2020: ASEAN Region with a Focus on Vietnam, Indonesia and the Philippines*. Vietnam Country Report, 2013

Beintema, Nienke and Stads, Gert. *A comprehensive overview of investments and human resource capacity in African agricultural research*. ASTI Synthesis Report. Washington, D.C.: International Food Policy Research Institute (IFPRI). January 2017.

Correa, Alkmin & Schmidt. *Public research organizations and agricultural development in Brazil: How did Embrapa get it right? (English)*. Economic premise; no. 145. Washington, D.C.: World Bank Group. 2017.

CGIAR/Agricultural Science and Technology Indicators. *R&D spending, total in millions USD PPP, 2017*.

OECD and FAO. *OECD-FAO Agricultural Outlook 2017-2026. Chapter 2, Southeast Asia: Prospects and challenges*, 2017.

III. Privatization of Seed Centers

To ensure the distribution and adoption of plant varieties, RDIs are closely intertwined with other government institutions such as the agricultural extension services as well as the seed centers in providing services and the transfer of technology to its farmers. This dynamic in the seed supply chain is slowly being overturned as seed centers also undergo an active restructuring towards their complete privatization. This is a part of the ongoing general economic strategy of Vietnam in its wide-scale divestment of SOEs, including those in the agricultural sector.

Not for long, the situation may become bleak in the future for farmers as some seed centers ceased the provision of seed

subsidies. We note that these seed subsidies serve as a safety net, while we enable sustainability of seed supply through local seed systems. The privatization of seed centers removes this safety net completely and will be extremely burdensome to farmers. The seed centers are merged with other attached agencies of DARD within the province, and once privatized will technically operate as seed companies with captured seed markets to compete with private businesses. At the moment, seed centers which have not completed privatization are burdened with keeping seed prices affordable and accessible to farmers while ensuring the steady flow of income to keep themselves afloat.⁸⁰

IV. Farmers at the Receiving End

Vietnam continues to provide full support for farmers through agricultural cooperatives, localized approaches to communities, and continued delivery of social services. Although we have seen parallel interventions of the state towards ensuring the development of its agricultural sector, the changes among the actors and

the effect of such changes to the seed supply chain is discouraging. The tilting of the scale towards the private sector for seed supply, the insufficient funding to agricultural research, and the privatization of the seed centers are all heading towards the further marginalization of farmers and the farmers' seed system.

⁸⁰ Tin, Huynh Quang, et al. *Prospects for Scaling Up Crop Breeding Capacities of Seed Clubs in Vietnam. Philippines: Southeast Asia Regional Initiatives for Community Empowerment. 2020.*



Chapter 3

The False Promises of Plant Variety Protection

With the implementation of the UPOV-inspired PVP Law in 2006, plant breeders could protect their new varieties with plant breeder's rights or PBR (also called Plant Variety Rights or PVR). PBR or PVR constitute the exclusive rights of the breeder over the variety in several aspects:

- 1) production or multiplication;
- 2) processing for the purpose of propagation;
- 3) offering for sale;
- 4) selling or other marketing;
- 5) exporting;
- 6) importing; and
- 7) stocking.

The PVP Law is patterned after the 1991 UPOV Convention. PBRs are granted by Vietnam's PVP Office, established in 2004. Protection may be achieved in two ways; one is through the conventional application which comes after a plant variety has completely finished the formal certification process; another is a parallel process wherein application can go side by side with the varietal certification process. Annual crops are granted a maximum of 20-year protection, and perennials a maximum of 25 years.

There have been attempts to highlight the benefits of PVP in plant breeding in several countries in the world, mentioning flow of investments, increased number of individuals or organizations involved in plant breeding, increased quality and accessibility of seeds, among many others. These are echoed by the implementers of the PVP in Vietnam, as well as national seed companies who stand to gain most from the protection of plant varieties.⁸¹ Additionally, the studies tend to ignore the structure of the seed systems, to obscure the complex interaction of other indicators of agricultural development, and to assume the effects on the actors involved including the farmers. On the other hand, several researches have long questioned these claims of UPOV as these studies fall flat and are not supported by concrete evidence in addition to their questionable rationales and methodologies.⁸² In this final chapter we will present the cost of protection, a detailed analysis of the implementation of PVP, the consequences and implications to the various stakeholders, and a brief look at the UPOV-style PVP system's claims of success.

⁸¹ The gains from the PVP Law in Vietnam have been repeatedly delivered in several occasions, presentations, forums etc. You may carefully read the article written by the chief implementer of the PVP in Vietnam and the head of the PVPO. see Minh, NT. *The Tremendous Impact of UPOV Membership in Vietnam*, 2019. Retrieved: <https://european-seed.com/2019/04/the-tremendous-impact-of-upov-membership-in-vietnam/> Note that Euroseed promotes the adoption of UPOV in all countries; also see Vinaseed (n.d) *UPOV in Vietnam: A Case Study of Vinaseed*. Retrieved from: <http://eapvp.org/>.

⁸² There have been several studies that not only questioned the methodologies and findings of several proponents of UPOV, but also tackled broad impacts. We urge you to read the following for a more comprehensive understanding.

For a theoretical reading: Partelow S., Abson D., et. al. *International Journal of the Commons*, Vol. 13, No. 1, 2019. pp. 747-776;

For a comprehensive assessment of UPOV's claims, Lieberherr, S. & Meienberg F. *UPOV report on the impact of plant variety protection - A critique*. Berne Declaration. Zurich, Switzerland. 2014;

For a comparative analysis of UPOV regime with the Indian PVP Law, Kochupillai, Mrinalini. *Is UPOV 1991 a Good Fit for Developing Countries?* 2018 Retrieved: https://www.researchgate.net/publication/322988248_Is_UPOV_1991_a_Good_Fit_for_Developing_Countries;

For a comprehensive and detailed analysis, Louwaars, N. *Seeds of Confusion: The impact of policies on seed systems*. Wageningen University and Research. The Netherlands. 2007. Retrieved from: <https://edepot.wur.nl/121915>

I. The Cost of Protection

The cost of plant variety protection is presented in Table 1 below. Considering the amounts needed, there is no denying that

the design of the PVP System is built to favor private companies or foreign investors with access to capital and works against the

Table 1. Fees applicable to plant variety protection in Vietnam⁸³

	VND	USD
Application Fee		
a. First Application	₫2,000,000.00	US\$87.00
b. Re-application	1,000,000.00	43.50
Technical Testing Fee		
a. DUS test for seasonal crops	8,300,000.00	360.90
b. DUS test for yearly crops	11,000,000.00	478.30
c. DUS test for perennial crops	24,000,000.00	1,043.50
d. Breeder conducts DUS test	50% of the fee	
Annual Maintenance Fee		
a. First Three Years	3,000,000.00	130.40
b. 4th - 6th Year	5,000,000.00	217.40
c. 7th - 9th Year	7,000,000.00	304.30
d. 10th - 15th Year	10,000,000.00	434.80
e. 16th to 20th Year	20,000,000.00	869.60
Other Fees (Case to case)		
Registration of Contract on Transfer of Rights of Protected Varieties	250,000.00	10.90
Reinstatement of the effectiveness of plant variety protection certificate	1,200,000.00	52.20
Issuance of PVP Certificate	350,000.00	15.20
Amendments, Re-grant of PVP	100,000.00	4.30
Priority for Application	250,000.00	10.90
Grant license of Rights-to-plant varieties representation services	100,000.00	4.30
Grant license of Inspection rights-to-plant varieties	100,000.00	4.30
Issue, re-issue and information amendment in licenses of Representatives of rights to plant varieties, Inspection rights-to-plant varieties.	100,000.00	4.30

⁸³ This is a conservative estimate and subject to changes, conversion used is 23,000 VND/1 USD. In PVPO's website, "Procedures for PBR Registration in VN" shows that there are different rates for the following crops – rice (24M VND), peanut (18M VND), soybean (16M VND) and maize (15M VND). Law on Applicable Fees for Protection of Plant Varieties - Ministry of Finance; Plant Variety Protection Office – Vietnam. Procedures for PBR Registration in VN, PVP Fees. Retrieved from: <http://pvpo.mard.gov.vn/>

interest of other actors of the seed system. The cost of protection becomes the very justification for the premium added to seed prices, which is highly speculative in nature. Note that these fees are for the protection alone, and excludes the prohibitive amounts required for the entire process of varietal development. A case study on the process and cost of certification of plant varieties outlines the incredible amount of resources needed for varietal development and explores its implications especially to farmers.⁸⁴ PVP presents an additional roadblock to the already disadvantageous position of the farmers' seed system.

Even with much government promotion, the majority of plant breeders

and owners of plant varieties across Vietnam remain adamant about applying for plant protection due to the high transaction cost and the slow rate of approval. On the other hand, national RDIs are mandated to apply for PVP subject to the availability of the institution's resources and are actively engaged in promoting the transfer of ownership of new plant varieties to companies, who will then apply for protection.

The undue advantage of private seed companies in the PVP system, of foreign over domestic applicants, and the struggles faced by the national RDIs becomes clearer in the assessment of its implementation in Vietnam.

