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Discussion Paper No. 7

A Natural Rice Supplier

Summary Discussion Paper on Case Studies of Reduced-input Rice Value Chains in the Greater Mekong Subregion¹

The Discussion Paper Series of the Greater Mekong Subregion's (GMS) Core Agriculture Support Program Phase 2 (CASP2) is a platform for stakeholders of the GMS to examine the current and emerging development concerns affecting the subregion especially on but not limited to, food safety and quality assurance, environmental sustainability, and inclusive agro-based value chains. The papers are posted at the GMS Working Group of Agriculture's (GMS WGA) website (www.gms-wga.org).

The GMS Working Group of Agriculture (GMS WGA) oversaw the development of the discussion papers.

The information and views expressed in the papers are those of the author/s and do not necessarily reflect the official opinion of the GMS WGA.

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Abbreviations

AINS	-	Agriculture Information Network System
ASEAN	-	Association of Southeast Asian Nations
ASEAN+3	-	the ASEAN nations plus the People's Republic of China, Japan, and the Republic of Korea
CASP2	-	Core Agriculture Support Program, Phase 2
CEDAC	-	Centre d'Etude et de Développement Agricole Cambodgien (Center for Study and Agriculture Development in Agriculture)
EBA	-	Everything But Arms
EU	-	European Union
GAP	-	Good agriculture practices
GI	-	geographic indication
GMS	-	Greater Mekong Subregion
ICT	-	information and communications technology
IRRI	-	International Rice Research Institute
Lao PDR	-	Lao People's Democratic Republic
PRC	-	People's Republic of China
SEAP	-	safe and environment-friendly agrifood products
USAID	-	United States Agency for International Development

Note: In this paper, the symbol "\$" refers to the United States dollar.

Executive Summary

Background

The Greater Mekong Subregion (GMS) is a leader in the supply of low-cost and premium rice and of rice products to global markets. The subregion has enjoyed dramatic increases in rice productivity in recent decades. However, this has been broadly associated with considerable intensification through widespread expansion of irrigation, the use of higher-yielding varieties, mechanization, and increasing application of commercial fertilizers and plant protection products, which is well-documented. The negative impacts of increased application of intensive synthetic agrochemical products on land quality and local environments in the GMS is also well-recognized, particularly in the most productive agricultural areas. In addition, rejection of rice consignments due to the presence of agrochemical residues threatens to decrease access to lucrative export markets for GMS rice.

The GMS countries share porous land borders and the volume of paddy (unhulled rice) and rice crossing borders both legally and informally is high and increasing, presenting potential food safety and quality risks to domestic consumers and exporters. Ample demand for high-value rice and rice products exists in markets in the GMS, ASEAN+3, and beyond. Identifying and addressing the current constraints on and opportunities for developing inclusive, safe, and sustainable rice and rice product value chains in the GMS can support food security, livelihoods, and economic development throughout the subregion. There is value in adopting a GMS approach to support the development of more sustainable, inclusive, and safe rice value chains that elicit price premiums in domestic markets and enable greater access to export markets.

Study Design

Case studies of rice value chains were conducted in three locations in the GMS. The objectives were to assess the competitiveness of reduced-input rice production and supply; to identify current constraints and opportunities; and to make policy and investment recommendations to support inclusive, safe, and environmentally sustainable GMS rice supply. The case studies selected were (1) low-input (from suppliers employing organic production practices) rice supply in Battambang Province, Cambodia; (2) organic rice value chains in Roi Et Province, Thailand; and (3) low-input (a system of rice intensification) rice in Chuong My District, Ha Noi, Viet Nam. In each case comparison was made with local conventional rice value chains. A qualitative and quantitative study design was employed involving a detailed review of available literature and secondary data; key informant interviews; three focus group discussions and 80–100 surveys of input suppliers, producers, processors, traders, wholesalers, and retailers in each location.

Issues and Gaps

Value chain efficiency, value addition, and branding and marketing. Inefficiencies in rice value chains continue to hamper suppliers, particularly smallholders operating in highly fragmented chains such as those observed in the Cambodian case study. The lack of market linkages, limited producer organization, and lack of market information means that smallholders in these value chains have little price setting ability in terms of the end product.

Limited availability of quality-assured seed and variable quality of fertilizer and plant protection products hamper productivity. Poor quality seed and unregulated or poorly enforced regulations relating to input standards and constituents and recommended usage lead to suboptimal performance in production and present risks to producers' health, local environments, and product safety.

The limited use of reliable moisture meters in assessing paddy quality and value continues to inhibit fair negotiations at the farm gate. Downstream, access to dryers is often limited in less well-

developed areas of the GMS and milling quality varies considerably. This was observed in the Cambodian case study and, to a lesser extent, in Thailand. In Cambodia, the costs of postharvest services and distribution are onerous due to high utility rates and weak transport infrastructure and competition, which reduces margins the length of value chains.

While there has been considerable consolidation in rice value supply in the GMS, in remote areas smallholders often continue to cultivate small areas and exist in fragmented value chains with weak linkages both up- and down-stream. This limits delivery of extension services and limits access to economies of scale on inputs. Furthermore, limited capacity to dry and store paddy can force producers to sell at suboptimal times and prices. Greater organization among producers and coordination with actors up- and down-stream can create efficiencies. However, efforts to create greater organization among producers are not new, and novel approaches are needed. There is great potential to increase organization and market connectivity through information and communication technology and e-commerce platforms, but, again, many attempts have been made in this area in recent years, generally with limited success. Approaches need to be developed with inclusiveness and economic sustainability in mind.

Greater coordination and integration of women, smallholders, and small- and medium-scale enterprises in rice value chains can support rural development and drive safe and sustainable rice supply. This can help to revitalize rural areas and reduce the current labor drain to urban centers within the GMS. Contracted supply arrangements may present opportunities to better integrate smaller players but also present risks of less scrupulous players tying producers into unfavorable arrangements. Ethical contractual arrangements must be ensured through appropriate regulatory and legislative oversights that consider inclusiveness and fairness.

Where product premiums do exist they do not necessarily translate into higher prices at the farm gate. The lack of price differentiation is in part associated with asymmetries in access to information and limited production scale and producer organization, where producers are engaged in fragmented chains with ad hoc marketing arrangements. The case studies indicated that the more organized chains with strong producer groups or associations and a degree of vertical integration better rewarded stakeholders along value chains and generated greater trust among consumers, to mutual benefit.

Risk management and safety and quality standards and assurances. GMS consumers recognize product quality and are frequently willing to pay a premium for safety and quality assurances. However, many consumers do not trust current certifications of food safety and quality. Assurances such as GMS geographic indications (GIs), organic systems of rice intensification, and participatory guarantee systems, can be competitive and attract consumers but can require improvements in chain management to ensure product safety and quality and to build recognition and trust among consumers. Safety and quality assured rice can be competitive in domestic markets but improved supply chain management is needed to provide such assurance. Further investment in product traceability from farm to table can help to build consumer trust in suppliers and assurance systems.

Investments. Additional investment in downstream processing facilities is needed to alleviate bottlenecks in rice value chains, such as access to drying capacity. Public–private partnership models could draw in private investment, however, opaque terms and conditions and regulations hamper private investment by raising investor risk—clarity and transparency is needed.

The quality and costs of transport and logistics infrastructure are highly varied within and between GMS countries and suppliers, which limits producers' access to wider value chains and can increase the costs of supply considerably. Linking regions through the continued development of transport and economic corridors can facilitate the flow of raw materials and end products to and from areas with comparative advantages. This can promote inclusiveness and competition and increase the subregion's competitiveness in both least-cost and premium rice markets.

General Recommendations

To enhance value chain efficiency, value addition, and branding and marketing:

- Review and harmonize policy and regulation relating to seed quality and agrochemical inputs across the GMS.
- Promote the virtues of local GMS rice varieties by strengthening current rice GIs and the establishing additional GI protection.
- Continue to fund and direct research and development into reduced-input rice production methods and disseminate findings through subregional platforms.
- Identify best practices in producer organization and innovative approaches to developing market linkages along smallholder-based rice value chains.
- Platforms such as through the Agriculture Information Network System (AINS) 2.0, and novel initiatives that draw on other sectors, such as the “MATCh: Mekong AgTech Challenge” are ripe for developing new ways of building social capital and creating and disseminating technical and market-related information.
- Investigate opportunities for further value addition, such as pre-prepared products and novel uses for byproducts, and establish joint branding and marketing initiatives among suppliers of safe and environment-friendly rice and rice products subregionally.

