

ECONOMIC AND SECTOR WORK REPORT NO 105285-EAP

RICE SECTOR DEVELOPMENT AND POVERTY REDUCTION
IN THE GREATER MEKONG SUBREGION

LESSONS LEARNED

**LEVERAGING
THE RICE VALUE CHAIN
FOR POVERTY REDUCTION**

IN CAMBODIA, LAO PDR AND
MYANMAR



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ACRONYMS AND ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
AWD	Alternate wetting and drying
CASRAD	Center for Agrarian Systems Research and Development, Vietnam
CH ₄	Methane
CRF	Cambodia Rice Federation
EBA	Everything but Arms Agreement
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FDI	Foreign direct investment
FOB	Free on board
GDP	Gross domestic product
GHG	Greenhouse gas
GMS	Greater Mekong Subregion
Ha	Hectares
HAACP	Hazard Analysis and Critical Control Points
IRRI	International Rice Research Institute
MAF	Ministry of Agriculture and Forestry, Lao PDR
MAFF	Ministry of Agriculture, Fisheries and Forestry, Cambodia
MOAI	Ministry of Agriculture and Irrigation, Myanmar
MRF	Myanmar Rice Federation
OECD	Organization for Economic Co-operation and Development
PPP	Purchasing power parity
SPS	Sanitary and phytosanitary
SRP	Sustainable Rice Platform
Tons	Metric ton
USDA	U.S. Department of Agriculture
WBG	World Bank Group
WDI	World Development Indicators
WFP	World Food Programme
\$	US dollar

EXECUTIVE SUMMARY

- 1. Rice is an important agricultural product and food staple in the Greater Mekong Subregion (GMS), especially for its three low-income members – Cambodia, Lao PDR, and Myanmar.** These countries are net exporters of rice, similar to their more advanced neighbors – Thailand and Vietnam – but their rice sector potential is still largely underutilized. They adopt slightly different approaches to rice sector development in terms of the role of the private sector, openness to foreign direct investments (FDI), and commitment to open trade, yet they all aim to remain competitive on export markets and to leverage this competitiveness for poverty reduction and boosted shared prosperity, while achieving other development outcomes such as better nutrition, climate-smart agriculture, and job creation. Cambodia, Lao PDR, and Myanmar are the “target countries” of this report, while Thailand and Vietnam are the peers used for comparison and experience-sharing throughout the report.
- 2. One way to help these countries achieve their objectives is to allow them to learn from each other to both replicate positive lessons from the region and globally and avoid mistakes made by others.** Learning from the recent past is an important starting point, including an assessment of policies and programs that have worked and had large lasting impacts. This learning builds on earlier individual country rice-related studies conducted by the World Bank Group (WBG), other development partners, and academia. Going forward, it is important to identify policies “fit for purpose” of these countries, i.e., tailored to their net export trade position and limited fiscal space. This implies learning from negative experiences with unsustainable, costly programs or unsuitable policies such as farm price supports or buffer stocks. The dialogue between private and public sectors is intensified to clarify the public sector’s roles in an era of constrained government budgets and tough competition on regional and world markets; this calls for targeted delivery of core public goods that would really make a difference to input suppliers, farmers, millers, and traders (i.e., the private sector) in the target countries. Rice federations are already actively engaged in this dialogue, especially in Cambodia and Myanmar, and this dialogue can be extended regionally.
- 3. National economies are becoming more interlinked and interdependent, and cross-border trade plays an increasingly important role in the rice sectors of GMS countries.** Active cross-border trade and technology transfers occur between Cambodia and Lao PDR and Thailand and Vietnam, and between Myanmar and China. Policies from one country affect the others; for example, Thailand’s rice pledging scheme affected prices and trade flows in other GMS countries during 2011-2014, and the reentrance of Myanmar onto world markets has increased competition with Cambodia on the European Union (EU) market under the *Everything but Arms* (EBA) Agreement. These interlinkages are poorly understood and rarely factored in national strategies and plans.
- 4. The WBG, in a strategic partnership with the United Nations’ Food and Agriculture Organization (FAO) and the World Food Programme (WFP), organized a series of workshops in 2015 and 2016 to promote cross-country learning and national, regional, and global experience sharing.** These workshops brought together policy makers, private sector representatives, academia, and development practitioners. They included more than 50 policy makers from the target countries, representing ministries of agriculture, commerce, industrial development, and economy and finance; rice millers and exporters; and academia and think tanks (Myanmar Development Research Institute, Myanmar Yezin Agricultural University, Center for Agrarian Systems Research and Development of Vietnam, Kasetsart University of Thailand, Knowledge Network Institute Thailand, and Thailand Development Research Institute). The WBG was represented by the International Finance Corporation and several Global Practices of the World Bank (e.g., Agriculture, Poverty, Human

Development & Nutrition, Trade & Competitiveness, and Rural, Social & Urban Development), bringing the best practices and knowledge from around the world across the WBG.

5. Six workshops were carried out in 2015 and 2016, including three regional ones in Bangkok and three in-country:¹

- a. The March and May 2015 regional workshops in Bangkok, Thailand, gathered rice experts from five GMS countries (Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam) to develop policy-applied indicators of rice value chain development and verify the data collected in 2013/2014.
- b. The November 2015 regional workshop in Bangkok, Thailand, gathered policy makers, the private sector, academia, and development practitioners for three days to discuss: how rice sector development can contribute more to poverty reduction in Cambodia, Lao PDR, and Myanmar; how it can improve nutrition and gender outcomes, as rice value chains in the target countries lag behind compared to Thailand and Vietnam; and the outlook for global and regional external factors that will shape rice sector competitiveness in the upcoming decade. The workshop also discussed the future policy agenda for rice sector development.
- c. The November 2015 workshop in Vientiane, Lao PDR, focused on sharing Cambodian experiences with rice value chain development, especially the importance of the private sector, the enabling environment required to leverage private investment, and the importance of the public sector's catalytic role, including the partnerships with rice federations.
- d. The December 2015 workshop in Phnom Penh, Cambodia, discussed the challenges for rice sector development in Cambodia, and evolving competitive pressures from Myanmar and Vietnam on global markets.
- e. The January 2016 workshop in Yangon, Myanmar, focused on the competitiveness of its rice sector and farm production economics.

6. This report presents a summary of main findings, lessons learned, and policy recommendations from these workshops. The spectrum of discussions was broad, depending on the interest of each country to learn specific experiences from other countries or from the region and the world. Most workshops brought together private and public sector representatives to facilitate open dialogue and better integrate private sector objectives into agricultural strategies and policies.

7. The major lessons learned from the recent developments are summarized as follows:

- a. **Improved rice sector performance is critical for continued poverty reduction in the target countries.** The sector is still large and important in land use, farm incomes, and food consumption, and can be further leveraged to reduce poverty. Where the rice sector has already contributed to poverty reduction, such as recently in Cambodia and earlier in Vietnam, it has also boosted shared prosperity.
- b. **Rice value chains in the target countries are weaker than those in Thailand and Vietnam, and thus require strengthening to help reduce poverty.** In Cambodia, Lao PDR, and Myanmar, rice value chains are characterized by less efficient input supply systems, lower farm productivity and profitability, a more costly milling sector,

¹ Annexes present the detailed summary of these workshops, lists of participants, and the agenda.

higher exporting costs, and lower valued types of exported rice than in Thailand and Vietnam.

- c. **The target counties can catch up with Thailand and Vietnam, a convergence that offers a high rate of return.** Cambodia is ahead of Lao PDR and Myanmar in catching up with Thailand and Vietnam, triggered by strategic policy decisions in 2010 to liberalize trade, remove agricultural distortions, encourage FDI in rice mills, and encourage stronger ties between value chain players such as farmers and millers. This all helped Cambodia's rice sector to contribute handsomely to poverty reduction: rice sector growth explains an estimated 63 percent of the country's total poverty reduction between 2004 and 2011. The rice sector's contribution to poverty reduction in Lao PDR was also large, 44 percent from 2007 to 2013, but lagged behind that of Cambodia.²
 - d. **Closing the large yield gap between the target countries and their peers can render significant gains.** Yet closing the labor productivity gap, which is even larger than the land productivity gap, would bring even higher rewards. This is because labor productivity directly affects farm incomes and contributes to acceleration of structural transformation.
 - e. **Developing rice value chains in GMS countries is closely associated with raising their export competitiveness.** All GMS countries are net rice exporters, so higher productivity and production of rice can only be sustained by exporting larger surpluses, as they already produce enough rice for domestic consumption. Compared to Cambodia and Myanmar, Lao PDR is still a small irregular exporter to Vietnam, China, and the EU with high annual fluctuations of export quantities, but in the future even Lao PDR can become a consistent exporter. Gaining a competitive advantage on foreign markets depends not only on higher production but also quality, safety, supply reliability, marketing, and branding.
 - f. **The strength of rice value chains is affected by the quantity and quality of private investments in input supply, farm technologies, rice mills, and trading/exporting activities.** The public sector has a large role to play in encouraging private investment through programs, policies, and regulations. Cambodia's decision to open the rice milling industry to FDI in 2010, underpinned by its clear rice export policy, is an example of a "game changing" policy. From zero in 2008, at least 35 percent of Cambodia's modern milling capacities were recorded in 2015 as joint ventures with foreign investors from China, India, and Thailand. This helped increase the national rice milling capacity from 95 tons of paddy per hour in 2009 to 854 tons of paddy per hour in 2015. In contrast, Myanmar's partial easing of rules for FDI since 2011, especially the restrictions on investing in existing mills, has not encouraged investment in its rice value chain.
 - g. **Policies regulating markets are important.** Lao PDR uses quantitative restrictions for rice exports from time to time depending on domestic production. Its export therefore remains small. Cambodia pursues an open trade policy and permits export of both rice and paddy, which helps increase export volumes. Myanmar liberalized trade and unified exchange rates in 2012, which led to a doubling of its rice exports between 2011 and 2014.
8. **Going forward, the target countries are well positioned to strengthen their rice value chains.** This is because new emerging opportunities exist, including beneficial medium-

² Similar estimates for Myanmar are not available due to the lack of historical poverty data.

term projections for global rice demand growth, and high potential for the target countries to increase cropping intensity and close the large yield gaps with other Asian countries, which is easier to do by adopting already tested existing technologies than to invent new technologies that shift up the production possibility frontier. Opportunities also arise from the growing recognition in all target countries for the need to shift from the paradigm of rice production to strategies supporting broader objectives such as economic growth, competitiveness, better nutrition, and environmental sustainability.