II. Implementation - Applications, Issued and Cancelled Certificates

The number of applications for varietal protection and issued and cancelled PVP Certificates from 2007-2015 are presented below in Figure 7, based on data from the PVPO, under the administration of MARD.⁸⁵ The first chart shows the total number of applications received within the period in comparison to those processed, while the second presents the total number of issued, cancelled and nullified certificates.

There is a general increasing trend in

the number of applications for PVP, an improving but limited absorptive capacity for granting certificates, and a considerable number of them being cancelled. From 2007 - 2015, the PVPO received a total of 684 applications. Within the same period, it has successfully granted 302 PVP certificates, and rejected 11 applications. The information for the other applications is largely incomplete; it may be assumed that they were either backlogs or of poor quality, and as such were withdrawn prior to the

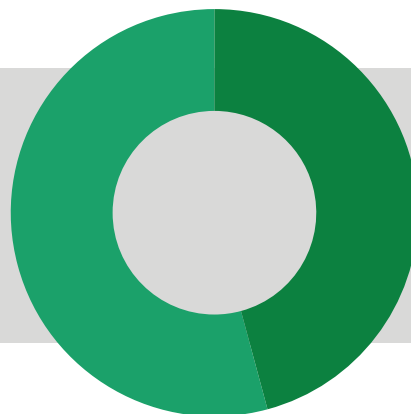
⁸⁴ For an overview on the process of certification, its associated costs, procedures and timeframes you may refer to a case study that followed the entire process of certification from varietal development in Vietnam. SEARICE. *Farmer-bred Varieties: Finding Their Place in the Seed Supply System of Vietnam: The Case of the HD1 Variety*, 2013.

⁸⁵ The PVP Law was enacted in late December 2006, as such we excluded all data prior to its official implementation and started this assessment from 2007. Note that the PVP Office has been established in 2004 and has started receiving applications for protection ever since. The official data from 2016 - 2020 are not yet available in the website. The PVPO's statistics stopped updating the data base early 2016 only issuing occasional announcements on applications, cancellations and granted certificates. All the data presented here were collected and officially released from their official website, and shows the total for 8 years.

684 applications were received from 2007-2015. Within the same period only 313 were processed including those received prior to 2007. There are more than 370 applications either unprocessed or withdrawn by the end of 2015.

Others
54.2%

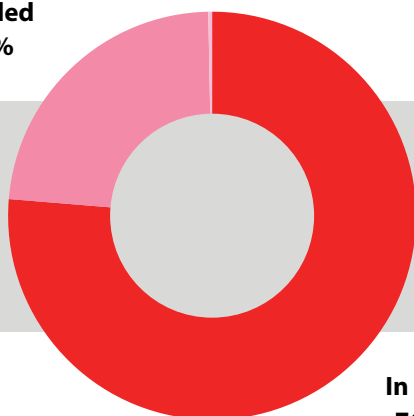
Processed
45.8%



Cancelled
23.4%

Nullified
0.3%

In Force
76.3%



Of the 302 granted PVP certificates in the same period, 71 of them were cancelled (23%). There are 232 PVP Certificates that remained in force by the end of 2015.

Figure 7. PVP applications and PVP certificates issued and cancelled, 2007-2015
Source: PVPO Vietnam (data summary)

grant of certificates, accounting for more than 370, excluding those filed prior to 2007. Certificates are being cancelled at a high rate; a total of 70⁸⁶ certificates or 23% of all the certificates granted within the same period eventually led to cancellation. Only 232 PVP certificates had remained in force by the end of 2015, 8 years after the implementation of the PVP Law.

To be able to make sense of these

numbers further and understand its deeper implications, we will provide a cross-sectional analysis of the applications, certificates that remained in force, as well as the cancellations and make comparisons among the three indicators. The succeeding tables will break this down further by type of ownership whether foreign or domestic, and public or private, as well as segmentation by crops to have a better picture of PVP in Vietnam.

A. PVP in Vietnam – Applications

PVP applications are private sector dominated and most of them are domestic in origin. However, domestic applications are highly concentrated on rice. A breakdown by crop also reveals that foreign applicants lead in other crops such as flowers, maize and vegetables. A summary of the PVP applications is presented in (Figure 8), the chart on the bottom left (in yellow) shows the segmentation by crop. A more detailed breakdown is in Table 2.

In terms of total applications as seen in Table 2, domestic applicants significantly dominate foreign applicants, with a ratio of 65:35 of total applications. Additionally, the private sector applications were triple those from the public sector, with the former filing 3 out of 4 applications. A breakdown by crop⁸⁷ shows that around 70% of all applications are main food crops wherein rice takes 54% and maize takes 14.5%. This is followed by flowers and ornamentals with 13.7%, then vegetables around 11%, and the remaining, around 7% is shared by fruits and other crops.

There was a noticeable surge of applications from 2013-2015, with almost 50% of all the total only occurring for the last three of the eight years in the data studied. The number of applications is expected to increase further as the government issued a strong directive for all attached R&D institutions under MARD to apply for PBR, technically making this mandatory. As seen

from the available data, we can expect a trend of an even greater number of applications originating from the private sector.

What cannot be seen through a cursory analysis can be revealed by looking at a cross-section of the data. It shows a clear and very high concentration of domestic applications dedicated to a single crop – 77% is for rice alone (341 out of 443 total domestic applications). For instance, 92% of all rice PVP applications (341 out of 370) were domestic in origin, showing Vietnam's competitive advantage in varietal development on rice. This is also partly a due to the retroactive application for protection of varieties already developed and widely used in the country for a number of years prior to the enactment of the PVP Law. CLRRRI leads the number of applications filing for 78, followed by Vinaseed with at least 26,⁸⁸ AGI with 16, and Thai Binh Seeds with 14.

Although rice has a clear domestic advantage, foreign applications dominate certain crops like flowers (99%), maize (68%), and vegetables (62%). Dutch firms collectively own 86 applications for flowers, while the rest come from Japanese, Australian, and Italian companies. For maize, Monsanto leads the pack with 44 applications, with single digit applications from East West, Bioseed, Syngenta, and King Agrotech (Chinese firm). Maize Research Institute and Vinaseed's subsidiary SSC are

⁸⁷ For the purpose of clarity and easier analysis, we have processed the available list of applications from the PVP Office, which has confusing categories. "Rice" in this table combines the figures of Paddy and Rice (South). We have included anthuriums in "Flowers" which the PVP database categorizes as an industrial crop. The category "fruits" include the following in the list – melon, orange, grapefruit, grapes, strawberry, dragon fruit, apples, longan (listed as industrial crop in PVPO list) and watermelon (listed as vegetable in PVPO list); "vegetables" include the following – squash, tomato, string beans, cucumber, chili, potato, onion, spinach and lettuce; lastly "others" include the following – bamboo, groundnuts, sachi ichi beans, soybeans, moringa, cotton, alfalfa and aquatic plants. This will apply for the succeeding analysis.

⁸⁸ These are combined numbers of rice applications from SSC with 18 and entries under National Seed JSC with 8, and does not include other subsidiaries and other crops. Vinaseed Group reports up to 45 applications by the end of 2015.