To employ risk management and safety and quality standards and assurances:

- Coordinate risk management systems in relation to diseases, pests, and chemical residues as a crucial step toward harmonizing systems between GMS countries.
- Harmonize quality and safety assurance standards and regulatory environments from inputs through to end products between GMS countries.
- Improve hygiene the length of value chains to improve the safety of GMS rice and reduce the risk of costly rejections of rice in export markets.

To increase investment:

- Catalyze and direct public and private investment in safe and environment-friendly rice-related value chain infrastructure.
- Provide the legislative and regulatory systems needed to ensure transparent and ethical terms and conditions for investment.

Proposed short-term initiatives (2017–2018) are:

- (1) Establish access to extension materials on reduced-input rice and marketing through AINS 2.0. Identify areas for potential collaboration with the “MATCh: Mekong AgTech Challenge” on specific communication and data-related solutions to social, technical, and market-related bottlenecks.
- (2) Review national regulations for addressing rice safety and quality issues, especially hygiene. Assure that farmers have accurate and transparent information about input constituents and their optimal use for domestic and export markets.
- (3) Establish standard operating procedures for the flow of rice samples for residue testing between GMS nations. Establish domestic food safety and quality metrics and skills in partnership with the United Nations Economic Commission for Europe.
- (4) Pilot GS1 barcode-based systems for tracking and tracing exported premium rice varieties from the GMS, such as GI protected rice and organic rice.
- (5) Review current national regulations and legislation in relation to contract paddy supply arrangements to ensure inclusiveness, transparency, and fairness.
- (6) Establish standard operating procedures for ethical domestic and foreign investment in rice processing facilities and wider value chain investments among the GMS countries.

1. Introduction

Rice remains the staple food for Greater Mekong Subregion (GMS) households and is essential for the subregion's food security and poverty and vulnerability reduction (World Bank Group 2016). Although rice is a staple, rice varieties exhibiting exceptional characteristics have long been cultivated in the subregion. Historically, the bulk of the high-value rice was produced for home consumption by smallholders; only small surpluses, where available, might be sold into local markets. Thai suppliers provide a recent exception to this. However, rising household incomes and consumer awareness has led to strong growth in demand for rice with different types of characteristics, leading to greater commercial supply of higher-value varieties carrying assurances of safety and quality. Moreover, the international market for high-value rice varieties is large and there are opportunities for high-quality GMS varieties to increase their access to and share of export markets, following in the footsteps of Hom Mali of Thailand. Furthermore, the negative impacts on local environments and low sustainability of conventional cultivation of high-yield rice varieties using large volumes of synthetic fertilizer and plant protection are increasingly well recognized by producers, consumers, and policy makers.

Against this background considerable changes have occurred or are occurring in rice value chains themselves, as Reardon, et al. (2012) describe it as "a quiet revolution" is altering the nature in which smallholder rice value chains operate and how value chain stakeholders interact. This context offers various and considerable opportunities to promote the development of inclusive, safe and environment-friendly rice value chains in the GMS.

The literature on rice in the GMS countries is extensive, notably the significant contributions of the Food and Agriculture Organization of the United Nations, the International Food Policy Research Institute, the International Rice Research Institute, and the World Bank Group (among many others). However, the sector is dynamic and less work has considered safe and environment-friendly rice supply and market access in the context of the GMS countries as a unit. The objective of this paper is to briefly summarize the findings of recent case studies of reduced-input rice value chains in the GMS, conducted under the Asian Development-led Core Agriculture Support Program Phase 2 (CASP2), and to make recommendations for their sustainable and inclusive development.

Reduced-input rice value chains in the GMS have the potential to meet growing domestic demand for quality and safety assured rice products with distinguishing characteristics. Moreover, there are opportunities to increase their presence among the food products exported from the GMS. However, policy adjustments and investments are needed for the potential to be realized.

Building on a review of literature, this paper presents a synopsis of detailed case studies of three reduced-input rice value chains, one each in Cambodia, Thailand, and Viet Nam. This paper outlines some of the high-priority issues that can best be addressed collectively by the GMS countries for developing reduced-input rice supply in the subregion. The paper then recommends an approach and proposes feasible and politically attractive initiatives to address the key issues.

The paper has been developed within the scope of CASP2. CASP2's vision is that the GMS becomes a leading producer of safe and environment-friendly agriculture products. This document is closely aligned with, and strongly endorses, the GMS Strategy and Action Plan for Promoting Safe and Environment-Friendly Agro-Based Value Chains 2018–2022, developed by the GMS Working Group on Agriculture for endorsement by the GMS ministers of agriculture.

2. State of Play

2.1. Overview

The GMS is a leader in the supply of both low-cost and premium rice and rice products to global markets (Figure 1a). The subregion has enjoyed dramatic increases in rice productivity over recent decades. However, this has largely been associated with intensification of rice production through irrigation, the use of higher-yielding varieties, and the increasing application of commercial fertilizers and plant protection products (Figure 1b and c). The negative impacts of increasingly intensive use of synthetic agrochemical products on land quality and local environments has become apparent in much of the GMS, particularly in the most productive agricultural areas. Rising household incomes and awareness of food quality and safety concerns in the GMS provide additional incentives for adopting safer, more sustainable production practices. In addition, rejection of rice consignments due to the presence of agrochemical residues threaten lucrative export markets for GMS rice. These threats to GMS rice production are exacerbated by the current and anticipated effects of climate change, the recent drop in global rice prices (Figure 2), and changing consumer demand. Ample demand for high-value rice and rice products exists in markets in the GMS, the ASEAN+3² and beyond. Identifying and addressing the current constraints on and opportunities for developing inclusive, safe, and sustainable rice and rice product value chains in the GMS can support food security, livelihoods, and economic development throughout the subregion.

² The members of the Association of Southeast Asian Nations plus the People's Republic of China (PRC), Japan, and the Republic of Korea.

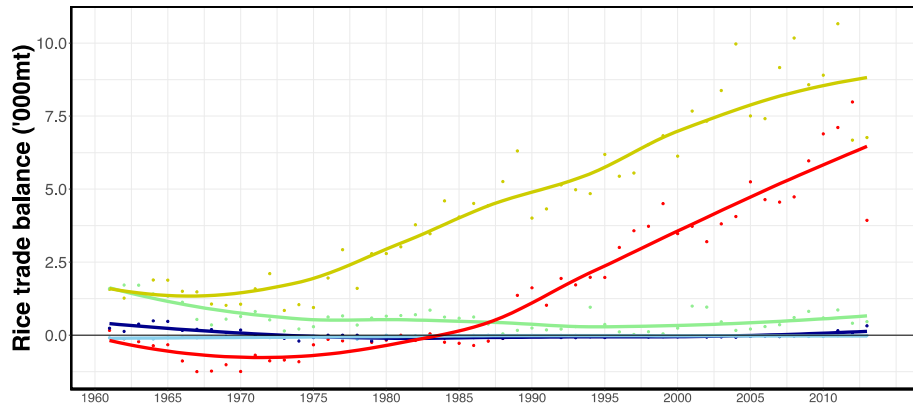
Figure 1: Trade Balance, Rice Yields, and Fertilizer Use in Five GMS Countries

1a: Trade balance

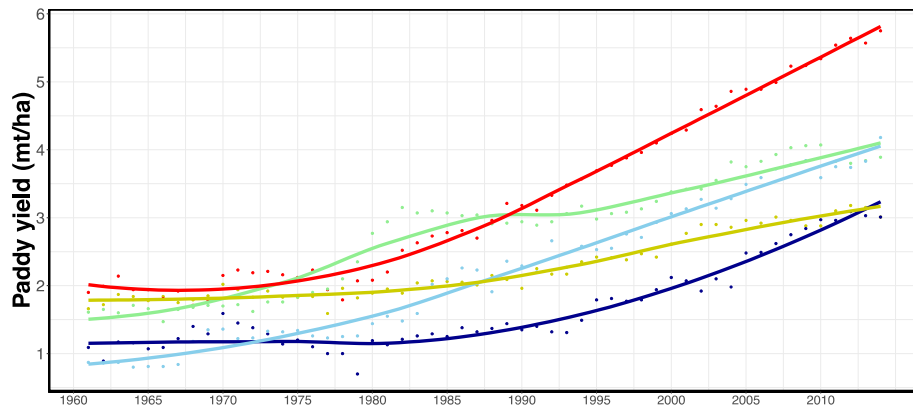
1b: Average paddy yield per hectare

1c: Fertilizer use per hectare of rice cultivated

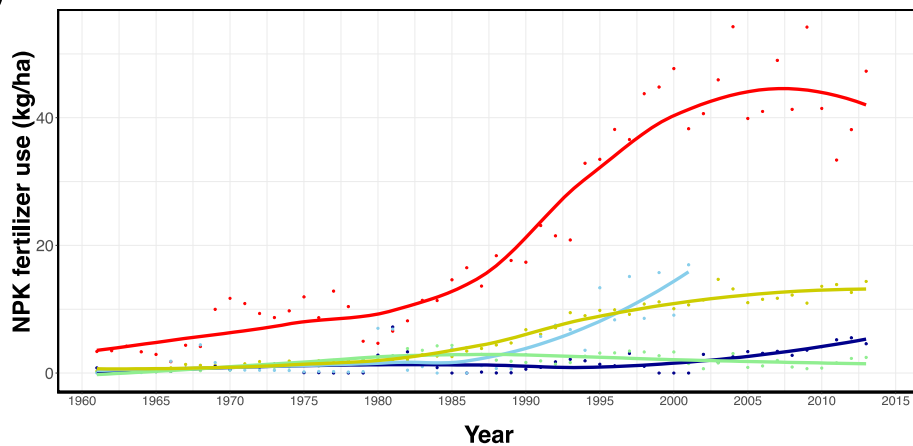
a)



b)



c)