9. **Capitalizing on these opportunities will depend on the target countries' ability to withstand the emerging challenges.** These include declining per capita demand for rice, strong competition on the global rice market, and the protectionist policies of major rice importers. Challenges also include rising competition from other crops for land, water, labor, and capital, their higher profitability, and more demands for the rice sector to contribute more towards better nutrition and reduced greenhouse gas (GHG) emissions. They are discussed in turn:

- a. **In spite of the higher aggregate global demand for rice over the medium run, exporters will face headwinds from several dimensions.** Per capita rice consumption is projected to decline as consumers shift to other food. Global rice prices are also on the decline: they are predicted to be 10 percent lower in 2025 than in 2015. Rice prices will remain volatile, adding uncertainty for producers and investors, thereby increasing the risk of political interventions aimed at stabilizing prices. Price stabilization efforts in net exporting countries have historically undermined export competitiveness, so an outlook of high price volatility is not encouraging.
- b. **Importers will buy more rice but competition among exporters will be fierce.** Vietnam, for example, recently signed a series of free trade agreements, including with the EU, challenging the recent monopoly of Cambodia and Myanmar in accessing the EU market through the EBA. In developed countries, consumers increasingly demand safer and higher-quality rice, further challenging the target countries. Accessing other markets will be difficult as rice remains politicized and all major rice importers seek to increase production to reduce imports. They may not be successful in reducing import needs, but they will continue to prohibit free imports and raise import barriers.
- c. **Rice producers face rising competition from other agriculture subsectors.** As incomes have risen across the world and urbanization increased, diets have diversified and substitution has occurred between types of food. Thus, producing and selling crops other than rice will offer higher growth opportunities. In addition, other crops are often more profitable, especially during the dry season, so switching from dry season rice to beans and pulses, for example, may bring higher profits. Also important, many crops are less costly and water-intensive to produce, all important factors in the credit- and water-constrained context of GMS countries.
- d. **The target countries are confronted with high malnutrition rates, especially child stunting, to which (still) low paddy profitability and (still) high rice consumption may contribute.** The increase in profitability of paddy production will bring more income to paddy growers, helping them to address some of the nutrition challenges. But making rice value chains more nutrition-sensitive through rice fortification and increasing awareness about the higher nutritional value of less polished and milled rice will be challenging and overcome only with large efforts.

- e. **The rice sector contributes heavily to climate change.** Paddy cultivation is the second largest emitter of GHGs in agriculture, with 90 percent of emissions originating in Asia. Agriculture is expected to contribute to mitigation efforts to save the planet, including Asia's rice sector. Cutting emissions from rice production and the associated use of fertilizers requires higher spending on programs that improve water, soil nutrients, and residue management and more capacitated extension services to help farmers adopt climate-smart technologies and diversification to other crops, a challenge in low-income countries.

10. **Taken together, these challenges are to be seen as an opportunity to conduct reforms and gain an edge in rice competitiveness, efficiency, and resilience.** Rice will remain an important crop in the GMS countries, and a significant diversification away from rice will be more successful on the back of superior paddy cultivation performance than as an alternative to struggling paddy cultivation. A farmer who is struggling with paddy productivity or quality is likely to have problems handling other crops, which require more specialized knowledge, more attentive care or good access to urban markets.

11. **The target countries have many policy instruments to improve the performance of their rice value chains that would help them capitalize on opportunities and overcome challenges.** Some of these instruments are presented in Table ES1. They arose from numerous discussions at the workshops and build on earlier individual country rice-related studies.³ These instruments have a varying degree of urgency and significance in the target countries, ranging from low (*) to very high (***). And many of them offer a high potential for public-private partnership (PPP) to achieve the best results. Shifting from production and export targets to supporting rice value chain actors' income is a new policy paradigm to be adopted by the target countries to continue to leverage their rice sector for sustained poverty reduction.

³ These and other studies can be found in the Reference chapter of the report.

Table ES1: Policy instruments for leveraging rice value chain for poverty reduction in the GMS target countries

Policy instruments	Cambodia	Lao PDR	Myanmar	PPP
<i>Input supply</i>				
Invest more in production of better quality and more diverse breeder and foundation seeds of all major crops	***	***	***	
Improve enabling environment for private sector investments in seed production and multiplication	***	***	***	X
Strengthen quality control of farm inputs (seeds, fertilizers, chemicals)	***	***	***	X
<i>Paddy production</i>				
Remove rice land use requirements	*	**	***	
Improve quality of irrigation investments by				
- Proper O&M of existing systems	***	***	***	
- Drainage improvements and multipurpose	***	**	***	
- Systems upgrades to allow alternate wetting and drying	**	**	**	
Strengthen public extension services and link them better with research	***	***	***	
Develop vocational training for agricultural mechanization	***	**	***	X
Invest in programs for soil nutrient and integrated pest management	***	***	***	
Design programs supporting women farmers and nutrition	***	***	***	
<i>Milling</i>				
Remove cumbersome requirements for FDI	*	**	***	X
Support contract farming with rice mills	**	***	***	X
Facilitate rice mill food safety management certification	**	***	***	X
Promote rice fortification	**	**	**	X
Invest in electricity generation and distribution	***	*	*	
Promote the use of green gasifiers by mills	**	*	***	X
<i>Trade</i>				
Maintain predictable trade policy	*	***	**	X
Promote competition among exporters	*	**	**	X
Develop rice brand(s)	**	***	***	X
Support market intelligence and marketing campaigns	***	***	***	X
Improve trade facilitation services for cross-border trade	***	***	***	
Reduce export processing costs	***	**	**	X

*Note: Urgency/significance: * low; ** high; *** very high. PPP – private-public partnership.*

Source: Authors' presentation.

CHAPTER 1: SETTING UP THE CONTEXT

1. **Rice is the main agricultural product and food staple in Asia.** Its importance is comparable to that of wheat in Europe and the Middle East or maize in East and Southern Africa. Rice in Asia plays important economic, cultural, and political roles, and in some countries it still has a significant leveraging role in the economy as it accounts for high shares of gross domestic product (GDP) and labor force. In the Greater Mekong Subregion (GMS),⁴ these countries include Cambodia, Lao PDR, and Myanmar, which belong to a group of low-income countries with low paddy yields and low cropping intensity but high agricultural potential. The rice sector dominates agriculture and food in these countries even more than in neighboring Thailand and Vietnam (Table 1), and its further development offers many benefits in the short to medium run, including a reduction in extreme poverty, boosted shared prosperity, lower greenhouse gas (GHG) emissions, job creation, especially in the rice processing and trade industries, and improved nutrition.

Table 1: The importance of rice in GMS countries

	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Production					
Share of arable land under paddy, %					
Wet season	62	60	58	59	68
Dry season	12	6	10	14	36
Labor use for paddy production, wet season, days/ha	50	>100	80-130	5-10	23-60
Consumption					
Food calories coming from rice, %	63	61	73	40	52
Share of rice in household food spending, %	33	26	21	3	13
Share of rice in food spending of poor households, %	46	42	35	4	26

Note: Data for production are for 2013/14. Data for consumption are between 2010 and 2014 depending on data availability by country.

Source: WDI 2015, FAOSTAT 2015, and various World Bank reports.

2. **Cambodia, Lao PDR, and Myanmar have much in common regarding their potential to use the rice sector in poverty reduction.** This allows for a regional approach and cross-country knowledge-sharing for the “target countries” of this report. What are these common features?

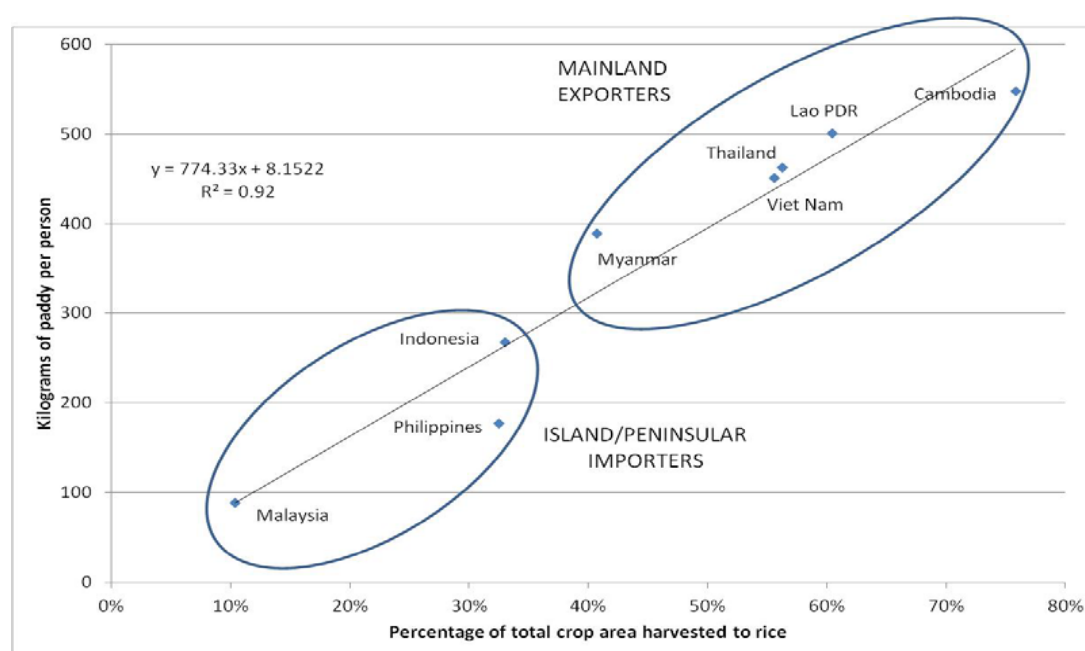
3. **First, all three are net rice exporters.**⁵ Unlike island countries (Indonesia, Malaysia, and the Philippines) or countries with limited land and water (China), but similar to Thailand and Vietnam, they have strong natural advantages (i.e., sufficient land and water, with main rice production bowls located in the deltas of the Mekong and Ayeyarwaddy Rivers) to generate rice surpluses (Figure 1). Such environments are particularly suitable for cultivating rice, which, unlike wheat and maize, has a semi-aquatic ancestry and is thus particularly

⁴ The Greater Mekong Subregion is a country grouping introduced by the Asian Development Bank. It includes China, Cambodia, Lao PDR, Myanmar, Thailand, and Vietnam. When referring to GMS herein, China is excluded due to its unique large size, net importer trade status, and its different history of development compared to that of other GMS countries.