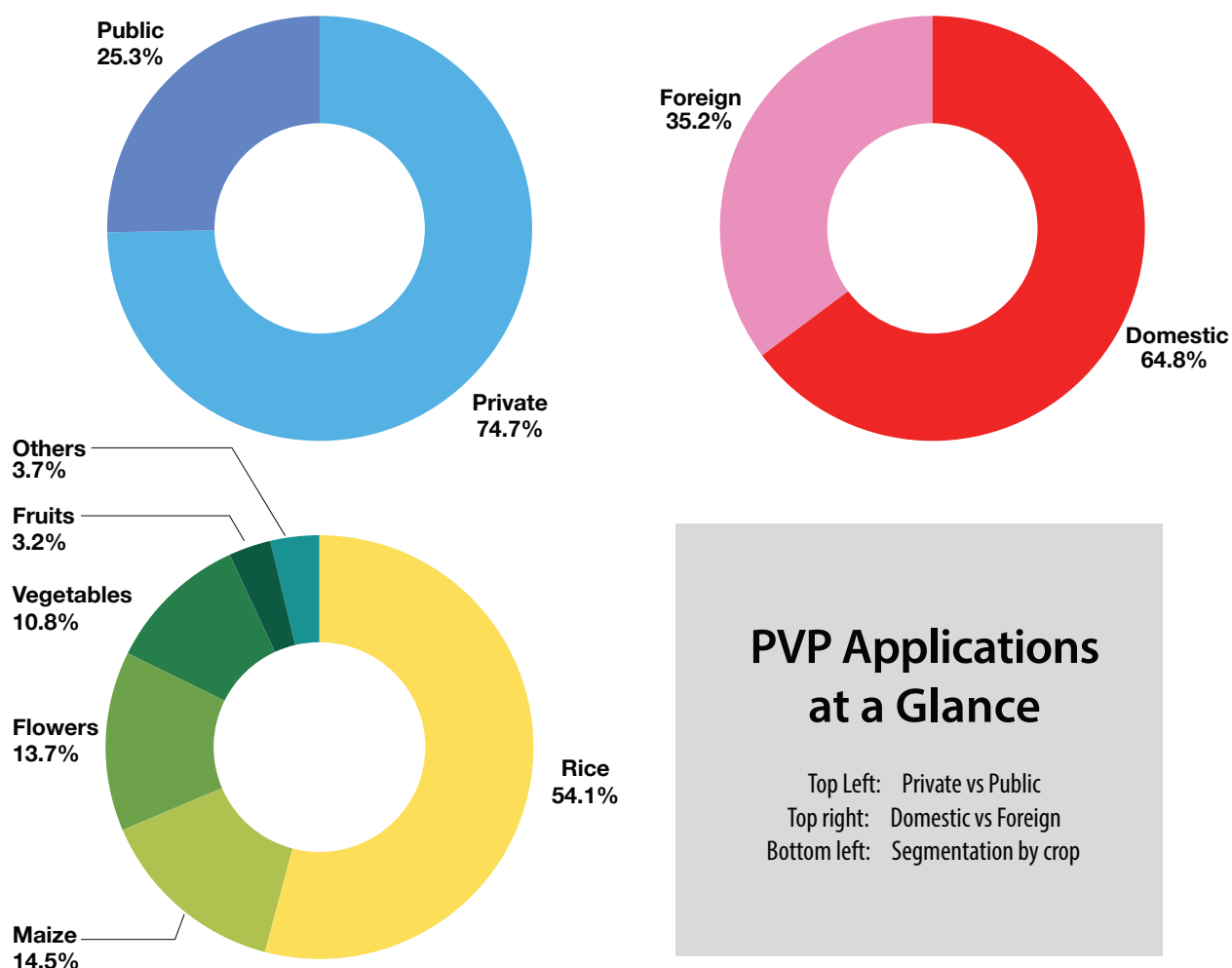
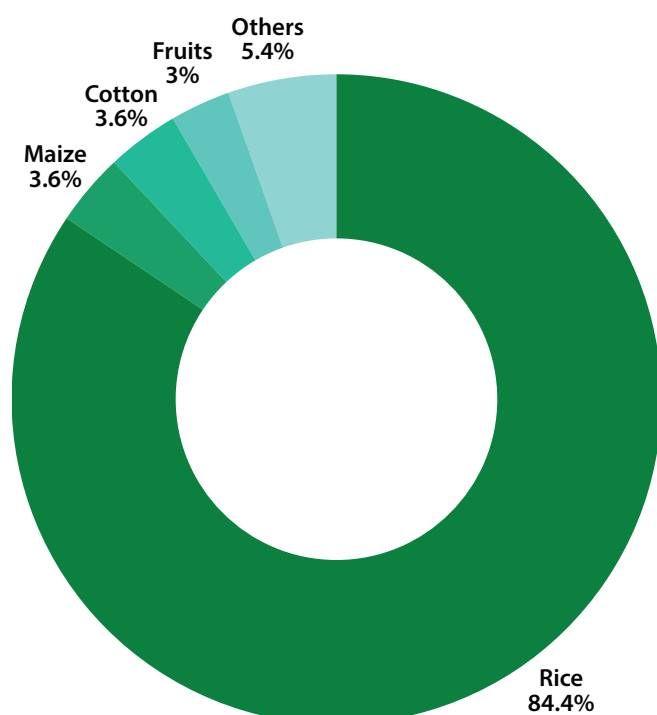


Figure 8. Nature of PVP applications from 2007-2015

Table 2. Summary of all PVP applications from 2007-2015

	Foreign	Domestic	Total	Public	Private
	241	443	684 (100)	173	511
Rice	29	341	370 (54.09)	141	229
Maize	67	32	99 (14.47)	6	93
Flowers	93	1	94 (13.74)	1	93
Vegetables	46	28	74 (10.82)	6	68
Fruits	6	16	22 (3.21)	6	16
Others	0	25	25 (3.65)	13	12

⁸⁹ There are only 167 total applications from Vietnam's public sector. The applications from the Rural Development Authority (RDA) from the Republic of Korea is added to this number with 6 (5 potatoes, 1 strawberry) resulting to 173. RDA is technically a government agency thus categorized under foreign but public applications. As of the end of 2015, these applications have not been approved yet, and does not affect the succeeding analysis on certificates in force or cancellations.



Application from the domestic public sector is concentrated on rice at 84.4% (141 out of 167); Applications constituted 3.6% each for cotton and cotton; around 3% for Fruits, and the rest, 5.4% was shared by other crops- soybean, gourdnut, potato, and flower.

Figure 9. PVP applications of the domestic public sector across crops

the only domestic institutions with significant number of applications. Limagrains recently acquired domestic company Tropical Development and Investment JSC or Tropdicorp holds the most application for vegetables with 23, followed by Viet Nong (VINO) Seeds,⁹⁰ a Vietnamese company, with 17.

Important agricultural products like groundnuts, soybean, and fruits show marginal number of applications, mostly are domestic in origin. Notably, no applications for protection were made for main food crops showing incredible yield performance over the last two decades – sweet potatoes and cassava, as well as some of the high-value perennial crops. This hints at the

importance of plant breeding, but not necessarily of plant variety protection in the context of Vietnam's crop varietal development in particular, and agricultural development in general.

This brings us to analyze the response of the national RDIs to the call to apply for PVP. Vietnam's public sector applications totaled 167, mirroring the general trend of concentration on rice which accounts for around 84% of all its applications, and with very marginal application on the rest of the crops.

All in all, the applications came from 19 public (domestic) institutions. From eight RDIs under VAAS were 136 applications out of 167⁹¹ from the public sector. Of these,

⁹⁰ East West Seed operates two ways in Vietnam, first is through its own brand Hai Mui Ten Do Brand and through VINO Seeds its distributor in the country which according to the company's website started in 2009. VINO Seeds is still considered a domestic company in this analysis as there are no information about its ownership structure. https://issuu.com/fsayoc/docs/sprouts__jun2012_

⁹¹ Based on Table 2, there are 173 total applications from the public institutions, but there are only 167 domestic public sector applications. In case you missed it, please see note 89 on the crops omitted on this analysis.

more than half came from CLRRRI with 78, followed by AGI (24), FCRI (14), Nhaho-RICOTAD (6), MRI (6), CETDAE⁹² (3), PPRI (2), IAS (2) and one application that is directly named under VAAS. The 31 other applications were split between eight provincial level agricultural offices (DARD of Soc Trang: 6, Hung Yen, and Kien Giang;

Seed Centers of Nge Ahn, Lao Cai: 2, Quang Ngai: 2, Binh Thuan: 2, and Quang Nam:3); two higher education institutions (Hong Duc University: 2, and Vietnam National University for Agriculture: 9); and a national testing center (National Seed Testing Center – South). All of these 31 applications are on rice.

B. PVP in Vietnam – Certificates in Force

For certificates in force, the private sector retains its stronghold in all crops while the public sector's ownership is reduced to three crops – rice, maize and groundnut. The case is reversed as foreign companies edges out domestic ownership in total existing certificates and maintains its dominance on flowers, maize and vegetables.

For all the PVP Certificates in force, rice takes the majority with around 40%, followed by flowers and ornamentals, 29%, maize and vegetables at roughly 14%, with marginal numbers for other crops. 105 out of 231 existing certificates are domestically owned while 127 foreign-owned; also 37 are owned by public RDI's, while 194 hail from the private sector. The dominance of foreign companies in terms of certificates currently in force is easily obscured by the fact that a number of applications were domestic of origin. A staggering 194 of 231 of the existing certificates are privately-owned, with the public sector owning only 37 of the certificates still overly concentrated on rice, with 4 certificates for maize and 2 for groundnut.

A cross-section of data reveals that the foreign applications are much more successful than the domestic ones – the percentage of applications which resulted in granted certificates is much higher for foreign applicants. Furthermore, while the domestic sector clearly outnumbers foreign certificates for rice, the reverse is true in almost all other crops – 67 out of 67 (100%) for flowers and ornamentals, 24 out of 32 (75%) for vegetables and 21 out of 33 (64%) for maize. The argument therefore that the domestic entities dominate the plant variety protection maybe questioned as it is dependent on the crop, but what it clearly does is to protect the foreign business interest on the aforementioned crops. We can also see by looking at these numbers alone that interest on plant protection becomes crop-specific, narrow and limited, leaving research for other crops in possible jeopardy as breeders will be inclined to focus their breeding work on marketable crops which they can protect later.

⁹² The Center for Technology Development & Agricultural Extension (CETDAE) was a part of the FCRI prior to its attachment to VAAS in 2010, as such some applications prior to its independence are tagged as Center for Technology Transfer and Extension under FCRI.