■ Cambodia ■ Lao PDR ■ Myanmar ■ Thailand ■ Viet Nam

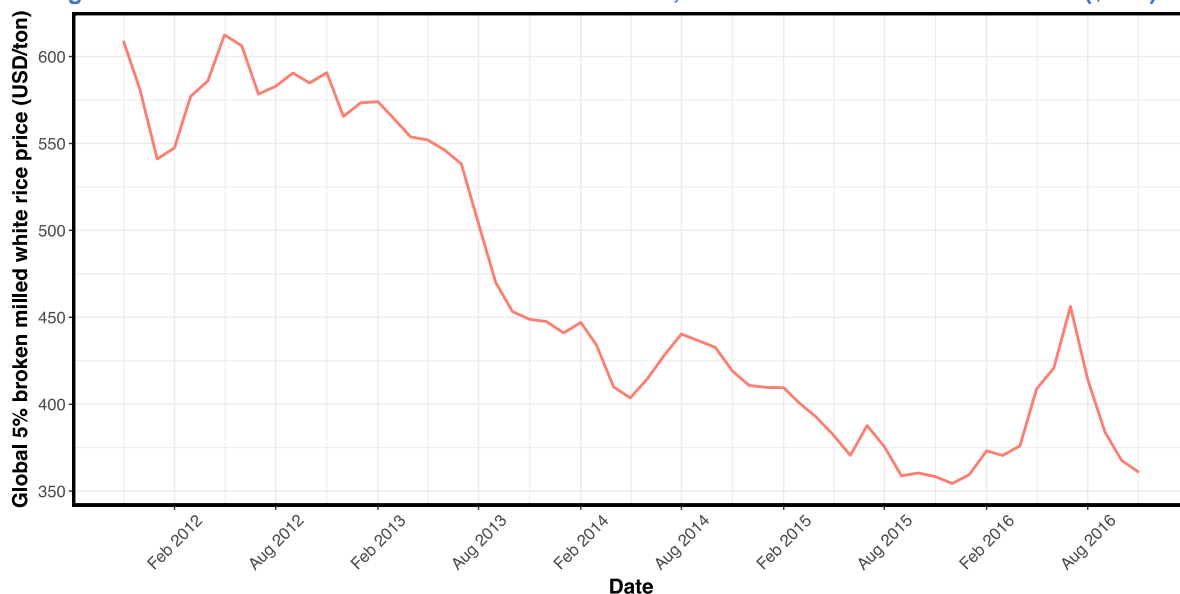
ha = hectare, kg = kilogram, NPK = nitrogen, potassium, and phosphorous fertilizer.

Note: No data were available for Guanxi and Yunnan provinces, People's Republic of China

Source: Data from IRRI (2016b), originally from FAO (2016).

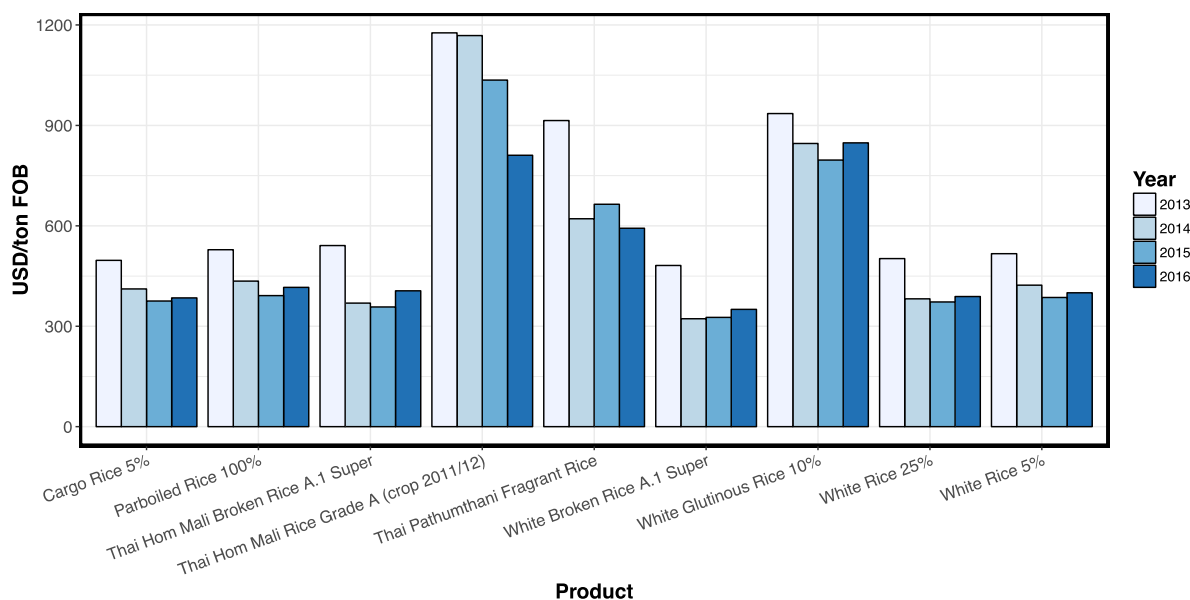
Global rice prices have diminished considerably in recent years, despite a brief revival in mid-2016 (Figure 2). This has been the case across core rice commodities in the global markets. Thai figures show the universal decline of prices against 2013 levels for both high-and lower-value rice and rice products (Figure 3). Prices are predicted to remain low for the next 10 years (World Bank Group 2016).

Figure 2: Global Prices for 5% Broken Milled White rice, November 2011 to November 2016 (\$/ton)



Source: Data from IndexMundi (2016).

Figure 3: Thai Rice Product Export Prices, 2013–2016 (\$/ton, free on board)



Source: Data from Thai Rice Exporters Association (2016).

Cambodia and Myanmar, and to a much lesser extent the Lao People’s Democratic Republic (Lao PDR), are developing export markets for rice. These countries have potential competitive advantages over Thailand and Viet Nam in terms of costs of production and availability of unique fragrant rice varieties. Moreover, they all benefit from the “Everything But Arms” (EBA) trade

agreement with the European Union (EU), presenting considerable potential to establish premium rice brands and leverage further investment in domestic rice value chains. However, the three countries are hampered by low technology uptake, limited access to extension services, high postharvest costs due to high losses, high milling margins and utility costs, and high costs of freight. Furthermore, rice produced in Cambodia, the Lao PDR, and Myanmar has yet to develop the brand awareness in global markets enjoyed by Thai premium rice varieties such as Hom Mali.

Guangxi and Yunnan provinces, like the People's Republic of China (PRC) as a whole, are currently net importers of rice. The provinces are the most direct route for GMS formal and informal trade into the PRC market. At present, a large proportion of the rice and rice products entering the PRC through the border provinces are thought to be of relatively low value, typically undergoing further processing on arrival. However, the increasing living standards and household incomes in the PRC are driving up demand for safer, higher-quality products. The recent spate of high-profile food safety scares in the PRC has accelerated demand for better products. The GMS countries are well-positioned to meet this growing demand but need to demonstrate effective risk management systems to obtain greater formal access to the PRC market.