⁵ Lao PDR is still a small exporter, but with the potential to become a larger and more consistent exporter.

sensitive to water shortages. The river systems also allow for lower-cost transportation of rice over medium and long distances, thereby facilitating exports (Dawe 2013).

Figure 1: Rice production endowments, ASEAN⁶ countries



Note: Data are average for 2008-2010. Raw data are from FAOSTAT.

Source: Dawe 2013.

4. **Rice exports in turn can be leveraged for economic development.** Larger exports is one of the best available options for the target countries to convert the anticipated higher productivity and production of rice into higher farm income, because all three countries already produce more than enough rice for domestic consumption (Table 2). Another option is improve rice quality and penetrate into higher quality and niche markets. The export volumes of the target countries are relatively low now compared to those of Thailand and Vietnam, but relative to production the ratio is not far away. In 2014/15, Cambodia's share of export to production was 23 percent versus 22 percent in Vietnam and 48 percent in Thailand. Myanmar's share was 16 percent, while Lao PDR's was close to zero. More than half of the target countries' rice exports go across the border informally, another common feature.

⁶ ASEAN is the Association of Southeast Asian Nations.

Table 2: Production and consumption ('000 tons) of rice, 2014/15

Country	Production	Consumption	Exports
Cambodia	4,700	3,700	1,100
Lao PDR	1,875	1,840	small
Myanmar	12,600	10,550	2,000
Thailand	18,750	11,700	9,000
Vietnam	28,074	22,000	6,300

Note: Production and consumption are expressed in milled rice terms.

Source: FAS-USDA 2015.

5. **Second, they are poorer than Thailand and Vietnam (Table 3) and many people in these countries depend on agriculture.** These three countries are actually the last so-called “agriculture-based” economies in East Asia, with large shares of agriculture in national accounts (GDP and labor force).⁷ Figure 2 shows that by 2012, all other East Asian countries had left the “agriculture-based” phase of development, transitioning further left, closer to “urbanized” Korea and Japan. The good news for the target countries is that the 2008 World Development Report found that in “agriculture-based” economies, growth originated in agriculture is four times more effective in reducing poverty than growth originating in any other sector (WDR 2007). Since rice production dominates the agriculture sector in Cambodia, Lao PDR, and Myanmar, rice sector improvements offer tremendous economic benefits, while a failure to launch the rice sector will handicap overall agricultural growth.

Table 3: Selected poverty and agricultural indicators in GMS countries

	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Poverty headcount, %					
• National poverty line	17.7	23.2	19.6	10.5	13.5
• International poverty line (\$1.25/day, PPP)	6.1	30.0	26.5	0.1	3.2
Share of agriculture (crops, livestock, and forestry) in GDP, %	26	27	30	12	18
Share of agriculture in labor force, %	51	66	52	40	47

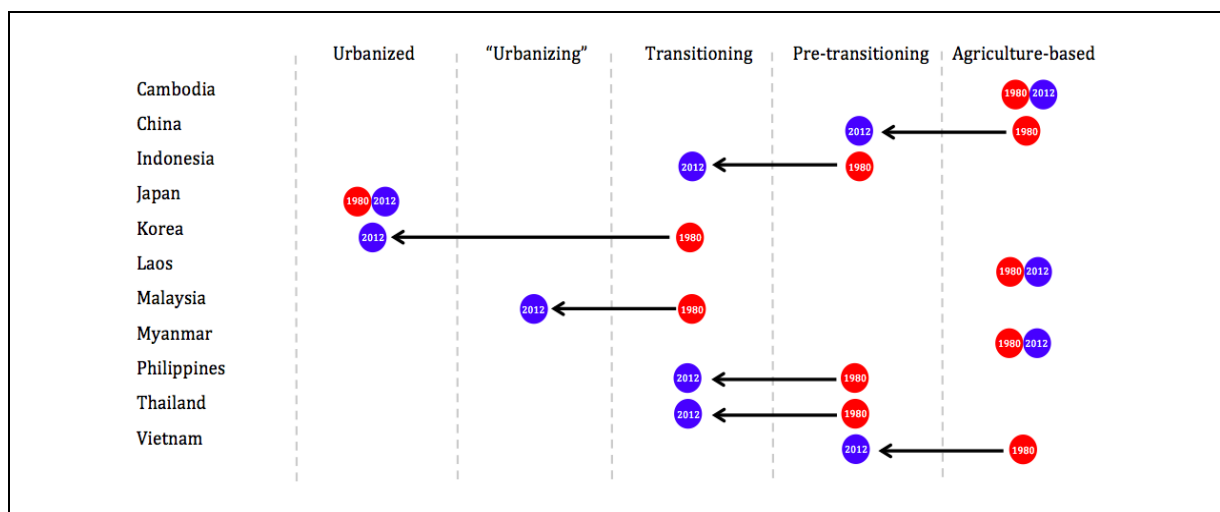
Note: Data are for 2013 and 2014, except for poverty in Myanmar, which is for 2015.

Source: World Bank EAP Poverty and Equity Portal and World Bank poverty reports; WDI 2015; World Bank and MNPED forthcoming; FAOSTAT 2015.

6. **Third, the target countries have good rice sector and overall agricultural potential.** Paddy yields, both average and those of better farms, in these countries lag behind yields in Thailand and especially Vietnam (Table 4). Their cropping intensity is also much smaller, along with yields resulting in much lower agricultural value added per hectare. Yet these countries have sufficient arable land and suitable agro-ecology to catch up with their more advanced neighbors.

⁷ The 2008 World Development Report divided all countries into five groups depending on the share of their agriculture sector in GDP and labor force. Countries with a large share were included in an “agriculture-based” group and countries with a small share in an “urbanized” group.

Figure 2: Agricultural transformation in selected East Asian countries, 1980 versus 2012



Source: Authors' presentation based on WDR 2007.

7. **Fourth, some of the target countries already have a proven record for using the rice sector in poverty reduction.** Cambodia stands out as a good example: 63 percent of poverty reduction during 2004-2011 was driven by positive developments in the rice sector (World Bank 2013b). Cambodia has repeated the earlier performance of Vietnam, whose increased paddy productivity in the 1990s and consequent growth in rice exports helped reduce poverty, from 34.8 percent in 1998 to 16.2 percent in 2008, measured at \$1.25 a day in 2005 purchasing power parity (PPP) (Minot and Goletti 2000; World Bank 2012c).

Table 4: Selected rice productivity and agricultural income indicators in GMS countries, 2013/14

	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Average paddy yields, tons/ha*	2.9	3.0	2.7	3.0	5.5
Best farm paddy yields, tons/ha**	3.5	4.0	3.5	5.7	7.0
Cropping intensity, %***	119	110	118	124	154
Agricultural GDP, \$/ha of arable land****	1,161	1,871	1,800	2,825	4,910
Arable land per person, ha***	0.27	0.22	0.21	0.25	0.07

*Source: *FAS-USDA 2015; **Bordey et al. 2015, LIFT and World Bank 2016, and World Bank and AusAid 2015; *** WDI 2015.*

8. **At the same time, Lao PDR and Myanmar's rice sectors have been underperforming, putting a dent in poverty reduction efforts there.** In Lao PDR, the poverty headcount (measured at \$1.25 a day in 2005 PPP) fell only by 17 percent, from 36.3 percent in 2007 to 30.0 percent in 2012, in spite of high per capita GDP growth (Table 5). In comparison, the poverty headcount in Cambodia declined by 79 percent during the same period at lower per capita GDP growth. The difference is in the contribution of agriculture and particularly the rice sector to overall GDP: in Cambodia, average growth in agricultural GDP during 2007-2012 was 4.6 percent while in Lao PDR it was 3.3 percent (WDI 2015). In Myanmar, for which poverty estimates in 2005 PPP are not yet available, the poverty headcount at the national poverty line declined by 29 percent between 2009/10 and 2015 (Table 5). At an

annual per capita GDP growth at 6.3 percent, the growth elasticity of poverty was only 0.9, similar to the situation in Lao PDR.

Table 5: Poverty and poverty growth elasticity in selected GMS countries

Country	Poverty headcount in 2007, %	Poverty headcount in 2012, %	Annualized per capita GDP growth rate, %	Growth elasticity of poverty
Cambodia	29.4	6.1	3.3	5.2
Lao PDR	36.3	30.0	5.9	0.5
Myanmar	37.5	26.5	6.3	0.9

Note: Poverty headcount for Cambodia and Lao PDR is measured at \$1.25 a day in 2005 PPP. Annualized per capita growth is for 2007-2011. Poverty headcount for Myanmar is measured at the national poverty line from 2009/10 to 2015. Annualized per capita growth is for 2010-2015.

Source: World Bank East Asia Poverty and Equity Portal; World Bank 2015b; World Bank 2014c.

9. **Many questions arise, including the following.** What were the drivers of rice sector growth in Cambodia and how did this growth translate into lower poverty? Why was the growth-poverty link weaker in Lao PDR and Myanmar? What are the future drivers of rice sector growth in the target countries? Are their rice value chains prepared to capitalize on the emerging opportunities and respond to challenges? How can the rice sector adjust to the higher profitability of other crops? How can the rice sector be better leveraged for better nutrition and lower carbon emissions? And what should be the role of government vis-à-vis the private sector going forward?