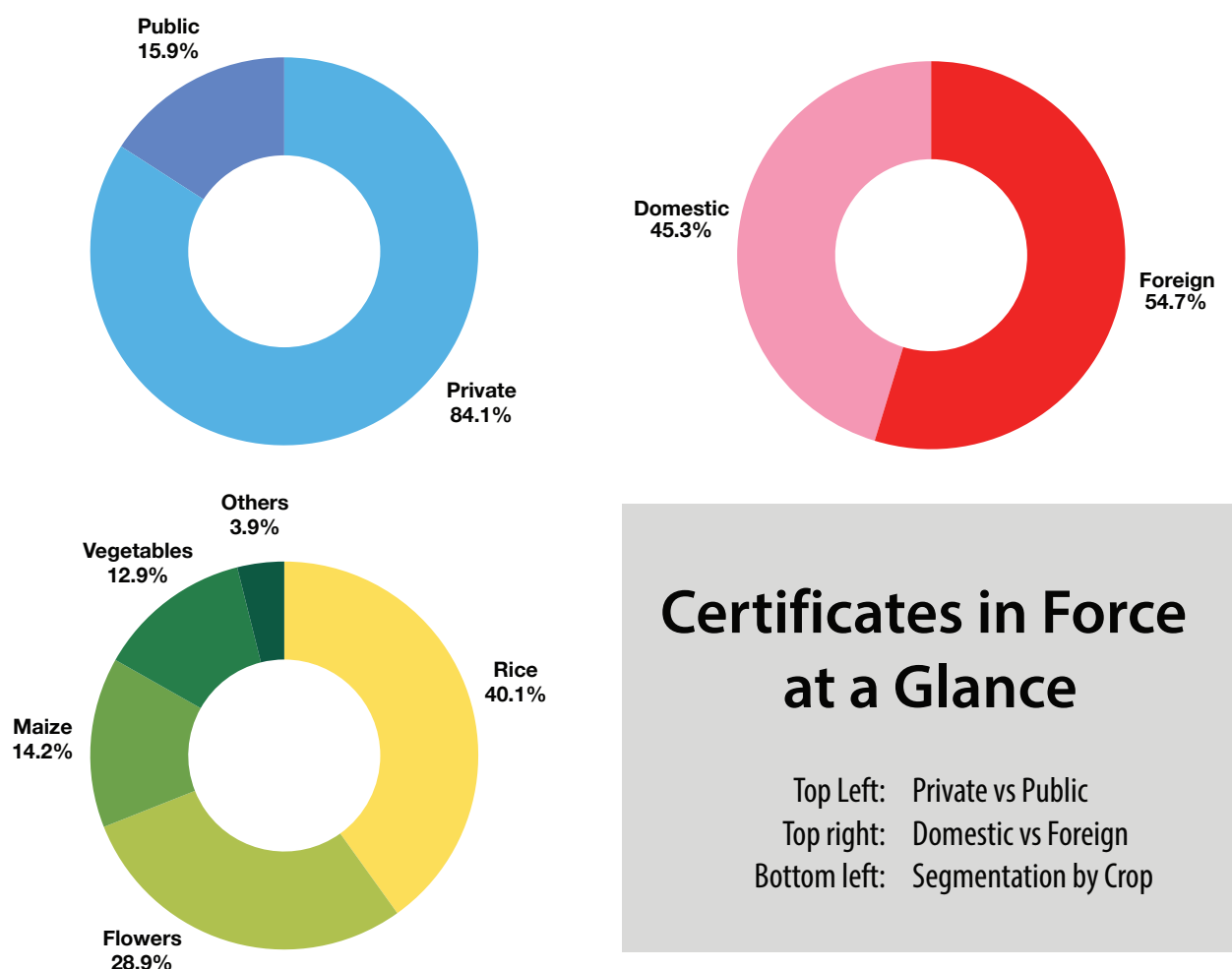


Figure 10. Total PVP certificates in force by the end of 2015

Table 3. Summary of all PVP certificates in force by the end of 2015

	Foreign	Domestic	Total	Public	Private
	127	105	232 (100)	37	195
Rice	13	80	93 (40.08)	31	62
Flowers	67	0	67 (28.88)	0	67
Maize	21	12	33 (14.22)	4	29
Vegetables	22	8	30 (12.93)	0	30
Fruits	4	1	5 (2.16)	0	5
Others	0	4	4 (1.72)	2	2

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C. PVP in Vietnam – Cancelled Certificates

For cancellations, 1 in 3 domestic certificates and 1 in 2 from the public sector results in its eventual cancellation. This is significantly higher than foreign and private sector counterparts.

Based on the available data of cancelled certificates, 70 PVP certificates have been cancelled by the end of 2015, or 30% of all granted certificates, but the cancellation rate is higher for domestic and publicly owned certificates. Presented in Table 4 is the summary of all cancelled PVP certificates, showing that a majority of revoked PVPs are domestic in origin, with almost an equal number between public and private entities. Overall, almost 60% of cancelled certificates is for rice, followed by flowers (including other ornamentals) and maize, fruits, rounded up by about 7% comprising vegetables and others.

Table 4 above shows a seemingly equal status between public vs private and foreign vs domestic entities in terms of cancellation, but a closer inspection shows a different story. Subjecting the number of cancelled certificates vis-à-vis the total number of granted certificates reveals a discouraging result – almost 1 in 3 domestic certificates (45 cancelled out 150 total granted), and half of all public RDIs granted certificates result in cancellation (37 cancelled out of 74 granted to the public sector). This is significantly higher cancellation rates when compared from foreign entities at 16.4% and private entities at 14.4% respectively.⁹³

Cancellation of certificates may be due to failure of payment for the annual maintenance fee or a voluntary withdrawal of the protection by the owner. The specific reason for all cancellations is not available in the PVPO website, but based on the cancellation announcements, almost all of them are due to failure of payment of the annual fee. On the other hand, requests for withdrawal of protection may be due to the anticipation of possible losses of revenue based on market assessments. PVP applicants, especially true for private entities, may quit paying the annual fee once it is predicted that PVP will have marginal effects on their profit or once a better, more marketable variety has been developed; thus the certificate owner may either voluntarily withdraw or simply allow the protection to lapse.

The public sector experiences the bulk of cancellations of all domestic certificates (37 out of 45 certificates cancelled, or 82%; thus only 8 out of 45 certificates are from domestic private companies, please refer to table 4), and is almost exclusively due to failure of payment of the maintenance fee. This implies that not all protected varieties eventually perform well in the market. The cancellations from the public sector are mostly on rice, reasonably because applications are also concentrated on this crop. Figure 12 shows that that on the very few attempts on protection from the public sector to other crops, most have been discontinued.

⁹³ Total granted certificates is a combination of all in force and cancelled certificates. Please refer to tables 3 and 4 for values related to this calculation. Total granted certificates for all foreign entities is 152; for all domestic is 150, for all public is 74; and, for all private is 228. We get the rate of cancellation by dividing the number of cancelled certificates over the total granted certificates.

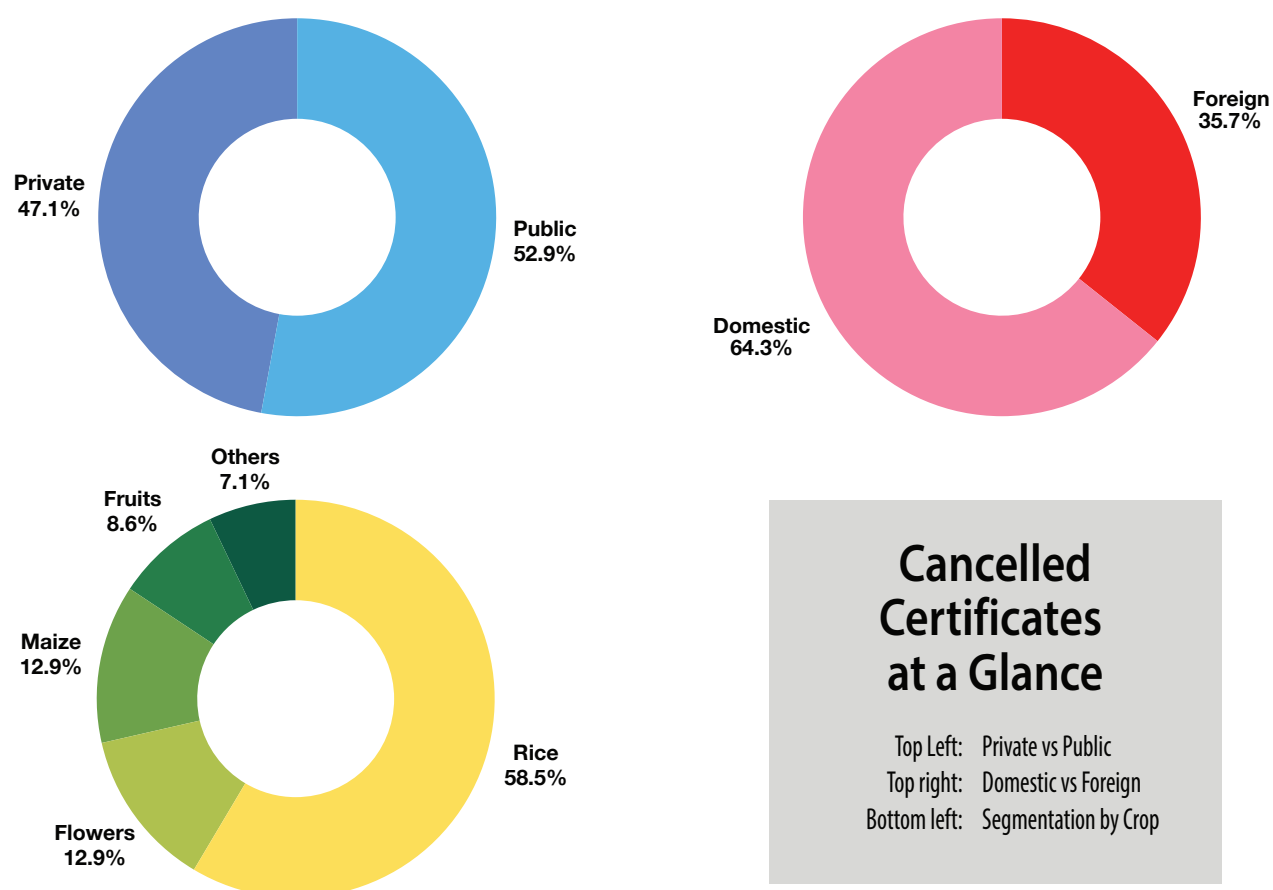
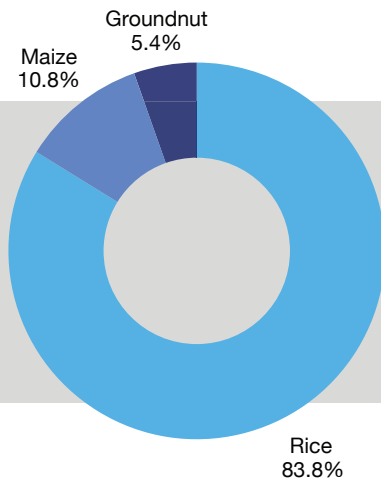