Thailand and Viet Nam are the rice export powerhouses of the GMS. Thailand has long been among the top five global exporters and was joined by Viet Nam in the mid-1990s. Thailand has established a worldwide brand for premium jasmine and other fragrant rice varieties, while also exporting large volumes of lower-value high-yielding white rice, whereas Viet Nam remains largely an exporter of white rice. Both have suffered setbacks in recent years. The consequences of the populist Thai rice pledging scheme³ had considerable impacts on the domestic rice industry and impacted rice prices in the GMS and globally. Viet Nam has recognized that current production methods are not sustainable in the long term. Moreover, Viet Nam has yet to establish a reputation for premium rice and rice products internationally, and this has been hampered by food safety scares domestically and rejection of consignments that failed to meet maximum residue levels in export markets. Each country can learn from the other and both have the research and technical capacity to support other countries within the GMS. Furthermore, by engaging at the GMS level both Thailand and Viet Nam can manage risks more effectively and learn from their neighbors in developing sustainable production systems and policies that diversify and strengthen their rice industries.

The GMS countries share porous land borders and the volume of paddy (unhulled rice) and rice crossing borders both legally and informally is high and increasing, presenting potential food safety and quality risks to domestic consumers and exporters. Cross-border trade in paddy and rice supply between GMS countries is likely to grow further with trade liberalization within the GMS and ASEAN, epitomized by the advent of the ASEAN economic community. However, much of the current trade in paddy and rice is informal with little recognition of safety and quality. Harmonized standards across borders are needed to protect consumers and producers and appropriately reward suppliers of safety and quality assured inputs, paddy, rice, and rice products. Moreover, mutual recognition of safety and quality assurances between GMS countries can increase transparency, facilitate legal trade, and increase access to export markets further afield.

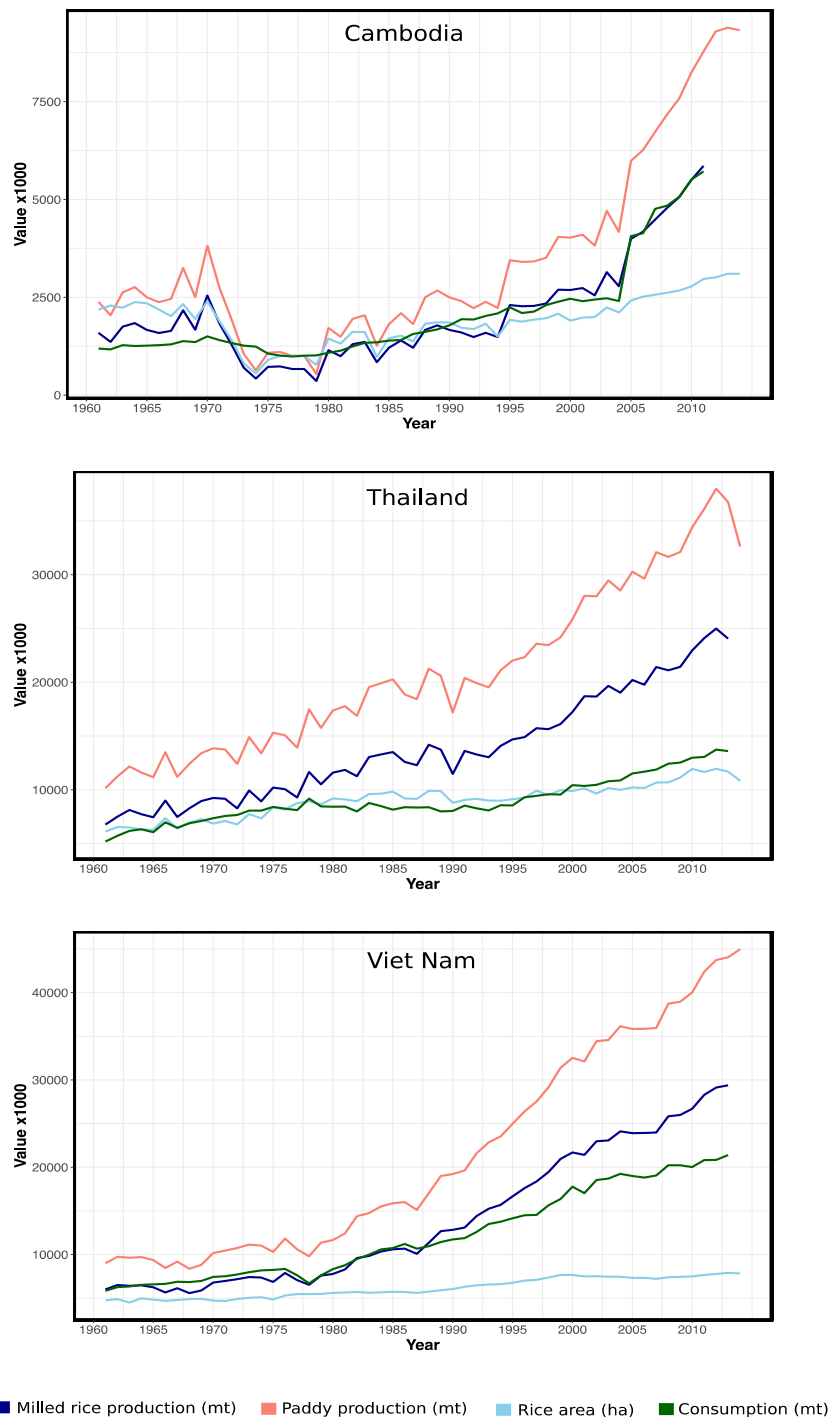
2.2. Characteristics of rice industries in the case study countries

Case studies of reduced-input rice value chains were conducted in Cambodia, Thailand, and Viet Nam. Each country has experienced considerable growth in domestic consumption and production relative to the total area cultivated, demonstrating improved rice performances and advances in the subregion's food security (Figure 4). However, the increased production has also been closely

³ Prime Minister Yingluck Shinawatra's populist policy to buy rice from Thai farmers at above market prices. This policy and other events in global rice and commodity markets, notably India's return to rice exports, caused Thailand to lose its status as the world's leading rice exporter for a number of years and is associated with considerable, largely negative, socioeconomic and political impacts on Thailand, the GMS, and global rice markets.

associated with increased application of agrochemicals (Figure 1c). The current state of play of the rice sector in Cambodia, Thailand, and Viet Nam is summarized here.

Figure 4: Total Rice and Paddy Production, Area, and Consumption, Cambodia, Thailand, and Viet Nam



Source: Data from IRRI (2016b), originally from FAO (2016).

Cambodia. Cambodian rice production has kept pace with rapid growth in consumption since 1980, reflecting its increasing population and household incomes. Cambodian rice exports have rose dramatically during 2008–2015, to over 350,000 tons/year. This is largely due to the signing of the EBA trade agreement with the EU, which provides a considerable advantage to Cambodian exporters (Slayton 2015). The large majority (90%) of Cambodian rice exports are to the EU and

Russian markets (Slayton 2015). Moreover, an increasing share of exports are premium fragrant rice varieties—up from 10% of exports in 2010 to 45% in 2013—for which Cambodian exporters have received a \$250/ton premium in the EU market relative to Thai fragrant varieties (USAID 2015). Giroud (2013) cited figures of \$1,100/ton for fragrant varieties compared to \$440/ton–\$580/ton for white rice. Cambodian rice has won global rice awards on three occasions in recent years, increasing the country’s reputation as a producer of high-quality rice. Cambodia’s main export competitors remain Thailand for fragrant rice in high-value markets such as the EU, Viet Nam in white rice markets such as the Philippines and Indonesia, and Pakistan and Myanmar in low-quality white rice markets primarily in Africa (Slayton 2015).

The effects of the EBA agreement may see Cambodian exports reach levels similar to the country’s peak export period of the early to mid-1960s. However, achieving the national objective of exporting 1 million tons of rice per annum remains a challenge due to the industry’s structure, bottlenecks within rice value chains, and costly essential services such as transport and utilities. These issues are discussed in greater detail in the next sections.

Thailand. Thailand is currently both a low-cost supplier of white rice and low-value rice products and an established supplier of premium rice products, particularly fragrant varieties such as Hom Mali, in both domestic and global markets. The production of lower-yield, higher-quality varieties is reflected in lower average paddy yields per hectare than in Viet Nam. Thailand has successfully developed strong global brand recognition for such products as Hom Mali rice varieties and products. Thailand has established protected GIs for varieties such as Khao Hom Mali Thung Kula Rong-Hai, Sakon Dhavapi Haang Golden Aromatic Rice, and Sangyod Muang Phatthalung Rice. These are now recognized in international markets. However, considerable quantities of low-yielding, high-value local rice varieties are still cultivated. The Thai rice industry is mature and diversified, presenting a useful model for neighboring GMS countries.