10. **These questions are critical for all three target countries.** The report provides answers to these questions, organized as follows. Chapter 2 presents an overview of recent experiences in leveraging rice for poverty reduction in the GMS. Chapter 3 discusses opportunities and challenges going forward. Chapter 4 presents a comparative analysis of rice value chains, including an analysis of their preparedness to use the rice sector for poverty reduction and achievement of other social and economic development objectives such as climate change mitigation, improved nutrition, and job creation. Chapter 5 presents policy recommendations.

CHAPTER 2: RICE SECTOR AND POVERTY REDUCTION IN THE MEKONG: RECENT EXPERIENCES

11. As mentioned above, Cambodia is a good example of how positive rice sector developments can drive poverty reduction. The poverty headcount measured at the national poverty line declined from 50.2 percent in 2004 to 17.7 percent in 2012, or by 65 percent. Measured at \$1.25 a day in 2005 PPP, the decline in the poverty headcount was even larger (81 percent), from 32.0 percent in 2004 to 6.1 percent in 2012 (Figure 3). The number of poor people fell from 4.9 million in 2004 to 0.6 million in 2012 (Figure 4).

Figure 3: Poverty reduction in Cambodia, 2004-2012

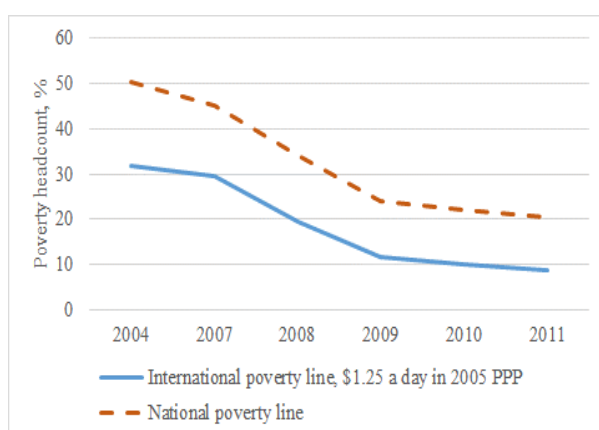
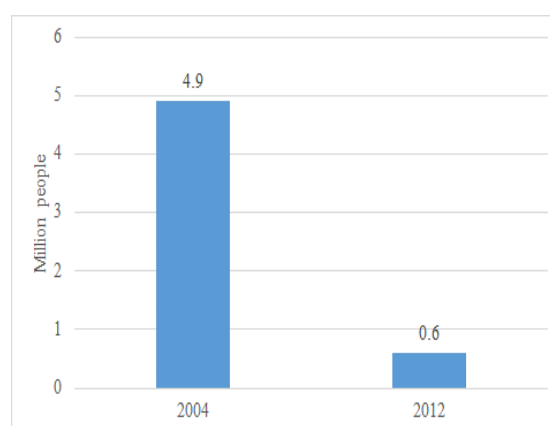


Figure 4: Number of poor people in Cambodia, 2004-2012

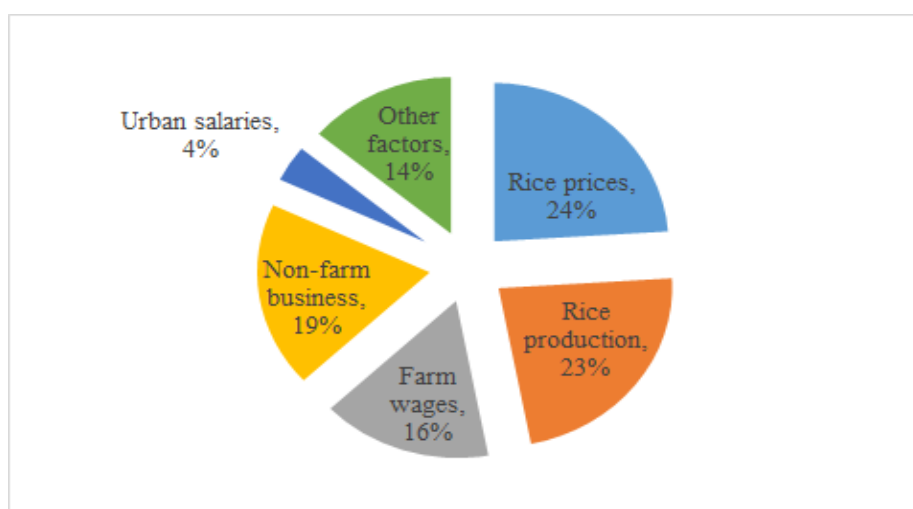


*Note: * Poor are those living below \$1.25 a day.*

Source: EAP Poverty and Equity Databank; World Bank 2013b.

12. The World Bank estimated that 63 percent of Cambodia's poverty reduction was linked to the rice sector (Figure 5). How did it happen?

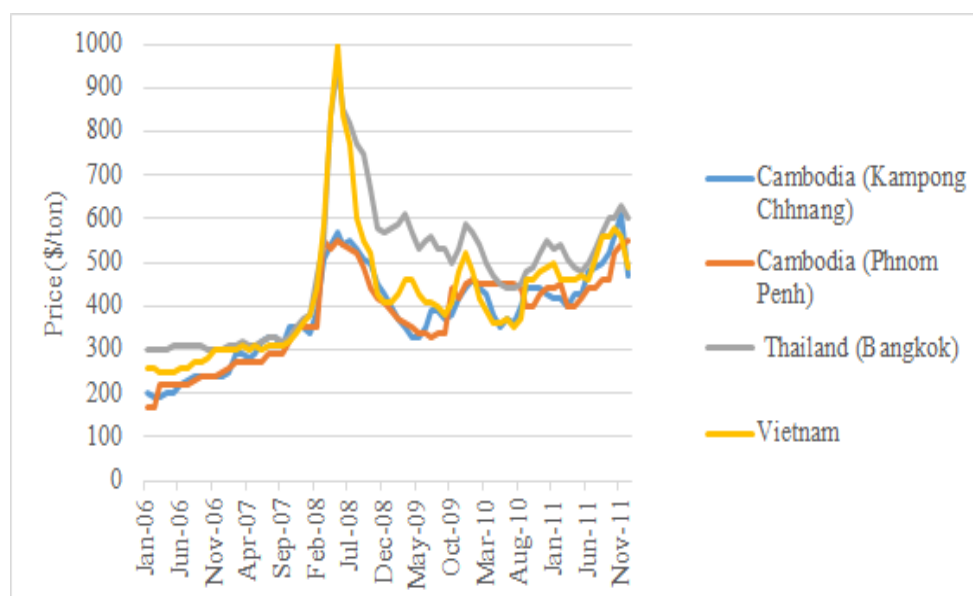
Figure 5: Factors explaining poverty reduction in Cambodia, 2004-2011



Source: World Bank 2013b.

- a. Higher rice prices (24 percent): The significant increase in global rice prices in 2008 led to higher prices in Cambodia (Figure 6). With its commitment to an open trade policy, the government permitted the transmission of higher global prices into local markets. In Cambodia, the number of net buyers of rice is higher than the number of net sellers (Table 6) but poverty is higher among net sellers so higher rice prices in general increase incomes of the poor in the short run (World Bank 2013b).

Figure 6: Rice prices (\$/ton) in Cambodia, Thailand, and Vietnam, 2006-2011



Source: FAO-GIEWS 2015.

Table 6: Net sellers and buyers of rice in Cambodia, 2011

	Share, %
Net sellers, % of population	37
Net buyers, % of population	41
Autarky situation, % of population	22

Source: World Bank 2013b.

- b. Higher rice production (23 percent): Higher rice prices, improved access to better seeds and other inputs, improved irrigation, an open trade policy, and an inflow of FDI in the rice milling sector were among the key factors that triggered the 9.4 percent annual increase of paddy production during 2004-2011 (World Bank and AusAid 2015). Paddy producers could sell more of more expensive paddy, thereby increasing their incomes. It should be noted, however, that more than 60 percent of the production increase was due to land expansion, especially in the dry season, not productivity increases.
- c. Higher agricultural wages (16 percent): Higher production of paddy and other agricultural products resulted in increased farm wages.⁸ From 2005 to 2013, average farm wages increased by an estimated 265 percent (World Bank and AusAid 2015).

⁸ The growth in farm wages was also a result of other factors, such as higher wages in the garment and construction sectors.

13. **The positive impact of higher agricultural prices on poverty reduction in Cambodia was confirmed by a global study carried out by the World Bank (Ivanich and Martin 2014).** The study used household models based on detailed expenditure and agricultural production data from 31 developing countries, including Cambodia, to assess the impacts of changes in global food prices on poverty. Higher agricultural prices were found to have beneficial poverty effects in Cambodia. Table 7 presents poverty impacts for 10 and 50 percentage point increases in global agricultural prices, predicting poverty to reduce by 4.8-15.8 percent in Cambodia when higher agricultural prices are fully transmitted into higher consumption (short-run effect), higher wages (medium-run effect), and higher production (long-run effect).

Table 7: Poverty impacts of global food price rises on Cambodia

	10 percentage point increase in global prices	50 percentage point increase in global prices
Short-run poverty impacts (price effect)	-3.0	-10.1
Medium-run poverty impacts (price and wage effects)	-4.6	-14.6
Long-run poverty impacts (price, wage, and production effects)	-4.8	-15.8

Note: Poverty headcount is at \$1.25 a day in 2005 PPP.

Source: Ivanich and Martin 2014.

14. **Higher paddy production in Cambodia led to large surpluses that were exported as domestic consumption was fully satisfied.** In 2004, rice production was still below consumption, according to the USDA. In 2011, production exceeded consumption by 70 percent (Table 8). Rice was thus exported outside of the region, mainly to the European Union (EU), and across the border with Thailand and especially Vietnam, mainly in the form of unmilled paddy.