Figure 11. Total PVP certificates cancelled by the end of 2015

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	Foreign	Domestic	Total	Public	Private
	25	45	70	37	33
Rice	9	32	41	26	15
Flowers	8	1	9	1	8
Maize	7	2	9	2	7
Fruits	0	6	6	5	1
Vegetables	1	1	2	1	1
Others	0	3	3	2	1



CERTIFICATES IN FORCE

A total of 74 PVP Certificates were awarded to the public sector. Half of these certificates remained in force by the end of 2015. the certificates were only for three different crops, still concentrated on rice (31); the two others were maize (4), and groundnut (2).

CERTIFICATES CANCELLED

The other half (37) of the certificates were cancelled - rice (26), fruits (5), maize (2), with 1 each for potato, flower, and groundnut. All applications for fruits and the single applications for both potato and flower were eventually discontinued.

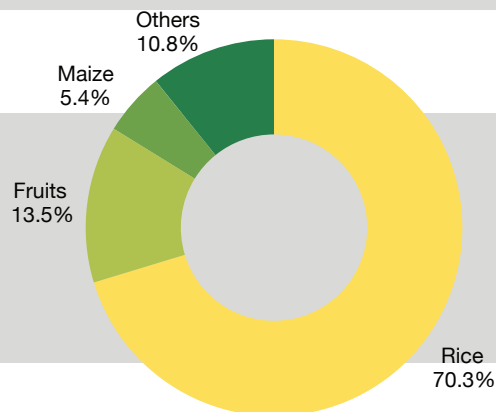


Figure 12. PVP certificates in force and cancelled from the domestic public sector (2007-2015)

In sum, the PVP system in Vietnam is clearly directed at strengthening the private sector, stirring the interest of both domestic and foreign companies. Domestic actors, both public and private, concentrate on rice, while foreign entities dominate in specific crops like maize, flowers and vegetables. As

evidenced by these assessments, the interest on PVP is becoming crop-specific, narrow, and limited – leaving R&D for other crops possibly neglected as breeders will be inclined to pursue varietal development on crops which they can protect later.

III. The Consequences of Plant Variety Protection in Vietnam

The assessment of PVP implementation is merely scratching the surface and does not provide the complete picture. Beyond the statistics are the lasting consequences that has been changing the landscape of varietal development and the seed supply system in the country. In the preceding chapter, we tried

to capture the challenges facing Vietnam's seed sector. It is imperative to present how PVP as it currently exists and is being implemented aggravates the situation, along with its lasting impacts on the actors that are often overshadowed by the exaggerated claims of its proponents.

PVP as an alternative source to research funding

As presented in the second chapter of this report, one of the fundamental issues that confront agricultural research in general, and varietal development in Vietnam in particular, is the lack of funding. As such, it is rational for the affected institutions to seek other sources of funds to allow for the continuity of their plant breeding and other R&D activities. It is apparent that the government's primary motivation in implementing varietal protection is its promise of economic incentives that the state cannot fully provide – both to the RDIs and to the plant breeders alike.

This is achieved by entering into contracts for the transfer of ownership of the new varieties to private entities – either the full entitlement of the variety or the right to seed distribution. The first option provides full ownership of the variety to the private sector with a one-time payment;⁹⁴ in the second, the research institution remains as the variety owner where companies remit an agreed license fee based on the total seed sales.⁹⁵ The latter is preferred by the plant breeders, and is based on mutual trust in the accurate reporting of seed sales wherein 70% of the license fee goes back to the breeding institution (RDI) and 30% to the individual plant breeder/s.

After deducting the cost of resources used for the development of the variety, taxes, and other related fees, plant breeders usually end up taking home around 5%. The entire process is based on the assumption that payments on premium of the varieties developed that are plowed back to the originating institution are used to fund more researches, and thus further encourage plant breeders to develop more varieties. However, a major consequence of this arrangement is that it drives research institutions to depend on private partnerships for their survival, rather than viewing them as complementary source of funding.

Citing promising economic benefits from PVP, some plant breeders opt to sell the varieties that they developed outright. Although such benefits may be a small percentage of the potential profits, breeders consider them as “better than nothing”, hinting that the incentive system from developing new varieties is purely financial.⁹⁶ The lack of recognition and comprehensive incentive system in place, as well as the modest government salary drive some plant breeders to accept the existing system.

⁹⁴ The transfer of ownership can be made before the application for protection, thus once protected we can no longer track the institution involved in its development. CLRRRI based on the interviews for example, shared that they conduct conventions where private companies can select varieties they want to purchase, and reported 10 varieties of full ownership transfer without disclosing the details. There is only one variety initially protected that was eventually transferred to a private company that we can track from the data of the PVPO – DT121, a saline tolerant rice from IAS which was sold to SSC.

⁹⁵ Seed distribution can also be location specific, thus multiple contracts with seed companies can be simultaneously in force.

⁹⁶ Tin, Huynh Quang, et al. *Prospects for Scaling Up Crop Breeding Capacities of Seed Clubs in Vietnam*. Philippines: Southeast Asia Regional Initiatives for Community Empowerment. 2020.

PVP becomes mandatory

PVP application for new varieties developed has become a part of the mandate of RDIs. They must strictly follow the government directive on protection should resources allow for it. These institutes are also expected to promote the new varieties and facilitate technological transfer to seed companies;⁹⁷ this pushes for the inevitable reorientation of the goals of RDIs away from plant breeding activities with deep interrelation to broad aspects of agricultural development characteristic of R&D in developing countries. In its stead, it encourages a system of varietal development obsessed with assessing marketability of crops, promoting and seeking funds for the protection of varieties,

driving research away from crops that are considered not profitable.

These institutions are even burdened with implementation of the PVP Law. In fact, several RDIs under VAAS are the assigned testing centers of the Department of Crop Production (DCP) for Distinctiveness, Uniformity and Stability (DUS) testing of certain crops.⁹⁸ Additionally, due to the structure of RDIs working on multiple crops with overlaps, competition is expected – rather than encouraging the harmonization of plant breeding activities responsive to agrobiodiversity, climate change adaptation, among many others.

PVP has no real evidence in bolstering R&D for all crops

It appears that PVP's intended outcome of bolstering research and innovation on all crops does not match the actual results. The implementation assessment shows that varietal protection has been working contrary to its promises and has become very crop-specific, and highly concentrated on rice; this has a negative effect on varietal development of other crops. Only RDIs working on rice receive significant attention

on plant breeding and augmentation of funding, since it is a crop with a sure and significant market, with rice being a staple food of Vietnamese people. Moreover, the country is the second biggest rice exporter in ASEAN, and remains in the top three in the world.⁹⁹

The result has become evident on plant breeders. It is not just motivation, but what

⁹⁷ CLRRRI for example is conducting periodical summits to invite private companies to purchase their rice varieties.