There are opportunities to further strengthen Thai rice supply, particularly in the less well-connected areas of the country, such as the northeast. Priorities include building greater rice value chain resilience to biophysical threats such as flooding and droughts; ensuring sustainable production practices; increasing access to mechanized services in land preparation, harvesting, and postharvest; and increasing access to capital among value chain stakeholders. These challenges mirror those faced throughout the region. Moreover, Thailand’s recent experiences under the rice pledging scheme provide a strong warning in to future policy makers domestically and in neighboring countries.

Thailand is well positioned to support other GMS countries to strengthen their rice value chains. Building on past experience and considerable technical and research and development capacity, Thailand can take a role at the forefront of the development of the GMS as a global hub for sustainably produced premium and niche rice varieties and products.

Viet Nam. Viet Nam produces large volumes of low-yielding, high-value rice varieties to meet household needs and for the domestic market. High and increasing domestic demand for premium rice products with assurances of food safety standards has driven a surge in the domestic supply of niche rice and rice products. Organic rice production is growing quickly. Other reduced-input approaches to rice cultivation, such as the system of rice intensification, have been promoted for many years with slow uptake, primarily in northern Viet Nam. The Irrigated Rice Research Consortium and the National Agricultural Research and Extension Systems champion the “three reductions, three gains” and, more recently, the “One Must do, five reductions”⁴ to promote more sustainable, safer, and higher-quality rice production (Demont and Rutsaert 2017).

⁴ “One Must” use quality seed, and reduce seeding rates, and the use of water, fertilizer, insecticides, and post-harvest losses.

As a major global exporter, Viet Nam resembles Thailand in the maturity of the rice industry. Moreover, Viet Nam's achievements in increasing food security and reducing poverty since the early 1990s are near unparalleled internationally. Viet Nam has become increasingly integrated with the global economy since the early 2000s; in 2008 Viet Nam joined the World Trade Organization and has signed a number of bilateral and multilateral free trade agreements. This opening of the economy has provided opportunities for rice exporters to access new markets. However, Vietnamese exports are not diversified in the way Thai rice is. Vietnamese rice exports are largely relatively low-grade rice from high-yielding varieties going to Indonesia, the Philippines, and West Africa. Viet Nam is yet to establish a brand for safety and quality assured premium Vietnamese rice, as achieved by Thai fragrant rice and South Asian basmati.

The opportunity to develop exports of higher-value products that reduce the costs on natural resources is recognized in national policy. Policy in Viet Nam is shifting toward higher-value rice and reduced-input production to lower the impacts of rice on natural resources. Viet Nam has produced premium rice varieties for centuries, but they are almost exclusively consumed in the domestic market. Thailand's experiences provide lessons in developing a globally recognized brand in premium rice markets for Viet Nam and neighboring GMS countries.

3. Study Design and Scope

A qualitative and quantitative methodology was employed, involving secondary data collection, key informant interviews, focus group discussions and surveys. Literature and secondary data were thoroughly reviewed. Interviews were conducted with 10–20 key informants in each country. Three focus group discussions were conducted in each location, each involving 10–12 participants representing key nodes in reduced-input or conventional rice value chains. In addition, 80–100 surveys were collected from persons representing input suppliers, producers, processors, traders, wholesalers, and retailers in each country. The data collected was used to map value chains in detail and calculate key indicators such as gross margins and profits along the length of value chains. The collection of detailed surveys and in-depth qualitative data from interviews and focus group discussions allowed triangulation and cross-checking of findings.

Case studies of reduced-input rice value chains were conducted in three locations:

- (1) Battambang Province, Cambodia, was selected as an area of high rice production in Cambodia where the nongovernment organization/company Center for Study and Agriculture Development in Agriculture Centre d'Étude et de Développement Agricole Cambodgien (CEDAC) had previously provided extension to rice producers on organic/low-input rice cultivation techniques. Moreover, considerable volumes of paddy and milled rice from Battambang are exported to Thailand through both formal and informal channels.
- (2) Roi Et, Thailand, one of the five provinces in the Thung Kula Rong Hai area, was selected as an important rice producing area with organic rice supply chains.
- (3) Thuong Phuc Village, Chuong My District, Viet Nam, was selected as most of the land in this area had been converted to organic rice production, which is collectively branded as PAMCI-organic rice.

4. Summary of Results

The farm sizes, production yields, profits, and gross margins calculated broadly reflected reported norms at key nodes in value chains in the countries and areas in the studies (Table 1).

Table 1: Rice Areas Cultivated and Paddy Yields of Case Study Participants

Variable	Cambodia	Thailand	Viet Nam
Median Rice Area Cultivated, ha, (mean)	7.0 (10.4)	3.0 (4.8)	0.3 (0.3)
Median Paddy Yield, t/ha, (mean)	2.0 (2.1)	2.1 (2.0)	6.9 (6.8)
Average National Yield, t/ha	3.0	3.0	5.8

ha = hectare, t = metric ton.

Source: Case studies for CASP2.

Producer margins were relatively consistent across the study area (Table 2). The Vietnamese producers surveyed all produced PAMCI organic rice and were able to obtain considerable premiums for their products by aggregating and marketing directly to retail outlets in Ha Noi and Ho Chi Minh City, reflected in the high profit margins. The study findings were consistent with other reports documenting high Cambodian miller margins. Interestingly, the gross margins for millers calculated in Roi Et Province were similar to, in fact higher than, those calculated in Battambang. The high margins recorded in the Roi Et case study may relate to the remoteness of the area, the limited milling capacity available to producers and paddy traders, and milling of higher-value rice varieties, allowing millers to set higher margins. The relatively limited milling capacity in Roi Et could account for the relatively low margins received by producers in the area. That Vietnamese millers received relatively low margins and profits per unit may reflect greater competition in a better-connected area and the milling of considerable volumes of lower-value rice by comparison with the other study areas.⁵

Table 2: Median Profits and Gross Margins at the Farm Gate and from the Mill.

Variable	Cambodia	Thailand	Viet Nam
Farm Gate (paddy)			
Median estimated profit per kg (\$/kg)	0.2 (0.2)	0.1 (0.2)	0.5 (0.5)
Median estimated gross margin, % (mean)	54.8 (54.0)	63.9 (61.7)	76.6 (76.6)
Ex-Mill (all products)			
Median estimated profit (\$/kg)	0.2 (0.3)	0.4 (0.4)	0.06 ^a (0.1)
Median estimated gross margin, % (mean)	41.0 (42.0)	42.8 (43.5)	13.8 ^a (22.7)

kg = kilogram.

^a Based on the survey of millers trading conventional rice in the same area.

Source: Surveys conducted during the CASP2 case studies.

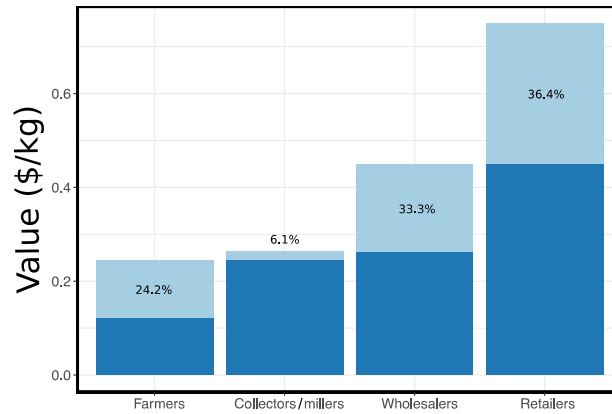
In terms of value addition along the three supply chains the most notable observations were that: (1) the proportion of value added post-harvest was quite consistent across the studied chains; (2) suppliers in Battambang received very low prices and no price differentiation for higher value varieties or use of reduced-input production methods; (3) producers in the Thai case study did not

⁵ Only Vietnamese millers of conventionally grown paddy were included in this analysis as the PAMCI organic rice producers employed a mill on a fee-for-service basis.

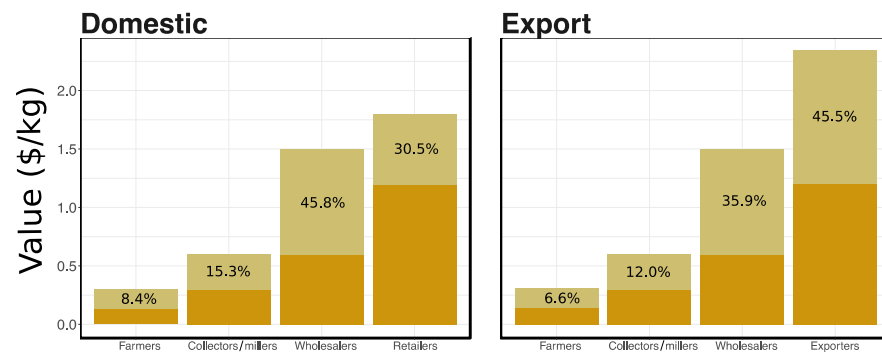
receive greater value if rice was exported or sold domestically; and (4) the vertical integration of the PAMCI value chain in Viet Nam allowed considerable value to aggregate with producers (Figure 5).