Table 8: Rice commodity balance ('000 tons) in Cambodia, 2008-2013

	2008	2009	2010	2011	2012	2013
Total paddy production	7,175	7,586	8,250	8,779	9,291	9,389
Total milled rice production	4,305	4,552	4,950	5,267	5,575	5,633
Domestic consumption of rice	2,862	2,937	3,039	3,126	3,212	3,256
Total surplus of rice	1,443	1,614	1,911	2,142	2,368	2,378
Export of rice	1.5	12.61	105.26	201.89	205.71	378.85
Estimated export of paddy (in milled rice equivalent)	100	200	350	1,472	1,600	1,536

Source: World Bank 2014a.

15. **Cambodia successfully penetrated the EU market, using a zero tariff access to the EU granted under the EBA.** Most of its formal FOB (free on board) exports go to EU countries⁹ and Cambodia accounts for half of the total EU imports under the EBA Agreement. It mainly sells fragrant varieties, which are of higher value and demand. In comparison,

⁹ Main destinations in 2014 were France (27.5 percent of total import), Poland (22.0 percent), Netherlands (12.6 percent), Belgium (7.3 percent), Czech Republic (5.2 percent), the United Kingdom (4.6 percent), Spain (4.6 percent), and Germany (4.5 percent).

Myanmar sells a low-quality broken rice, with an FOB price of \$340/ton while Cambodian fragrant rice was priced at \$850/ton in 2014/15 (see Table 45 in Chapter 5).

16. **The rice sector played a major role in poverty reduction in Lao PDR, where poverty has also fallen, but its impact was smaller than in Cambodia.** The poverty headcount rate at both the national and international poverty lines decreased by 30 percent (Figure 7) compared to the 60-70 percent reduction in Cambodia. The number of poor declined by 21 percent, from 2.4 million in 2002 to 1.9 million in 2012 (Figure 8), versus 59 percent in Cambodia.

17. **The agriculture sector contributed an estimated 43.7 percent to poverty reduction in Lao PDR during 2007-2013** (World Bank 2015b). In Lao PDR, agriculture is strongly associated with rice production. Out of 783,000 farm households, 775,000 produce paddy (MAF 2015). In 2010/11, 75 percent of total arable land was sown with paddy. Why was the rice sector's contribution to poverty reduction smaller in Lao PDR than in Cambodia?

Figure 7: Poverty reduction in Lao PDR, 2002-2012

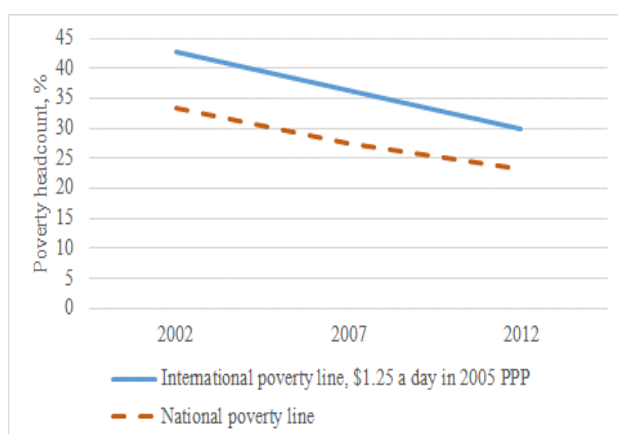
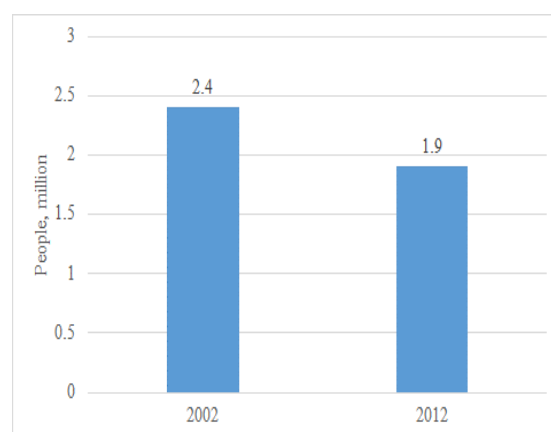


Figure 8: Number of poor people in Lao PDR, 2002-2012



*Note: * Poor are those living below \$1.25 a day.*

Source: EAP Poverty and Equity Databank.

18. **The first reason was a smaller increase in paddy production.** During 2004-2012, paddy production in Lao PDR increased annually by 3.7 percent, a much lower rate than in Cambodia (Table 9). Most of this production growth came from expansion of harvested area. Land productivity growth was dismal – annual paddy yield grew by 0.8 percent. The resulting increase in production created a very small rice surplus, with production exceeding consumption by only 5-10 percent.

Table 9: Rice production in the target countries, 2004-2012

	Harvested area, annual change, %	Paddy yield, annual change, %	Paddy production, annual change, %
Cambodia	5.2	4.2	9.4
Lao PDR	2.9	0.8	3.7
Myanmar	0.5	0.9	1.4

Source: FAS-USDA 2015.

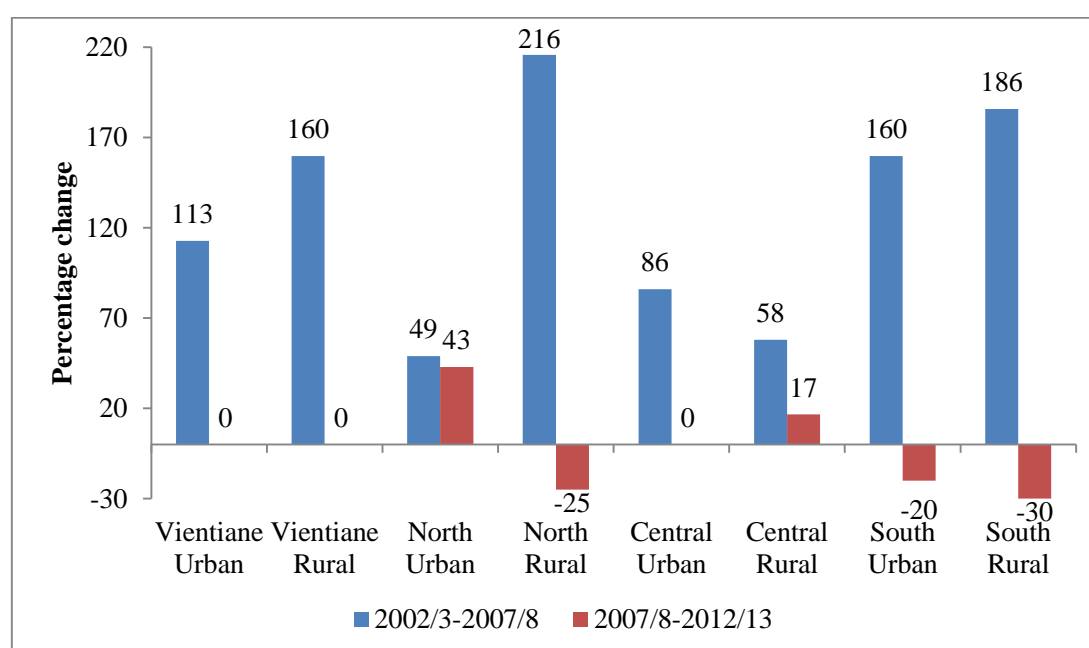
19. **The second reason was the negative rice price effect.** Poverty in Lao PDR is higher among net sellers of rice, the same as in Cambodia. About 53 percent of the poor households in Lao PDR are net sellers of rice compared to 40 percent of the poor being net buyers (Table 10). Furthermore, most net buyers of rice are seasonal, with only 6 percent of poor Laotians buying rice year round. So when rice prices increase, poverty is expected to decline. Rice prices in Lao PDR, however, remained unchanged or even dropped during 2007-2012, at least at the village level (Figure 9). In this regard, it should be noted that most rice produced and consumed in Lao PDR is glutinous, and the glutinous rice market functions quite independently of the white rice market. Thus, it is not necessarily surprising that rice prices moved differently in Lao PDR and Cambodia. In any event, due to the price decline, Lao PDR's production response was small compared to that of Cambodia.

Table 10: Net sellers and buyers of rice in Lao PDR, 2012

	All year net buyers	Seasonal net buyers	Autarky	Small sellers	Large sellers
Non-poor, % of all non-poor	22	27	3	22	26
Poor, % of all poor	6	34	7	30	23
Average, %	19	28	4	23	25

Source: World Bank 2015b.

Figure 9: Changes in paddy prices at village level, Lao PDR, 2002-2012



Note: Prices are expressed in nominal terms.

Source: World Bank 2015b.

20. **The third reason was Lao PDR's weak export performance.** Official statistics report zero or very small rice exports. Most rice produced in Lao PDR is consumed domestically (Table 11). Cross-border trade with Vietnam is estimated at 100,000-200,000 tons per year, but this trade is hampered by the export quota (70,000 tons) and recurrent, often informal, bans on paddy export. Trade is subject to restrictions because the authorities are concerned about a small rice surplus generated by Lao farmers and the thinness of glutinous rice market (i.e., Thailand and Vietnam are the only other producers of glutinous rice). Once rice production

increases, however, proactive trade promotion would be necessary to achieve long-run poverty impacts from higher rice production.

Table 11: Rice commodity balance ('000 tons) in Lao PDR, 2000-2011

	2000	2005	2011
Production of milled rice	1,468	1,712	2,044
Food consumption	860	945	1,058
Other consumption	512	660	950
Imports	15	25	19
Exports*	0	0	0
Ending stocks	111	133	56

*Note: * Official export is estimated to be zero. Unofficial exports average 100-200 thousand tons.*

Source: FAOSTAT 2015.