⁹⁸ Department of Crop Production. (2018). PVP and DUS System in Vietnam. Retrieved from: http://eapvp.org/files/report/docs/myanmar/20180122/Topic2-2c_PVP%20and%20DUS%20system%20in%20Viet%20Nam.pdf

⁹⁹ Vietnam is second to Thailand in the ASEAN Region in rice exportation, and third in the world after India and Thailand. A recently published report from Reuters show that Vietnam imported Rice from India for the first time in years but mainly for animal feed. It remains however, that the three countries will retain their position in rice exportation for the years to come, as they have done so in the last two decades.

OECD/FAO, OECD-FAO Agricultural Outlook 2020-2029, OECD Publishing, Paris/FAO, Rome, 2020. <https://doi.org/10.1787/1112c23b-en>.

Jadnav, Rajendra & Khanh, Vu. EXCLUSIVE-Vietnam buys Indian rice for first time in decades - industry officials. January 2021, Reuters. Retrieved from: <https://www.reuters.com/article/india-vietnam-rice-exports-idUSL4N2JF214>

Observation for Economic Complexity. Rice, top exporters from 2000-2020. Retrieved from: <https://oec.world/en/profile/hs92/rice?yearSelector1=tradeYear17>

happens to the breeders themselves – those who focus on rice get some financial rewards from their work, while those who conduct R&D on other crops do not. Those focusing on rice are drawn to PVP due to the economic benefits from varietal protection, while those working on other crops lament the little to no attention to their crop specializations, and as such likewise see little or no real benefits at all.

Vietnam's RDIs have continuously conducted plant breeding activities, with some bright spots and achievements as presented on Chapter 2; this development cannot be simply attributed to the PVP Law. We reiterate that crop development is an aggregation of complex factors, of which plant breeding is only one of them. We can use cassava as an example to illustrate this point: primarily grown in areas experiencing water scarcity in the rural highlands, it has achieved increasing productivity over the years. Recent studies show that the yield development of the crop is supported by a strong informal seed system network and R&D focused on broad aspects of crop development.^{100 101} Sweet potato has also shown promising productivity, arguably due to the crop diversification system being adopted. Both cassava and sweet potato have achieved increasing yields without any single application for plant variety protection. Data on the national yield averages of main crops can be revisited in Chapter 1 (Figures 1-4).

For vegetables, national RDIs work on varietal development not because of PVP but due to the strong mandate of the institutions involved. In reality, there is a large number of plant varieties developed by these institutes which are made available for crop production, but only a fraction of these gets protected due to the attendant costs. And as previously mentioned, R&D on other crops are negatively affected due to focus on the more marketable crops.¹⁰² The competitive advantage of foreign companies in breeding of certain crops such as maize, vegetables and flowers/ornamentals is simply reinforced in a country with no evidence of genuine contribution to improving plant breeding in Vietnam on these crops.

The findings discussed above are contrary to other studies claiming PVP's role in the development of productivity of such crops (maize, vegetables, and flowers) and stimulating plant breeding activities in all crops. This, among many other claims will be discussed in further detail below.¹⁰³ Nevertheless, it can be expected that PVP applications from the public sector will continue to increase and still highly concentrated on specific crops, without assurance that the granted certificates will be kept.

¹⁰⁰ see Delaquis E., et. al. *Raising the Stakes: Cassava Seed Networks at Multiple Scales in Cambodia and Vietnam*. *Front. Sustain. Food Syst.* 2:73. 2018. doi: 10.3389/fsufs.2018.00073

¹⁰¹ see Malik A., et. al. *Cassava breeding and agronomy in Asia: 50 years of history and future directions*. *Breeding Science Preview*. 2018 doi: 10.1270/jsbbs.18180

¹⁰² The FCRI website for example, reveals a wide array of plant varieties developed, only a handful of these are protected. http://fcri.com.vn/cat_sanpham/cac-giong-dau-do/; you may visit the websites of other RDIs to check on the varieties they develop.

¹⁰³ see Noleppa, S. *The socio-economic benefits of UPOV membership in Viet Nam: An ex-post assessment on plant breeding and agricultural productivity after ten years*. 2017.

PVP has negative effect on accessibility of seeds

Public researchers have the genuine intention of increasing farmers' incomes by promoting the adoption of varieties developed, although they agree that private companies benefit the most from the PVP Law. But the reality is, once rights have been transferred to the private companies, the crop breeders and the institutions they represent no longer have the capacity to decide on and control the price of the seeds. The price of the seeds which is highly speculative becomes the sole discretion of the PVP certificate owners, which are in many cases private companies that bought the rights to the varieties.

The leading domestic seed company in Vietnam estimates that the average seed price increase from their PVP products is about 115%¹⁰⁴—and this, given its advantage of already having lower prices compared to its competitors.¹⁰⁵ Furthermore, of the 35 total PVP certificates that it held, a significant proportion were transfers of

ownership and only 10 were actually developed by the company. This magnifies our previous point on the limited contribution of varietal protection to R&D. Experts from RDIs also estimate seed prices of protected varieties to be double or even higher and are aware of the threats on the accessibility and affordability of these seeds. They also commented about the possibility of some farmers giving up their lands to seek other sources of income due to rising costs of agricultural inputs, seeds included.¹⁰⁶

In some instances, the added premium on seeds is shouldered by seed centers. They try to cushion the price shock resulting from PVP by providing small farmers with around 30%-70% subsidies of the seed prices. The rate of subsidy varies with the socio-economic conditions in the communes under each seed center.¹⁰⁷ But as these seed centers undergo privatization, the removal of such subsidies in the future is a very distinct possibility.

PVP marginalizes the smallholder farmers

Prior to the enactment of the UPOV-style PVP Law in Vietnam, farmers were free to save, exchange, and sell seeds among themselves. The farmers' seed system and the farmers' rights embedded with it was at the backbone of Vietnam's seed system – a time-tested practice of smallholder farmers in most developing countries. After 2006, although the practice of seed saving has been maintained,¹⁰⁸ the

exchange and trade of seeds was prohibited under the PVP Law. This breaks the dynamism that defines the farmers' seed system which is strengthened by the social practices of exchanging and selling seeds through their informal channels.

There are attempts to dampen such effects through the mediation of existing structures embedded in Vietnam's

¹⁰⁴ see Vinaseed Group. *UPOV in Vietnam: A Case Study of the Vinaseed Group*. Retrieved from: <http://eapvp.org/>

¹⁰⁵ see Tin, Huynh Quang, et al. *Prospects for Scaling Up Crop Breeding Capacities of Seed Clubs in Vietnam*. Philippines: Southeast Asia Regional Initiatives for Community Empowerment. 2020.

¹⁰⁶ *Ibid.*

¹⁰⁷ *Ibid.*

¹⁰⁸ Vietnam Intellectual Property Law of 2006, Article 190 states the limitations to the right of a plant variety protection certificate holder, (d) Production households may use the harvested products of the protected variety for propagation and cultivation in the next season in their own field. While there is no limit to the quantity and type of crop, exchange and selling among farmer networks are no longer allowed.

agricultural system. As previously mentioned, the price increase from seeds are mitigated by other government institutions at the local level through seed subsidies. However, there is no data available on which varieties are being used by farmers, which ones are being subsidized, and for how much. Nevertheless, the anticipated increase in seed prices have negative effect on seed accessibility to farmers. These subsidies which are provided on a case to case basis are stop-gap solutions, and the ongoing privatization and restructuring threatens the existence of this lifeline.

The limitation put on exchanging and selling seeds produced by farmer breeders seriously curtails the potential of the farmers' seed system, not to mention stopping a traditional practice itself that has served farm families for generations. The efficient distribution of seeds (via exchange and sale at local markets) is severely hampered and as a result the price also increases. The Breeders exemption would still allow breeders, including farmers, to use the protected varieties as parent materials for cross-breeding. However, this possibility is not available for selection breeding due to Art. 187 of the Vietnamese Intellectual Property Law.¹⁰⁹ In particular, the formulation "Plant varieties which originate

mainly from the protected plant variety" (named essentially derived varieties in other laws) is very difficult to interpret, even by experts. The great uncertainty about their rights leads farmer-breeders to exclude protected varieties from their breeding work altogether.¹¹⁰

The above proscription is in addition to the existing challenges of huge costs and the stringent technical requirements related to certification. PVP concentrates plant breeding of certain crops to a very few companies, worsened by the RDIs' active transfer of a few of their own to the private sector, and within the legal framework, leaves very little room for the development of the farmers' seed system. The initial successes in the acknowledgement and recognition of the robust farmers' seed systems is slowly being overturned, and farmers are being largely excluded from the varietal development process.

The ultimate criticism is that Vietnam's PVP Law has relegated farmers to the role of mere consumers or end-users, removing their active participation in filling the gaps in their communities' seed supply. The limitations posed by varietal protection restricts the inherent rights of farmers to seeds and only grants partial recognition of their capacities..

IV. A Closer Look on Claims of Success of the PVP Law

Noleppa's (2017) study on the socio-economic benefits of the UPOV in Vietnam is the basis of various articles, statements and presentations by adherents to the UPOV 91- style PVP Law. The study has conclusions that are arbitrary and can potentially draw other countries towards adopting the law using these inconclusive

arguments; as such, it is important to examine its claims. The study provided 13 overstretched conclusions on the supposed benefits of the PVP which we will analyze with our alternative explanations.