Figure 5: Value Addition at Key Nodes Along the Case Study Value Chains.

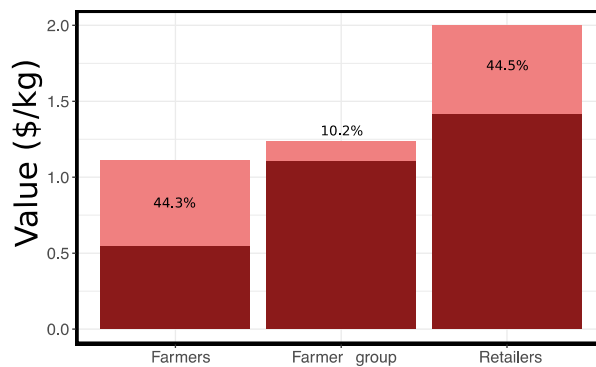
Cambodia



Thailand



Viet Nam



Note: The lower dark area of the bar plots depicts costs, the upper, lighter shaded area indicates value added. Plots are annotated with the percent of value added at each node along the chain.

Source: Surveys conducted during the CASP2 case studies.

5. Issues and gaps

The study assessed the value proposition of the GMS as a supplier of premium rice and rice products. This discussion draws on the findings of the specific case studies and the wider literature to identify avenues for further investment and activities to promote fair, sustainable, safe, rice supply in the case study areas, and the wider national and GMS context.

Three overarching themes were considered:

- value chain efficiency, value addition, and branding and marketing;
- risk management and safety and quality standards and assurances; and
- investments;

5.1. Value chain efficiency, value addition, and branding and marketing

The case studies demonstrate that smallholder reduced-input rice production can be profitable. However, producers in the case studies were hampered by variable input quality, environmental challenges associated with the overuse of agrochemical inputs, the effects of climate change, small cultivated areas, and lack of organization among producers and coordination with other value chain actors up- and down-stream. The high level of urban migration across the GMS threatens smallholder rice production in the subregion, increases loss of biodiversity, and increases urban poverty. Many consider this to be the greatest current challenge for poverty reduction and future food security in the subregion. Reducing the drain of labor from rural areas in the GMS begins with revitalizing rice. The World Bank Group (2016) noted the need to focus on farm incomes for paddy producers, recognizing that costs have to be reduced along value chains to improve farm profitability. The authors identify a series of potential policy and investments along value chains to achieve this, many of which were seen in the case study value chains. The series includes improving the input quality and access, reducing utility costs and the costs of transport through policy and infrastructure development, and promoting trade (World Bank Group 2016).

Costs of supply. The insufficient supply of quality seed and subsequent low farm yields and high postharvest losses hampered smallholder productivity in Battambang (USAID 2015). This is also regularly reported in the Lao PDR and Myanmar for both farmer seed and the quality and availability of certified seed. Current seed supply is dominated by public sector suppliers in Cambodia, the Lao PDR, and Myanmar. Policies are needed that promote private sector engagement, particularly in seed multiplication and research and development. In Cambodia, this would begin with developing a supportive policy framework around the Seed Law. Policies need to spread investor risk by providing cost-effective support for government certification of seed and access to credit at reasonable rates. Moreover, national bodies have a role to play in promoting private seed supply; for example, in Myanmar there is considerable mistrust surrounding commercial seed suppliers.

The issue of high price and variable quality of fertilizers and plant protection was raised repeatedly during the study and is a problem throughout the GMS. The porous borders in the subregion make this a regional issue. Thailand and Viet Nam, and to a lesser extent the PRC, produce the bulk of products circulating in the rest of the GMS. Limiting the movement of these inputs is unrealistic, therefore, the establishment and effective enforcement of common certifications, through incentives and effective regulation and testing protocols, are in the interest of all. Quality and price issues surrounding key inputs present an opportunity to further promote lower-input production methods. Continued promotion of demonstration sites and circulation of performance figures, and encouraging “premium” market channels that promote improved on-farm performance, such as those of CEDAC and Amrurice—one of the largest Cambodian integrated rice suppliers, are the most obvious means of promoting these approaches.

Although Cambodia’s costs of production are considerably lower than those of Thailand and Viet Nam, Cambodian milled rice struggles to compete ex-mill and in overseas markets due to

Cambodia's high milling and transport costs, inefficient export procedures, and port charges. Slayton (2015) estimated Cambodian milling and transportation costs were nearly double those of Viet Nam in 2011, mirroring estimates have been made in the Lao PDR and Myanmar. Further investment in basic land and sea freight related infrastructure is also needed to increase competitiveness. Cambodian millers set high gross margins largely to cover their high utilities costs and to build up working capital. Increasing millers' access to affordable credit to alleviate working capital issues may allow reductions in margins, improving competitiveness. Moreover, utility costs must be reduced. The increased use of rice hulls as fuel has improved the situation, reducing outlays for diesel and electric considerably. However, more needs to be done.

Inclusiveness. Women, smallholders, and small and medium-size enterprises form the backbone of much of the rice supply in the GMS. Many of the producers in the case studies could be described as vulnerable in social and/or economic terms. Increasing rice value chain efficiency and inclusiveness can support rural development and drive safe and sustainable rice supply. Inclusiveness is a potential driver of the revitalization of rural areas in the GMS. Contracted supply arrangements may present opportunities to better integrate smaller players but also present risks of less scrupulous players tying producers into unfavorable arrangements. Appropriate regulatory and legislative oversights need to be in place to ensure ethical contractual arrangements that are fair and inclusive.

Value chain efficiency. The case studies indicated that the fragmented nature of smallholder rice value chains in more remote areas, such as Battambang and Cambodia more generally, can present a difficult environment for extension and technology transfer. The value chains in the Cambodian case study were fragmented with numerous potential intermediaries between paddy producers and myriad end markets ("intermedationally long" [Reardon et al. 2012]). In contrast, the chains observed in Viet Nam and Thailand provided examples of considerable vertical integration in reduced-input rice value chains managed by smallholders and small and medium-size enterprises—geographically long but intermedationally short chains (Reardon et al. 2012). The small areas cultivated by household producers in the case study, particularly notable in Viet Nam, provided further evidence that greater organization is essential to increase the profitability and economic sustainability of smallholder rice production in a region where vertically integrated supply chains are becoming increasingly prevalent. Organization is needed to build the economies of scale that reduce input costs and provide efficiencies in postharvest processing and value addition, including the branding and marketing of products.

The Cambodian case study describes productive but fragmented rice value chains in a relatively remote area. Many of the strengths of the suppliers are similar to those of by rice value chain stakeholders in other areas of the GMS, such as the availability of local high-quality varieties; relatively low input usage and costs of production; and often good growing conditions, at least seasonally. The producers are hampered by limited value chain coordination, suffer the impacts of various biophysical shocks and stressors, endure high postharvest losses, and are hampered by high freight costs. The large majority of sales are conducted at the farm gate in part due to limited access to dryers and storage capacity, and often cash is needed to repay input suppliers. Market information is largely collected from neighbors, friends, and family. Increased organization can strengthen horizontal and vertical linkages, facilitate information sharing such as on prices, and level playing fields in terms of decision making at harvest. The limited use of reliable moisture meters in assessing paddy quality and value continues to inhibit fair negotiations at the farm gate in many areas.

In contrast, the PAMCI model in Viet Nam demonstrated the value greater organization among smallholders can deliver to producers with a good product. PAMCI organic rice production is an example of a village-centered, smallholder-based vertically integrated rice supply chain. Stakeholders in the chain received considerable advantages from aggregated input procurement and in the branding and marketing of products. The model demonstrated the advantages of organized, short, farmer-owned vertically integrated chains in the rewards to producers and allied

value chain actors, and for communicating traceability and quality characteristics to buyers. Equally importantly in the context of Viet Nam and the GMS, the PAMCI rice supply chain demonstrates environmentally sustainable supply of a higher value product.

Although there were clearly opportunities to improve the functioning of the PAMCI chain, the approach has merit and potential for replication in other areas of Viet Nam and potentially elsewhere in the GMS. The PAMCI model suffers from the limitations of many such initiatives that rely on intensive technical support over extended periods, primarily in terms of scalability. However, key lessons can be learned from the initiative and the many like it around the region. Although assessments have been conducted in the past, a broad “state-of-play assessment” of such initiatives around the region could elicit key lessons and components of such schemes that might be more readily rolled out in other locations.