21. **In Myanmar, the link between rice sector development and poverty reduction is more difficult to establish due to the lack of accurate historical data.** Yet some preliminary analysis can be made. According to preliminary World Bank estimates, the poverty headcount decreased from 37.5 percent in 2009/10 to 26.5 percent in 2015 using the methodology established in World Bank 2014c. Some of this poverty reduction might have been due to the recent increase in paddy production. During 2010/11 and 2014/15, paddy production increased by 3.3 percent annually, entirely due to the rising yields, using the data from USDA. Performance during this recent period contrasts with performance between 2004 and 2012, during which annual paddy production rose by only 1.4 percent (Table 9). Since the largest number of poor in Myanmar live in the Delta and Dry Zone, the country's main paddy production areas (Table 12), the increase in paddy production and productivity is likely to have contributed to lower poverty rates in Myanmar (World Bank 2014c).

Table 12: Rice and poverty in Myanmar

	Number of farm households	Area planted to annual crops, % of total area	Paddy production, million tons	Number of poor people in 2009/10, millions
Delta	1,431,340	47	9.6	4.6
Dry Zone	2,067,374	41	4.6	5.3
Hills	909,229	7	2.3	2.5
Coastal area	578,732	6	2.9	3.1
Myanmar	4,986,672	100	19.4	15.5

Source: MOAI 2013; World Bank 2014c.

22. **The improved export performance might have also added a positive impetus to poverty reduction.** Exports rose from 190,000 tons in 2004 to 1,750,000 tons in 2014 (Table 13), although the overall surplus (defined as production less domestic consumption) remains small. In 2014, the ratio of rice surplus to production in Myanmar was just 15 percent, compared to 30 percent in Cambodia and Vietnam and 50 percent in Thailand. In 2012/13, export was equally divided between FOB export through Yangon Port and cross-border sales to China (LIFT and World Bank 2014). In 2014/15, about 75 percent of rice export went to China through cross-border trade, with the larger FOB export to the EU not able to fully compensate for the loss in exports to Africa (Table 14).

Table 13: Rice commodity balance ('000 tons) in Myanmar, 2004-2014

	2004	2008	2010	2012	2014
Production	9,570	11,200	11,060	11,715	12,600
Consumption	10,300	10,800	10,100	10,400	10,650
Exports	190	1,052	1,075	1,163	1,750
Ending stocks	709	548	485	553	572

Source: FAS-USDA 2015.

Table 14: Rice export (tons) by destination, Myanmar, 2012-2014

	2012/13	2013/14	2014/15
EU	77,117	71,868	204,355
ASEAN plus 3	763,708	932,419	1,400,951
Middle East	10,135	8,888	33,413
Africa	200,731	1,746	2,950
Other	112,969	98,529	99,488
Total exports	1,423,3701	1,262,617	1,840,588
Formal FOB trade, %	42.8%	31.0%	25.1%
Informal cross-border trade, %	57.2%	69.0%	74.9%

Source: World Bank estimates based on data from Myanmar's Ministry of Commerce and Customs.

23. **As in Cambodia and Lao PDR, most paddy producers in Myanmar are net sellers of rice.** A survey of about 1,730 farms carried out in four regions of Myanmar during the 2013 monsoon season and 2014 dry season found that their paddy production exceeded own farm consumption. Per capita annual consumption of milled rice ranged from 112 kg in Sagaing region to 152 kg in Bago region, while per capita production of paddy was 361 kg in Sagaing region, 1,078 kg in Bago region, and 1,238 kg in Ayeyarwady region.¹⁰ Even small farms, those with farmland area less than 1 ha, were consistently found to be net sellers (Table 15). This implies that they benefited from the larger rice export. Export is not the only factor determining rice prices in Myanmar, but if exports had been lower, paddy prices would have been lower too.

24. **Not known in Myanmar, however, is the relative poverty rate of net sellers vis-à-vis net buyers.** In both Cambodia and Lao PDR, net sellers of rice are poorer than net buyers, so higher paddy prices or lower costs between farm-gate and markets leading to higher profits from selling paddy reduce poverty. This may not hold in Myanmar. Poverty in Myanmar is highest among landless and small farmers, who are net buyers of rice. More unequal land distribution in Myanmar than seen in other target countries hints at less clear short-run positive effects of higher rice prices on poverty, even if small farms are net rice sellers, although most rural landless are wage workers so in the medium run they can also benefit from higher wages triggered by higher prices and production.

¹⁰ On average, it takes 1 kg of "paddy" to produce 0.6 kg of "rice" in Myanmar. In other words, the average milling ratio is 60 percent.

Table 15: Net rice seller position by farm size in Myanmar, 2013/14

	Net surplus per farm, kg of paddy	Surplus as share of production, %	Sales as share of production, %
Ayeyarwady region			
Small farms	1,935	64	62
Medium farms	4,270	79	66
Large farms	8,263	86	71
Bago region			
Small farms	1,731	55	50
Medium farms	4,882	78	61
Large farms	7,396	80	67
Sagaing region			
Small farms	145	10	60
Medium farms	1,215	55	66
Large farms	2,129	67	66
Shan State			
Small farms	2,336	68	50
Medium farms	4,431	81	73
Large farms	4,422	80	76

Source: LIFT and World Bank 2016.

25. **In summary, history reveals that the rice sector can be leveraged for poverty reduction.** Cambodia is a clear example of how this can be done, especially when rice prices are high. All three target countries lag behind Thailand and Vietnam in many respects, from yields and cropping intensity to export volumes and agricultural income. Thus they can still count on the rice sector to reduce poverty in the near future. Whether their potential is actually realized depends on many factors, especially the quality of agricultural policies and public programs aimed at capitalizing on the evolving opportunities and addressing challenges. These opportunities and challenges are discussed in Chapter 3.

CHAPTER 3: EMERGING OPPORTUNITIES AND CHALLENGES

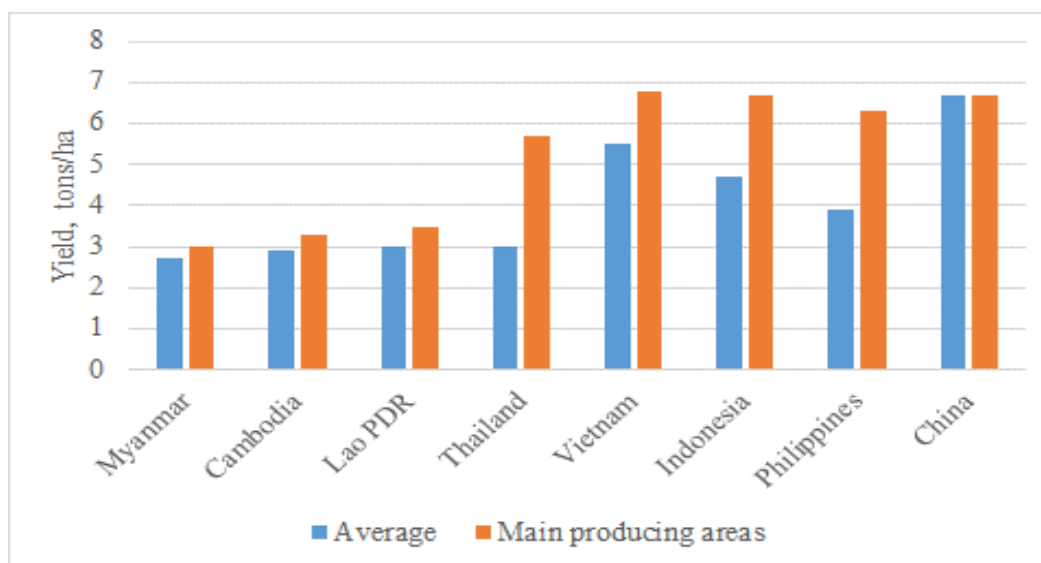
Opportunities

26. **A number of short- to medium-run opportunities exist for the rice sector in the target countries.** If capitalized on, the rice sector will certainly contribute to poverty reduction. These opportunities include closure of the large paddy yield gap, the high potential to increase cropping intensity in a sustainable manner, and rising global demand for rice. The target countries have also started to shift from rice production-centric strategies to strategies aimed at achievement of broader objectives such as promotion of export and value chains. They can build on this shift to move further to a new policy framework for supporting the rice sector.

(i) *Closing paddy yield gaps*

27. **In spite of recent improvements, average paddy yields are still very low in all three target countries.** Their paddy yields average less than 3 tons/ha, while yields in other countries are much higher, both on average and in the main rice bowls (Figure 10). There is no reason why the target countries cannot close the yield gap, at least with Thailand and Vietnam, countries with similar agro-ecology and sometimes even less favorable (smaller) farm sizes (e.g., Vietnam). Closing the paddy yield gap offers high rates of return for the target countries.

Figure 10: Paddy yields (tons/ha), country average and main producing areas, 2013/14



Source: FAS-USDA 2015 for the country average yields; Bordey et al. 2015 for the main producing area yields in China, Indonesia, the Philippines, Thailand, and Vietnam; World Bank estimates for the main producing area yields in Cambodia, Lao PDR, and Myanmar.

(ii) *Increasing cropping intensity*

28. **Most paddy in the target countries is produced during the wet (or monsoon) season.** In 2013/14, the share of paddy produced during the dry season in total production ranged from 13 percent in Lao PDR to 23 percent in Cambodia (Table 16). In Thailand and Vietnam, this share was close to a half of total production.

29. **The difference is a result of much lower cropping intensity in the target countries.** Cropping intensity is defined as paddy area cultivated in the dry season divided by paddy area cultivated in the wet season, multiplied by 100. It is lower in the target countries due to their lower irrigation coverage (Table 16). Although much depends on agro-ecological conditions and water availability, there is no reason to suggest that the target countries cannot catch up with Thailand and Vietnam in irrigation coverage and cropping intensity. This offers a tremendous opportunity.

Table 16: Role of dry season paddy in GMS countries, 2013/14

	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Share of dry season production in total paddy production, %	23	13	18	43	54
Paddy area in wet season, ha	2,564,572	891,190	6,200,000	9,932,785	4,337,900
Paddy area in dry season, ha	490,935	92,340	1,100,000	2,408,812	2,339,900
Cropping intensity, %	119	110	118	124	154
Share of irrigated areas in arable land, 2011-2012, %	7.9	15.0	12.0	32.1	70.5

Source: World Bank estimates and FAO 2012b for data on irrigation.