We summarize these claims and point out similar findings as well as divergent

¹⁰⁹ Article 187 (as amended in 2009). Extension of rights of protection certificate holders, rights of a protection certificate holder may be extended to the following plant varieties: 1.) Plant varieties which originate mainly from the protected plant variety, unless such protected plant variety itself originates from another protected plant variety. A plant variety is considered originating from a protected plant variety if such plant variety still retains the expression of the essential characteristics resulting from the genotype or combination of genotypes of the protected variety, except differences resulting from impacts on the protected variety; 2.) Plant varieties which are not definitely distinct from the protected plant variety;

¹¹⁰ see Tin, Huynh Quang, et al. Prospects for Scaling Up Crop Breeding Capacities of Seed Clubs in Vietnam. Philippines: Southeast Asia Regional Initiatives for Community Empowerment. 2020.

views condensed to three arguments which may be the basis of further research. First, we subject the claim of successes in the PVP application to a more thorough investigation of the cross-sectional data on its implementation. Then, we dissect the attempts on attributing Vietnam's agricultural development to the UPOV-style PVP. Lastly, we present the contradictions and alternative views of various stakeholders drowned by the seemingly uniform and positive acceptance of the PVP Law.

First, the proponents present their main findings on implementation – a steep increase in PVP application and certificates issued in Vietnam, highlighting the dominance of domestic breeders in the application process. They also use this argument to leverage the assumed benefits of stimulating the plant breeding activities in the country, along with other socioeconomic benefits by comparing the first and second half of the decade since the implementation of the PVP Law. The study notes that half of the total applications are focused on rice with the private sector dominating the total number of applications, with the assumption of increased availability of resources, plant materials, and technology from foreign applications.

On the surface, the data from the PVP Office do seem to lead us to generally conclude that the domestic and private entities dominate in terms of applications. However, we recall from our own findings that by carefully looking at the cross section of the data across crops, domestic applications are highly concentrated on rice, while the foreign ones have significant advantages in maize and vegetables, and almost exclusively on flowers and ornamentals. The other study also misses

out on presenting the entire picture by omitting the analysis on which of these applications were eventually granted a certificate, and which ones were maintained or eventually led to cancellation. From our findings, foreign firms had the edge in the percentage of certificates in force over their domestic counterparts; they also held a significant advantage in retaining their PVP certificates.

The frame of comparison using the first and second half of the decade of implementation is simply an internal assessment that attempts to overvalue PVP implementation in Vietnam. The applications will logically increase, since there was no varietal protection system in Vietnam prior to 2006,¹¹¹ and upon the implementation of PVP, protection became mandatory for government-funded institutions such as public RDIs. Needless to say, all the RDI-bred varieties would have been developed otherwise, with or without PVP – as the research institutes have already been releasing new plant varieties long before 2006. Thus, it is inaccurate to say that the new varieties would not have come to being without the PVP.

Furthermore, we have to consider the fact that a successful plant breeding cycle, that is, from initial crossing to certification, takes a very long time and varies significantly depending on the crop. It is then logical to say that most of the plant varieties analyzed in the implementation cannot simply be due to the UPOV-style PVP. The most glaring issue is, other than looking at data on applications, there was no evidence presented to support the claims of PVP's contribution to plant breeding activities. Through interviews with the leading public RDIs, there is inconclusive evidence on increased activity in plant breeding. To the untrained eye and without

¹¹¹ Vietnam initially created a PVP Law in 2004, but was immediately replaced with the UPOV-style PVP, 2 years after.

careful examination of the analysis in the Noleppa study, anyone can be swept by the promises of the UPOV-style PVP Law.

Second, by analyzing the productivity of the main food crops in Vietnam, the study attributes these developments to the implementation of the UPOV-style PVP Law. Using the academic consensus on the total factor productivity, the study presents imagined values of potential market loss for rice, maize, and sweet potato. It goes further by converting these values to figures that touch on one's social imagery – food that could have been used to feed and nourish the population: “If all the added tons were consumed as food, the additional rice alone would be sufficient to feed 20 million Vietnamese people. The extra corn (maize) could nourish more than the entire population of the country, and the additional sweet potato could feed 74 million people.” (Noleppa, 2017, p. 40).

This computed potential market losses and subsequent social imagery is absurd because for one, it is unrealistic. We can present some realities to contend with these absurdities – Vietnam is a rice-exporting country and any excess from its production is likely to end up as export;¹¹² the country's maize production is directed towards its growing livestock industry – in fact, it is one of the fastest growing importers of corn in the world and the leading importer in Southeast Asia;¹¹³ its sweet potatoes are also largely for export and Vietnam has been consistently among the top exporting countries from Asia.¹¹⁴ But what is more disconcerting being the Noleppa study's attempts to attribute the entire “innovation-

induced development” using yield improvement of crops to the UPOV-style PVP Law. In other words, the study constructs a causality between crop yield increases and the UPOV membership where there is none.

It must be underscored that plant breeding is necessary, but a UPOV-style PVP Law is not a fundamental prerequisite for agricultural development. In fact, sweet potato which was mentioned in the study showed consistent yield increases even without a single PVP application from 2006-2016, and was performing well even prior to 2006. We can extend this analysis to cassava, an important food and industrial crop, which has also shown incredible yield performance – again, without any PVP application.

The calculation and applicability of the total factor productivity used in the analysis, or sometimes called multi-factor productivity, is an active area of research, with debates primarily aimed on its philosophical assumptions and generalizations.¹¹⁵ The deliberations on its applicability can be discussed elsewhere and will not be further elaborated in this paper. Nonetheless we maintain that its calculations cannot fully capture not only all the inputs in agricultural production but also their complex interactions. Additionally, it fails to take into account public infrastructure, management quality, organizational capacity, among many other factors that Vietnam has consistently invested on. These investments were made through programs in its comprehensive rural development program and

¹¹² OEC database on rice exports; OECD-FAO Agricultural Outlook 2020-2029; You may also refer to note 95.

¹¹³ Unites States Department of Agriculture, Economic Research Service Project. Vietnam to continue leading the Southeast Asian countries in importing corn for its growing demand for livestock, particularly pork. Retrieved: <https://www.ers.usda.gov/amber-waves/2019/april/southeast-asia-s-growing-meat-demand-and-its-implications-for-feedstuffs-imports/>

¹¹⁴ OEC again shows that Vietnam has consistently been a top exporter of sweet potatoes (fresh or dried) in the world. The year-to-year visualizations can aid readers, and information on other crops and goods can be found in their website. Retrieved from: <https://oec.world/en/profile/h592/sweet-potatoes-fresh-or-dried?yearSelector1=tradeYear3>

¹¹⁵ Felipe, Jesus and McCombie, John S. L., Is a Theory of Total Factor Productivity Really Needed? *Metroeconomica*, Vol. 58, No. 1, pp. 195-229, February 2007, Available at SSRN: <https://ssrn.com/abstract=962214> or <http://dx.doi.org/10.1111/j.1467-999X.2007.00265.x>; OECD. Measuring Productivity measurement of aggregate and industry-level productivity growth. 2001. Retrieved from: <http://www.oecd.org/sdd/productivity-stats/2352458.pdf>. US Bureau of Labor Statistics. Overview of MFP. Retrieved: <https://www.bls.gov/mfp/mprover.htm>

cooperatives development, especially after adopting *Doi Moi*.

While we agree that innovation is an integral element of agricultural development as we presented in the first chapter, the fundamental factors - land distribution, development of cooperative system, water management, crop diversification etc., continue to interact and develop over time, looking at them only at isolation does not work. Furthermore, as discussed in the second chapter, we have seen that the structure of the national research institutions, and their critical potentials in continuing plant breeding activities with targeted solutions and were well on the way to achieve considerable successes, integrating broad aspects of agricultural development.

It cannot be simply ignored that the yield development in rice shows a strong reliance on the government's investments on water management and building of canal and irrigation systems.¹¹⁶ Vietnamese experts also consistently report that key drivers in crop development include reforms and policies pertaining to land, science and technology, infrastructure, and market expansion which were simultaneously implemented in the country. For instance, the massive land reform program that the government aggressively mounted in the early 1990s was shown to be positively correlated with increased productivity for crops, and most especially for rice.

The Noleppa study also applied the same analysis and calculations to horticulture and floriculture, even with the absence of conclusive figures on production and land use. It repeatedly attempted to attribute the economic gains in these areas to Vietnam's UPOV membership, and we can apply the same arguments that we already

made previously. We can recall the cross-sectional data on PVP applications (see Tables 2 and 3) showing an apparent dominance of foreign entities in these crop categories. We may attribute the value of trade in floriculture partly to certain policies and agreements not necessarily to PVP, and the promise of contributing to plant breeding activities related to flowers/ornamentals remains unsubstantiated. The figures on horticulture (fruits and vegetables) in the tables mentioned suffer from the same blanket generalizations.