Further investment in producer organization, effective and accessible extension, mechanization in land preparation, and (perhaps most pressingly) reduction of postharvest losses and costs of freight are essential to improve the competitiveness of smallholder rice supply in many areas of the GMS. In addition to reducing efficiency and increasing postharvest losses, the lack of dryers and storage facilities is associated with periods of over and undersupply, affecting prices and the negotiating power of producers.

Generating price premiums at the farm gate. In many areas of the GMS, little or no product or price differentiation for organic or reduced-input rice production occurs, as was observed in the Battambang market. This relates to the limited available avenues for marketing rice products with specific quality characteristics in rural areas and limited, though increasing, consumer awareness and demand, particularly in rural areas. Although organic/low-input production reduces input costs and producers recognized the potential benefits in terms of soil, water, and broader natural resource management, several study participants had stopped using these techniques due to their increased labor requirements. The lack of differentiation of low-input/organic rice in the local market value chains does little to embed employment of reduced agrochemical usage practices. However, this may change quickly, as demand rises with increasing incomes and awareness among consumers. For example, in Cambodia the efforts of CEDAC and, more recently, Amrurice to establish vertically integrated organic rice supply that integrates smallholders are showing great promise. There is considerable potential to establish additional rice GIs in the subregion, such as Phkar Kukey in Cambodia.

Value addition and branding and marketing. The study observed opportunities to add further value to the rice, many of which are likely applicable in other areas of the GMS. Examples include parboiling and product development such as processing of “instant” precooked rice and other preparations such as an instant “Khmer fried rice.” Markets for these products are growing internationally. Slayton (2015) estimated global trade in parboiled rice to be about one-third of regular milled rice and increasing. In Roi Et Province opportunities to improve and extend product processing exist, such as improved packaging and further investment in branding and marketing. The PAMCI organic rice supply chain can also readily venture further into product development. Viet Nam has extensive small-scale rice and rice product processing capacity and a rapidly growing large-scale industry in this area. In Battambang, the supply of paddy with a consistent level of quality needs to be consolidated before such ventures can be considered.

Opportunities to market products produced from quality assured rice byproducts are also evident. Examples include rice flour, rice starch, syrups, oils, and proteins. Other rice products include noodles, rice paper, cakes, and biscuits, much of which is currently imported in many areas of the GMS. Other avenues for investigation include puffed rice products, rice milk, rice “wine” (a beer), and pet food manufacturing. Again, packaging, branding and marketing, and logistical bottlenecks must be considered. Improving the management of byproducts can reduce costs of supply while supplementing incomes, and many approaches are applicable throughout the GMS. The International Rice Research Institute has conducted extensive work on safe, sustainable rice straw

management—such as disseminating straw baling technology from Viet Nam. This presents new business models for adding value to residues for use as animal feed and mushroom production. Other treatments being promoted include efficient biochar production, treatment with urea and *Trichoderma* fungi, and anaerobic digestion for more efficient use as a clean fuel (IRRI 2016a).

The surge in global popularity of dishes originating in the GMS presents great potential to develop product brands and ranges that promote geographically specific, niche, premium value-added products such as GI organic products from the region. This may be achieved through processing, preparations, packaging, branding, and marketing. Discussions with branding and marketing specialists in Europe also indicate the surge in demand for ready-to-eat rice preparations (Windward Group, pers. comm.).

Such new products may require further investigation of packaging technologies and current national and subregional capacity, for example some global leaders in the packaging industry operate factories around the region, notably in Chonburi and Rayong, Thailand. Linking to current service providers within the region could minimize capital investment requirements, circumvent current freight bottlenecks, and avoid high costs that hamper market access in areas of the GMS such as Cambodia.

Branding and Marketing. Hand-in-hand with product development comes investment in branding and marketing. The establishment of the Khao Hom Mali Thung Kula Rong-Hai GI exemplifies a relatively new approach to brand establishment on the basis of *terroir*,⁶ inputs, and quality assurances for agricultural products in the GMS. This supply chain offers lessons for suppliers of niche rice and rice products in other areas within the GMS. The specifications of the GI protection indicate that GI-registered producers better manage local natural resources and received price premiums and more stable prices for their products. The value chain's resilience to shocks, such as fluctuations in commodity prices and climatic events, appeared to be greater than that of conventional rice suppliers. Moreover, growing domestic and international demand for GI products indicates that stakeholders' positions will become stronger over time.

Market access. The EBA agreement, to which the Lao PDR and Myanmar are also signatories, and favorable trade agreements with Russia have resulted in a dramatic rise in Cambodian rice exports since 2010. While it is in Cambodia's interest to continue to develop these markets, other markets in Asia and Africa also offer great promise. Establishing bulk carriage capacity, whether in Cambodia and Myanmar and/or via Thai and/or Vietnamese ports, could facilitate access to stable and potentially lucrative markets for lower-quality milled white rice in West African, Indonesian, and Philippine markets. Moreover, Cambodian exports already supply Malaysia and the PRC, and there are opportunities to grow the presence of premium Cambodian and GMS rice in these markets.

Alongside increasing exports of premium fragrant rice varieties, Cambodian suppliers have gained access to export markets for organic rice. Although the global organic rice market is relatively small,⁷ it is likely growing. If Cambodia can differentiate organic rice products by qualities such as variety and establish a brand, the country could leverage favorable trade agreements, such as the EBA, to carve out a niche in high-value markets like the EU. This is also true of Lao PDR and Myanmar suppliers. At present Thailand exports approximately 4,000 tons of organic rice yearly (Slayton 2015), while in Viet Nam only the Hoa Sua company exports organic rice and in very small volumes of 70 tons–80 tons yearly. The Vietnamese case is particularly interesting as domestic demand for organic rice is now so high that Hoa Sua sells 80% of its organic product in the domestic market. Cambodia is already matching or surpassing Thailand in organic rice exports and the demand exists in Viet Nam.

⁶ A French word that conveys the geographical origin and the cultural and historical identity of products.

⁷ Slayton (2015) estimated global trade in organic rice at only 20,000 tons/year–30,000 tons/year.

As a major supplier of rice to export markets in Asia and around the world, Thai rice value chains and policy environments present many lessons for GMS producers. The advantages of larger, more contiguous rice fields are demonstrated in Thailand when compared to regional neighbors, such as Viet Nam and producers in the Red River Delta, where farm sizes are very small and often scattered. Furthermore, Thai stakeholders enjoy the advantages of relatively modern postharvest processing and lower freight costs associated with a larger economy and more advanced transport and logistics infrastructure and services. However, there are opportunities for Thailand to further aggregate and reduce transaction costs within supply chains.

Many of the reduced-input rice products in the GMS exhibit qualities that can appeal to consumers in higher-value export markets. The trade in these products requires greater market access. Such access can be facilitated by the establishment of track-and-trace systems, including bar codes, to demonstrate effective risk mitigation, product provenance, and quality assurance. Piloting track and trace systems with higher-value rice supply chains, such as GI-protected rice suppliers, in collaboration with specialists such as GS1, has considerable potential. GS1 has worked on track-and-trace systems for many agricultural products globally.

5.2. Risk management and safety and quality standards and assurances

Multisectoral coordination between ministries is needed to improve the effectiveness of safety and quality management systems. It is essential that the public sector, private sector, civil society, and researchers are engaged in coordination and decision making processes. Government bodies other than the ministry of agriculture—such as ministries of commerce, trade, science and technology, health, and environment—play key roles in the business environment; the natural environment; and technical considerations such as regulatory systems and enforcement.

Viet Nam must address concerns surrounding food safety. For rice this relates primarily to agrochemical residue levels. Although residue levels in rice are a concern across the GMS, Viet Nam is particularly vulnerable at present due to its considerably higher use of commercial fertilizers and plant protection products in fields. More generally, however, the capacities to analyze risks to food safety and to meet export market requirements are suboptimal across the region, except in Thailand. Viet Nam's infrastructural and technical capacity for risk analysis is considerably stronger than that in the neighboring Cambodia, Lao PDR, and Myanmar. However, much of the GMS, including Viet Nam, struggles to effectively implement adequate surveillance systems to protect consumers, demonstrate equivalence, and avoid rejection from foreign markets.