30. **Intensification of rice production is to be done in an economically, socially, and environmentally sustainable manner.** The policy to maximize rice production in Vietnam, for example, encourages farmers to produce two or even three crops in a year, yet during the summer-autumn season farmers often incur losses. In addition, its high environmental footprint impacts Vietnam rice's image on global markets. Having a "green" image is increasingly important to penetrate into more lucrative niche markets, for example through the new sustainable rice production standards (Box 1). This is especially important for Cambodia and Lao PDR, which are unlikely to be able to compete with Myanmar, Thailand, and Vietnam on export volumes. Over-intensification can reduce quality and sustainability of rice cultivation, and therefore requires a careful strategy.

Box 1: Sustainable Rice Platform

In October 2015, Mars Food Corporation, the owner of the world's largest rice brand, Uncle Ben's, announced its commitment to sustainably source 100 percent of its rice by 2020 using the Sustainable Rice Platform (SRP) standard. What is SRP? The SRP was launched in 2011 to promote adoption of sustainable climate-smart best practices while protecting the environment by boosting the use efficiency of resources such as water and agrochemicals. The SRP has 30 institutional members, including the United Nations Environment Programme, the International Rice Research Institute, government agencies, private sector actors, research institutions, and non-profit organizations.

The SRP standard consists of a set of 46 requirements for sustainable rice cultivation organized under 8 broad topics, including productivity, food safety, worker health, labor rights, and biodiversity. The validation of standards on farm fields is planned in Cambodia, China, India, Indonesia, Myanmar, Pakistan, Thailand, Vietnam, and Uganda. The findings of the validation program will be used to revise standards and performance indicators if necessary.

Source: Authors' presentation based on www.sustainablerice.org.

31. **Paying attention to the management of environmental risks is not only good for long-term profitability and export competitiveness but also for human health and nutrition.** The policy-induced unsustainable rice intensification in Vietnam offers good lessons for the target GMS countries. Three rice crop areas of Vietnam's Mekong Delta are now virtually dead zones. The overuse of chemicals and fertilizer run-off caused poisoning of paddies as well as of massive numbers of fish in the rivers (World Bank 2016a). Paddy fields that were formerly a source of animal protein (snails, frogs, fish, etc.) now just yield carbohydrates from rice. This unsustainable intensification also affected malnutrition, which remains high in many areas of the Mekong Delta despite the rising rice production.

(iii) Rising global demand for rice

32. **Global forecasts anticipate increased aggregated demand for rice, particularly in Asia and Africa, where population growth is fastest.** The International Rice Research Institute (IRRI) projects that 116 million tons of additional rice over 2010 levels will be needed by 2035 (IFC 2015). FAO and the Organization for Economic Co-operation and Development (OECD) estimate global rice consumption to increase annually by 1.5 percent between 2015 and 2024 (OECD-FAO 2015). In East Asia alone, demand for rice is projected to increase from 82 million tons in 2009 to 97 million tons in 2030 (Jamora 2014). According to the USDA, more rice will also be demanded in the Middle East and Sub-Saharan Africa (Table 17) and the demand growth for higher quality, specialty rice will exceed the demand growth for lower quality commodity rice (Table 23). This presents a significant opportunity for the target countries, which have a long tradition of producing rice, a large network of rice millers and traders, and various rice brands meeting the requirements of both less and more affluent consumers.

Table 17: Rice trade projections (million tons), 2013/14-2024/25

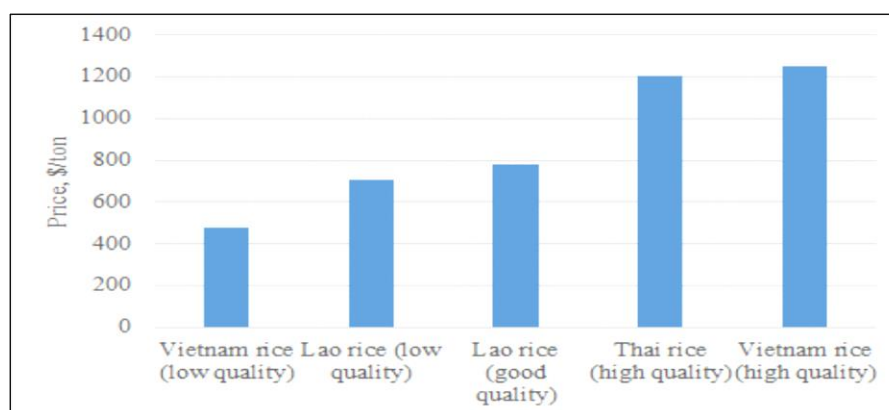
Importer	2013/14	2020/21	2024/25
EU	1.53	1.52	1.51
China	3.90	3.08	2.91
Bangladesh	0.68	1.06	1.45
Japan and South Korea	0.95	1.25	1.25
Indonesia	1.40	1.92	2.18
Malaysia	1.10	1.04	1.06
Philippines	1.45	1.73	1.95
Other Asia and Oceania	2.57	2.54	2.58
Iraq, Iran, and Saudi Arabia	4.33	5.10	5.48
Other Middle East and North Africa	2.78	3.14	3.34
West Africa	8.13	10.59	11.65
Other Sub-Saharan Africa	4.42	4.94	5.51
All other remaining countries	8.54	9.15	8.65
Total	41.78	47.06	49.52

Source: ERS-USDA various issues.

33. **Cross-border trade is anticipated to continue to provide a market opportunity for the target countries.** Vietnam is anticipated to continue buying paddy and rice from Cambodia, as Cambodian paddy is considered to be of higher quality than that produced in Vietnam. Well-established cross-country rice trade linkages further ease cross-border trade (Sok 2015). Vietnam will also continue to offer market opportunities for Lao PDR. Vietnam is projected to increase its consumption of glutinous rice and Lao rice is considered to be of higher

quality than the high-quality glutinous rice produced in Vietnam and much cheaper than glutinous rice imported from Thailand (Figure 11). China offers new market opportunities for Lao PDR as well since signing a rice trade agreement with China in 2015.

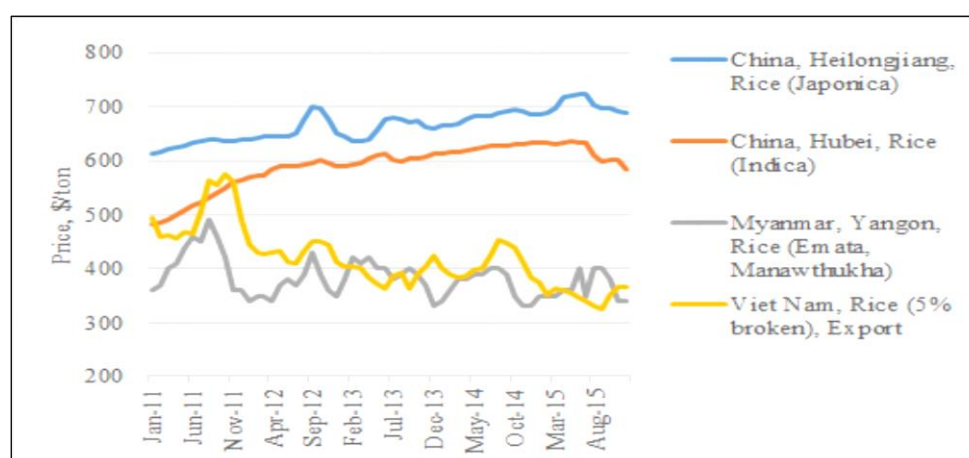
Figure 11: Retail prices (\$/ton) of glutinous rice in Central Vietnam originating from different countries, 2015



Source: The Ahn et al. 2015.

34. **China is likely to continue to be the main market outlet for Myanmar.** In recent years, rising demand for Myanmar rice in China was driven by the large price wedge between these two countries caused by China's farm price support program, introduced in 2010 (LIFT and World Bank 2014). Since then, rice prices in China have been twice as high as prices on the world market (Vietnam) and in Myanmar (Figure 12). No indications suggest that Chinese authorities will remove this price support program in the near future as the income gap between rural and urban areas continues to grow there. Demand from China will remain strong. The rice trade agreement signed with China in 2015 offers an additional entry point to complement informal cross-border trade with formal FOB trade in the near future. Eventually, higher exports are the only way to absorb the higher production necessary to generate economic growth and reduce poverty in all three target countries.

Figure 12: Wholesale rice prices (\$/ton) in China, Myanmar, and Vietnam, 2011-2015



Source: FAO-GIEWS 2015.

(iv) *Positive shifts in rice sector strategies*

35. **Recent changes in the paradigm of rice sector development can be used to capitalize on the emerging opportunities.** Production has long been the focus of government strategies and investment plans in the target countries, and higher paddy production until very recently was considered as a mission accomplished. Yet with rice surpluses rising, along with (gradually) rising productivity, attention is now being paid to other issues. Export promotion is a new recent priority in the region.

36. **Cambodia is a good example of this shift.** As alluded to in Chapter 2, the Cambodian Council of Ministers adopted “The Promotion of Paddy Production and Rice Export Policy” in July 2010. The policy: recognized the importance of rising rice productivity, as the country’s farmland frontier is essentially closed; set a target of 1 million tons of rice export by 2015; and emphasized rice quality improvements and diversification. The government put in place a number of reforms that opened and liberalized trade and FDI and reduced barriers for the private sector. Export licenses became available to all traders and rice mills requesting them, expanding the number of rice exporters from 5 to 86. It also established a “one window service” for exports and has continuously reduced export costs.

37. **These reforms helped increase export volumes and value.** In 2015 the Cambodian FOB rice export reached more than 500,000 tons, compared to 12,000 tons in 2009 and 380,000 tons in 2013 (Table 8). Most FOB rice has been a higher-value fragrant rice. About 1,500,000 tons are also exported to Vietnam and Thailand through cross-border routes, mainly paddy. The authorities resisted the temptation to forbid paddy export and redirect it to milling within the country, recognizing that farmers benefit from allowing paddy exports and that competition in the milling sector is important for the strength and sustainability of the overall rice economy.