In sum, we emphasize that crop development is multifactorial, and innovations such as plant breeding is significant, but constitutes only a part of the numerous interventions at play. Further, plant breeding is a necessary ingredient, but that a UPOV- style PVP Law is not a fundamental prerequisite to agricultural development. Worth noting is the fact that record productivity increases were achieved in some crops despite the limited R&D funding and without a single application for varietal protection. Lastly, it follows that any quantitative changes in production, consumption, and sectoral income must not be haphazardly attributed to Vietnam's UPOV membership.

Finally, based on testimonies of various stakeholders, the study concludes and implies a promising future for Vietnam's plant breeding sector under the UPOV system, even adding that the data it presented may be a conservative approximation. Contrary to this view, we see that the unsubstantiated quantification of the benefits and their arbitrary attribution to the PVP Law are overstretched statements that singularly aim to bolster the image of UPOV.

¹¹⁶ GSO. *Results of the Rural, Agriculture and Fishery Survey. 2011 & 2016.*





Conclusion and Recommendations:

Vietnam's experience is a cautionary tale that presents a compelling case for us to rethink the arbitrary colonial importation of the Plant Variety Protection system offered by the 1991 Act of the Convention of the International Union for the Protection of New Varieties of Plants. It reveals the threats that exacerbate the vulnerability of the already disadvantaged smallholder farming populations in Vietnam, and possibly in most of Asia. In this study we have carefully looked into the intricacies and complementation of the factors of agricultural development, the structure and challenges of the seed sector vis-à-vis the quantitative and qualitative analyses of the PVP implementation in Vietnam. The results of this study, contrary to others that have been attempting to bolster the image of UPOV, uncovers the realities behind the PVP's false promises of prosperity.

Vietnam's own experience in the cultivation of its main crops clearly shows the complexity of indicators of crop development. The concise presentation of the impacts of each factor presented in the first chapter of this research, are only attempts on exploring its complexities and impacts. Continuous research is required to fully capture the magnitude or extent of each, how they interact, and their contribution to the country's overall agricultural development. Nonetheless we can see that a strong and consistent government support, pursuing multiple and

simultaneous forms of intervention, is needed to advance the country's agriculture sector.

Vietnam's formal seed system is highly influenced by the private sector, which is understandably oriented toward the commercialization of seed supply. This has the tendency to drive plant breeding to a select number of crops – those that bring higher profit margins. RDIs, by their very mandate, continue to work in areas that the private sector does not find attractive (i.e., “marginal” or neglected crops that do not bring in profits) with the assumption that these institutes use different metrics like ecological and socio-economic considerations rather than just plain economic ones. As we have seen, the role of the public R&D sector is more pronounced in varietal development in a wide range of crops while the private sector is heavily focused on the distribution side of the chain. RDIs of the developing world then, have the potential to strike a balance and has been historically important in national seed development. RDIs' activities can be critical to the agricultural plant biodiversity conservation, climate change mitigation, socio-economic development of smallholder farmers and national food security.

The structure of Vietnam's national RDI is uniquely designed to respond to the country's needs. Several institutions are

simultaneously pursuing agricultural research and plant breeding activities, and are dispersed almost evenly among its regions. The geographic area and specialization of each research institute is defined by the people's needs and the important crops grown in each locality. The potential of these institutes are curtailed not by their structure, but by the insufficient public spending on agricultural research which result in reliance to private funding which inadvertently, but at times consciously, affect their objectives and mandates.

With this in mind, it is therefore necessary for developing countries like Vietnam to continue taking primary responsibility for varietal development. This will ensure a holistic approach to breeding work, with no essential crops being left behind, especially those utilized by the more vulnerable sectors of society. While private funding for public research can be explored as suggested by international organizations citing developed countries as models, this option must remain complementary rather than the primary source (of funds); the structure of R&D and availability of capital is vastly different in the developing world.

This highlights the attention and support that the government needs to provide not only to RDIs, but also to the provincial seed centers that play a special role in the country's seed system. With a specialized role in seed distribution, the seed centers can act as a strong foundational support to farmer-developed varieties and maximize the potential of

farmers' seeds systems in the seed supply.

Plant breeding has been consistently and successfully performed in Vietnam by several research and development institutions, and its continuous development does not need a UPOV-style PVP law. We again underscore that record productivity in main crops was achieved by the country despite the lack of funding in research and with some crops not needing any single application for varietal protection.

Moreover, the formal seed system which these institutes are a part of should serve to complement rather than compete with the farmers' seed system. A balance should be achieved especially considering the mandate of public research and how seeds should remain a public good. While it is widely acknowledged that farmers' seed systems sustain a majority of the world's agriculture, more pronounced in the developing world, it is unfortunate that little has been done to develop this sector; a significant number of policies and programs still tends to work against the farmers' seed system. The promising potentials of a robust farmers' seed system, although recognized and flourishing in Vietnam, is still far from being a national priority and contrary to claims, is continually being threatened by the UPOV-style PVP Law. In consideration of the facts presented, we offer a few recommendations for Vietnam, as well as other countries considering accession to the UPOV.

1. Increase Public Funding for Research and Development

With sufficient government support, public RDIs will not have to rely on private funding for their survival, but as a complementary resource for them to draw on. Forcing these institutions to seek private funding by cutting back on their funds distorts organizational mandate, objectives, and priorities with their agenda being highly influenced by the private sector. RDIs must continue to treat plant genetic resources as a public good. With adequate government funding, crop breeding work by public institutes are expected to focus on the conservation of agrobiodiversity and respond to the needs of the smallholder farmers treating them as co-equals or partners of development rather than consumers of agricultural products.

RDIs are usually associated with the formal seed system, focused on the technical aspects of seed development, but they also have the capacity to bridge the formal and farmers' systems together. In order to fully achieve the full potential of its RDIs, Vietnam must augment its R&D spending to support the several institutions directly working with farming communities. A greater budget for public R&D will enable the complementary work of plant breeding institutions and seed centers to provide a holistic response to immediate and long-term needs, which has the capacity to go beyond seed supply.

2. Establish a comprehensive system of benefits and incentives for researchers and plant breeders

In coherence with increasing public funding on R&D, establishing a comprehensive system of benefits and incentives for researchers and plant breeders is necessary to motivate them, which is instrumental in ensuring that the R&D for all crops will continue. Other than monetary incentives, the recognition of work must be in place to reward public researchers for their efforts. A

comprehensive system would include scientific recognition and providing ample opportunities for further studies which could further inspire researchers in their work of genuinely responding to the real needs of farmers. However, this incentive system should continue to recognize the capacities of farmers in varietal development and should not, in any way marginalize smallholder farmers.

3. Lay the groundwork for the genuine development of the farmers' seed system

The government must enact policies, allocate funds, and implement programs that recognize and strengthen the farmers' seed system. From the experience of the seed clubs in the Mekong Delta, we have uncovered the incredible potential of the farmers' seed system in helping satisfy the seed requirements of local communities. Moreover, the six farmers' varieties developed from these seed clubs that have passed Vietnam's national certification is a testament to the quality of work of our farmers. These farmer-breeders have already developed over

300 rice varieties that they freely share among themselves.¹¹⁷ All these are possible with the collaborative work of academics, local government officials, and agricultural extension workers and can be replicated elsewhere in the country, and elsewhere in the developing world. Ultimately, the rights of the farmers to seeds embedded in the farmers' seed systems, which is an inherent right that existed even before any attempts of legal codification of rights, must at all times be recognized, respected and preserved.¹¹⁸

4. Adopt a sui generis plant variety protection law

UPOV is not the only basis, and arguably not a good model for Plant Variety Protection. Instead of a restrictive UPOV-style PVP Law, Vietnam can adopt a sui generis plant variety protection system as it has been done in other developing countries. A sui generis PVP aims to balance the needs of the stakeholders and will put the emphasis on the development of smallholder farmers and genuinely encourage development and support innovation by the

farmers' seed system – as well as by the formal seed system, in a balanced way. Developing countries, where majority of our smallholder farmers hail from with differentiated and targeted needs, should take appropriate steps in ensuring that the needs of the vulnerable are central to national legislations, programs and agenda – as such a sui generis system is the best path to take.¹¹⁹

¹¹⁷ For a comprehensive discussion of the success and potentials, we urge you to read on our publication. See SEARICE. Securing the Local Seed System: The Journey of Farmers' Seed Clubs in Vietnam Southeast Asia Regional Initiatives for Community Empowerment. 2019. 44 pp.

¹¹⁸ An introduction to legal analysis on intellectual property rights and peasant's right to seeds is available online from the Geneva Academy, likewise, selected readings on similar topics accessed through the website. See Golay, Christophe. Research Brief the Right to Seeds and Intellectual Property Rights. 2020. Retrieved: www.geneva-academy.ch

¹¹⁹ We highly encourage readers especially those hailing from developing countries to turn to a publication outlining possible ways forward for adopting a sui generis PVP. See Carlos M Correa et al. Plant Variety Protection in Developing Countries: A Tool for Designing a Sui Generis Plant Variety Protection System: An Alternative to UPOV 1991, APBREBES, 2015.