Fundamental to this is the establishment of accessible, reliable and trusted certification systems, whether that is through promotion of the Sustainable Rice Platform global standard for sustainable rice, promotion of good agricultural practices (GAP) in the forms of the Global GAP and the ASEAN GAP in domestic markets, improved implementation of national GAP standards, third party organic certifications, holistic approaches such as GI or participatory guarantee systems, or myriad other potential assurance schemes.

5.3. Investments

Limitations in infrastructural capacity, which hamper the development of reduced-input rice value and rice value chains more generally, have been identified throughout this paper. The priority investment needs vary across the GMS. In more remote areas, particularly in the less economically advanced GMS countries, bottlenecks in drying, storage capacity and high costs of utilities and transport hamper competitiveness and reduce margins along value chains. Addressing these shortcomings requires investment in infrastructure and appropriate policy changes and institutional capacity building that encourage private sector engagement. Priority issues include electricity grids, water supply, roads, ports, and related transport and logistics infrastructure.

In addition, investment in input, production, and product laboratory testing facilities and operating capacity are needed. Access to affordable and timely laboratory services can improve standards and mitigate and manage risks to food safety and quality for domestic markets and for increased access to export markets. While some investments, such as road, electricity, and water infrastructure, are primarily a public good and therefore a government responsibility, many of the current shortcomings can be addressed by private or public–private investment arrangements.

6. Recommendations

Initiatives and policies are needed that support, direct, and catalyze public and private investment in GMS rice value chain development. Greater organization and integration of smallholders into efficient value chains, more reliable quality and safety assurance systems, reduced losses and greater value addition and branding and marketing, domestically and in export markets, can increase the share of sustainable and higher-value rice and rice products from the GMS.

6.1. Value chain efficiency, value addition, and branding and marketing

Review and harmonize policy for and regulation of seed quality and agrochemical inputs across the GMS. For example, in Cambodia appropriate supportive policies are need to support the recently established Seed Law.

Promote the virtues of local GMS rice varieties by strengthening current rice GIs and establishing additional GI protections. The GMS is exceptional in the diversity of rice varieties currently cultivated, which has led to the registration of several rice GIs domestically and in export countries.

Continue to fund and direct research and development into reduced-input rice production methods and disseminate findings through subregional platforms. Novel approaches to extension, such as the use of social media, can increase outreach. Given the high levels of connectivity in the GMS, ICT-based approaches to extension hold enormous promise for increasing outreach; however, best approaches have not yet been well-established. The Agriculture Information Network System (AINS) 2.0 and the GRET-coordinated Agro-Ecology Learning Alliance in South East Asia (ALiSEA) are examples of ICT-based knowledge sharing platforms in the GMS that can be harnessed to promote better practices, producer organization, and market linking.

Identify best practices in producer organization and innovative approaches to creating strong market linkages along smallholder-based rice value chains. The case studies reemphasize the well-known fact that organized smallholders can generate efficiencies of scale, enabling lower costs of production and processing and facilitating delivery of extension while promoting peer-to-peer learning. The high prevalence of smart phones and internet accessibility in the GMS present opportunities to build useful farmer-to-farmer relationships through services such as the AINS 2.0, for example. Novel initiatives that draw on other sectors, such as the “MATCH: Mekong AgTech Challenge” are also ripe for developing new ways of building social capital and creating and disseminating technical and market-related information.

Investigate opportunities for further value addition and establish joint branding and marketing initiatives among suppliers of safe and environment-friendly rice and rice products subregionally. The market for safety and quality assured rice in the GMS is growing rapidly and there is considerable global demand for niche rice and value-added rice products with premium quality characteristics, such as GI. Further investigation of consumer preferences and behavior in the subregion is needed to determine where opportunities currently exist and where they are likely to develop in the short, medium, and long term. Smallholders can supply these if supply chain

efficiency can be improved and branding and marketing initiatives are coordinated. Many novel rice-based products are produced in the GMS. The increasing popularity of pre-prepared rice in the EU, for example, could be harnessed through the production and marketing of GMS specialty high-value rice-based dishes. Examples include ready-to-eat premium Cambodian amok fish and rice, Vietnamese pho bo, and Myanmar fermented tea leaves and rice. Branding and marketing initiatives can build on the successful experiences of branding and marketing high-value products from within the region, such as Hom Mali from Thailand.

Establish more transparent and efficient systems for rice trade across GMS borders. The World Bank Group (2016) estimates that cross-border trade in rice accounts for more than 60% of total exports from Cambodia, the Lao PDR, and Myanmar and 26% of total export in Viet Nam. A large, but difficult to estimate, proportion of rice trade in the GMS occurs through informal pathways. Facilitating services for cross-border trade will help to reduce the transaction costs along the chain, increase transparency, and protect industries and consumers from substandard products. Moreover, improving traceability and market access within the GMS can allow suppliers of premium rice products to meet growing demand in urban centers around the region.

6.2. Risk management and safety and quality standards and assurances

Coordinate risk management systems for diseases, pests, and chemical residues. This is a crucial step toward harmonizing systems between GMS countries. Harmonizing systems offers efficacy and efficiency benefits. It can result in mutual recognition of equivalence and thereby facilitate formal intra-GMS trade and exports beyond the subregion. Demonstration and recognition of equivalence in risk analysis capacity with international standards and pest- and genetically-modified-organism-free status will increase export market access for rice. Ideally this would culminate in national certification with established surveillance systems that adequately reassure current and potential trading partners.

Harmonize quality and safety assurance standards and regulatory environments from inputs through to end-products between GMS countries. Improve hygiene the length of value chains to improve the safety of GMS rice and reduce the risk of costly rejections by export markets. Increase recognition and trust in standards among consumers and trading partners by establishing robust systems and transparently communicating the processes and results of surveillance activities, good or bad. Establishing recognized and trusted assurances among consumers and retailers across GMS borders by recognizing equivalence can promote safe cross-border safe and environment-friendly rice and rice product supply chains.

6.3. Investments

Catalyze and direct public and private investment infrastructure for safe and environment-friendly rice-related value chains. Legislative and regulatory systems need to be in place to ensure transparent and ethical terms and conditions for investment. Key infrastructural needs include postharvest processing—such as drying and milling quality, particularly in less-developed areas of the subregion; utilities; transport and logistics infrastructure; border and wider export trade infrastructure; and risk analysis infrastructure. Greater transparency in regulations, terms, and conditions for doing business can reduce real and perceived risks to investors.

6.4. Short-term initiatives (2017–2018)

Six initiatives are proposed:

- (1) Establish access to extension materials on reduced-input rice and marketing through AINS
- 2.0. Identify areas for potential collaboration with the “MATCh: Mekong AgTech Challenge”

on specific communication and data-related solutions to social, technical and market-related bottlenecks.

- (2) Review national regulations for addressing rice safety and quality issues, especially hygiene. Assure that farmers have accurate and transparent information about input constituents and their optimal use for domestic and export markets.
- (3) Establish standard operating procedures for the flow of rice samples for residue testing between GMS nations. Establish domestic food safety and quality metrics and skills. This may be done in partnership with the United Nations Economic Commission for Europe.
- (4) Pilot GS1 barcode-based systems for tracking and tracing exported premium rice varieties from the GMS, such as GI-protected rice and organic rice.
- (5) Review current national regulations and legislation on contract paddy supply arrangements to ensure inclusiveness, transparency, and fairness.
- (6) Establish standard operating procedures for ethical investment (domestic and foreign) in rice processing facilities and wider value chain investments among the GMS countries.

7. Conclusions

The disparities between and within GMS countries in economic development and the effectiveness of current legislative and regulatory systems present risks to neighboring areas due to the integrated nature of GMS rice supply. To protect suppliers and consumers in domestic and export markets, GMS countries need to act collectively to build essential controls for agricultural input quality, postharvest processing, and food safety and quality testing and assurances. Sharing of technical information, capacity, and rice value chain facilities and services between GMS countries can support sustainable rice production, food security, and increased market access.

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About the Core Agriculture Support Program

The Core Agriculture Support Program (CASP) supports the GMS in attaining its goal of being a leading producer of safe food using climate-friendly agriculture practices. Now on its second phase, since 2012, CASP2 is committed to increasing the subregion's agricultural competitiveness through enhanced regional and global market integration and subregional connectivity.

The agriculture ministries of the six GMS countries supervise the implementation of CASP2 through the GMS Working Group on Agriculture (GMS WGA). A technical assistance (TA 8163) with financing from the Asian Development Bank, the Government of Sweden, the Nordic Development Fund, and the Water Financing Partnership Facility supports the CASP2 implementation. The GMS WGA oversaw the development of the discussion papers.

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ADB's vision is an Asian and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to a large share of the world's poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

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Core Agriculture Support Program Phase II

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