38. **Myanmar also recognizes the importance of export promotion.** Its Ministry of Commerce prepared “The National Export Strategy of the Republic of the Union of Myanmar for 2015-2019” in April 2015, with rice among the priority products for export promotion. Launched by the Ministry of Agriculture and Irrigation (MOAI) in May 2015, the “Myanmar Rice Sector Development Strategy” puts emphasis on rice value chain development and export competitiveness. In 2015, the government also signed a sanitary and phytosanitary (SPS) agreement with China, the implementation of which, in partnership with the Myanmar Rice Federation (MRF), would allow adding FOB rice export to cross-border export through Muse in Shan State. These strategies and agreements were influenced by the increased recognition that export is the key to absorbing the rising paddy surpluses and that the larger volume of rice exports, which grew from 190,000 tons in 2004 to 1,800,000 tons in 2014 (Table 13), do not automatically translate into much higher profits for rice value chain actors, necessitating more strategic support to unleash the rice sector’s full potential.

39. **Lao PDR is now paying more attention to markets and exports.** Production targets will remain important in the country in the foreseeable future, which is understandable, as its rice production is not far above domestic consumption requirements and the international glutinous rice market is extremely small and thin (Table 11). In case of any production shock caused by El Niño, for example, and the need to import, Thailand and Vietnam would be the only possible suppliers of glutinous rice. Also, a production shock in Lao PDR will mostly likely affect production in Thailand and Vietnam. Yet the government aims to increase rice production; as emphasized in the “National Food Security Program for 2016-2020” adopted in July 2015, achievement of this objective requires strengthening of rice value chains, including export promotion. In January 2015, the government signed an SPS agreement with China, like Cambodia and Myanmar, to gain access to the largest Asian market and the largest rice importer

since 2012. Increasing production of glutinous rice is also recognized to require better-quality inputs, stronger rice mills, development of a Lao rice brand, and more coordinated actions of all actors, via establishment of a rice federation similar to Cambodia and Myanmar Rice Federations.

40. **The shift in these countries' rice strategies is supported by regional initiatives and development partners.** The FAO Regional Office for Asia and the Pacific adopted “A Regional Rice Strategy for Sustainable Food Security in Asia and the Pacific” in May 2014, which supports countries' efforts to align their strategies to the emerging thinking on the requirements for economically, socially, and environmentally sustainable rice sector development. IRRI is active in helping with strengthening of national research systems but also with strategic thinking about broad sector development. For example, it was instrumental in the preparation of the “Myanmar Rice Sector Development Strategy” mentioned above. The WBG actively helps governments and the private sector in all three target countries to strengthen rice value chains through global knowledge generation and dissemination, capacity building and training, investments in public programs, improved regulations and policies, and improved access to finance by the private sector. As discussed in Chapter 5, further improvement in national rice strategies is still necessary in most target countries to capitalize on emerging opportunities, but the recent positive strategic shifts and the continued availability of donor support form a strong foundation for these improvements to take place.

Challenges

41. **In addition to opportunities, challenges emerging over the medium run are to be addressed to build strong rice value chains in the target countries.** The challenges can be roughly divided into four groups. The first is strong competition on global rice markets, along with declining and volatile prices and stricter requirements for rice safety, quality, and branding that the target countries must meet. The second is rising competition for land, water, labor, and capital from other crops, which are often more profitable than paddy and face higher consumer demand. The third is concern over nutrition or that the rice sector does little to address malnutrition. The fourth is GHG emissions, to which rice production significantly contributes. These challenges can be seen as opportunities to trigger changes that would make rice value chains more competitive, profitable, and nutrition- and climate change-sensitive. Each is discussed in turn.

(i) Rice market outlook

42. **Total global rice consumption is projected to increase over the medium run as discussed above, yet this increase will be smaller than in the past.** This is due to projected declining per capita rice consumption, as food diets will continue to diversify away from cereals, driven by economic growth, rising incomes, and urbanization. FAO anticipates global per capita rice consumption to decline from 56.3 kg per year in 2009-2011 to 55 kg per year in 2030 (FAO 2006). Timmer *et al.* (2010) estimate per capita consumption to drop to 52.4 kg per year by 2030. Even in East Asia, the largest consumer of rice, daily caloric intake from rice is projected to drop from 889 calories in 2009 to 850 in 2030, or 4 percent annually (World Bank 2015c). Export competitors such as India, Thailand, and Vietnam will also want to capture a larger piece of the global rice market.

43. **Global rice prices are projected to decline, especially compared to the 2008-2009 period.** In 2008, global rice prices spiked to \$650/ton, from the \$250-300/ton that prevailed

during 2005-2007. Prices dropped from their 2008 peak in subsequent years; the average price in 2015 was \$385/ton. Going forward, global rice prices are projected to increase to \$410/ton in 2025 in nominal terms, but in 2025 they will be lower in real terms than in 2015, and much lower than in 2008-2009 (Table 18). Differences arise for various types of rice but the general tendency for all types of rice is declining real prices.

Table 18: Global rice price (\$/ton) projections, 2015-2025

	2008-2009	2015	2020	2025
Nominal prices, \$/ton	603.55	385.0	397.3	410.0
Real prices, \$/ton (in 2010 \$)		364.4	346.2	328.8

Note: Rice is 5% broken white rice, FOB Bangkok, Thailand

Source: World Bank 2016b.

44. **Cambodia is a good example of what lower prices over the long period can do to production.** During 2009-2012, when rice prices were relatively high, annual paddy production growth averaged 6.7 percent (Table 19). The recent decline in global commodity prices led prices to decline in Cambodia: they were 7 percent less in 2013-2014 compared to 2009-2012. The growth in paddy production slowed down to 1.1 percent in 2013/14 and contracted by 0.7 percent in 2014/15. In 2015, paddy production was projected to grow by 1 percent.

Table 19: Paddy production growth and prices in Cambodia, 2007-2014

	2009-2012	2013	2014	2015
Annual growth in paddy production, %	6.7	1.1	-0.7	1.0
Mix paddy prices, annual average, \$/ton, Battambang	375	350	345	325

Source: MAFF Cambodia.

45. **In addition to being lower, global rice prices will remain volatile, creating uncertainty for all rice value chain actors and raising political concerns.** Volatility of global rice prices is mainly caused by the rice self-sufficiency policies of net importing countries such as China and the Philippines. Their national price stabilization policies destabilize prices in net exporting countries, so the average price volatility of exporters is often twice as high as that of importers (Table 20).

46. **The challenge for GMS countries is that they have a limited set of instruments to stabilize prices in the short run without undermining their export competitiveness** (World Bank 2014d; World Bank 2012a). Prices are most easily stabilized through public stocks, import protection, or minimum farm prices, but these three instruments tend to elevate domestic prices so are not suitable for net exporters. On the other hand, the political pressure to “do something” to reduce price volatility at times of price spikes will continue to create risks that GMS countries intervene through stocks or export bans/quotas. Addressing the long-term drivers of price volatility (such as the failure of irrigation systems to ensure paddy production is spread more evenly over the year, low diversification of rice sale channels, high marketing costs, low private stocks, uncertainty over commitment to open trade, and lack of accurate and timely market information) calls to take priority over short-term fixes that weaken the rice sector’s contribution to poverty reduction.

Table 20: Historical rice price volatility (%) in selected Asian countries, 2007-2015

	2007-2012	2012-2015
Net importers		
China	1.9	1.1
Philippines	3.8	3.3
Net exporters		
Cambodia	4.2	1.6
Myanmar	3.6	2.5
Thailand	5.0	1.8
Vietnam	4.8	3.5

Note: Price volatility is defined as the standard deviation of the logarithm of monthly price returns.

Prices are wholesale prices representing the rice most commonly produced in the country.

Source: World Bank estimates based on price data from FAO-GIEWS 2015.

47. **Thailand's experience illustrates the damage caused by use of an unsuitable policy instrument such as minimum farm prices.** During 2011-2014, Thai authorities used a rice pledging scheme to support farm incomes through minimum farm prices. The program did indeed increase prices for Thai farmers (Table 21) but this was short-lived. The program increased prices in Thailand above prices offered by other exporters, essentially preventing Thailand from exporting rice (Nipon 2014). Exports dropped, and the rice ending stocks increased from 6.1 million tons (or 60 percent of domestic use) in 2009/10 to 14.4 million tons (or 134 percent of domestic use) in 2013/14 (FAS-USDA 2015). The subsidy cost the government \$12.7 billion, or 3.5 percent of GDP, in its first year of operation, raising the country's fiscal deficit to 4.4 percent of GDP in 2012 from 1.7 percent in 2011. The scheme cost the government another \$13.9 billion, or 3.6 percent of GDP, in 2013 (World Bank 2014d).

Table 21: Level and volatility of prices in Thailand and other selected countries

	2004-2007	2008-2009	2010-2013
Thailand			
Paddy prices, \$/ton	167	300	350
Rice wholesale prices, \$/ton	300	479	462
FOB export prices, 25% broken, \$/ton			
Thailand	264	532	504
Vietnam	249	468	403
India	256	345	398

Note: Paddy prices are non-glutinous average national farm-gate prices; wholesale prices are 25% broken in Bangkok.

Source: FAO-GIEWS 2015.

48. **Thailand incurred many other indirect but similarly significant costs.** Thailand's reputation of exporting high-quality rice for which a premium is paid was undermined by farmers switching to varieties with the shortest growing seasons and highest yields, varieties that have inferior palatability. Long-term storage of milled rice led to deterioration of its quality. The already overbuilt rice milling industry expanded, leading to the closure of mills not enrolled in the program. Farmers' costs of production increased, reflecting a doubling of land rents and increased use of and a 20 percent increase in the prices of fertilizer and pesticides. The higher land rents were a direct consequence of the pledging policy. And, unable to supply their customer base of over 10 million tons with Thai rice, Thai exporters started to trade third country rice on a large scale and invest in rice mills in competitor countries,

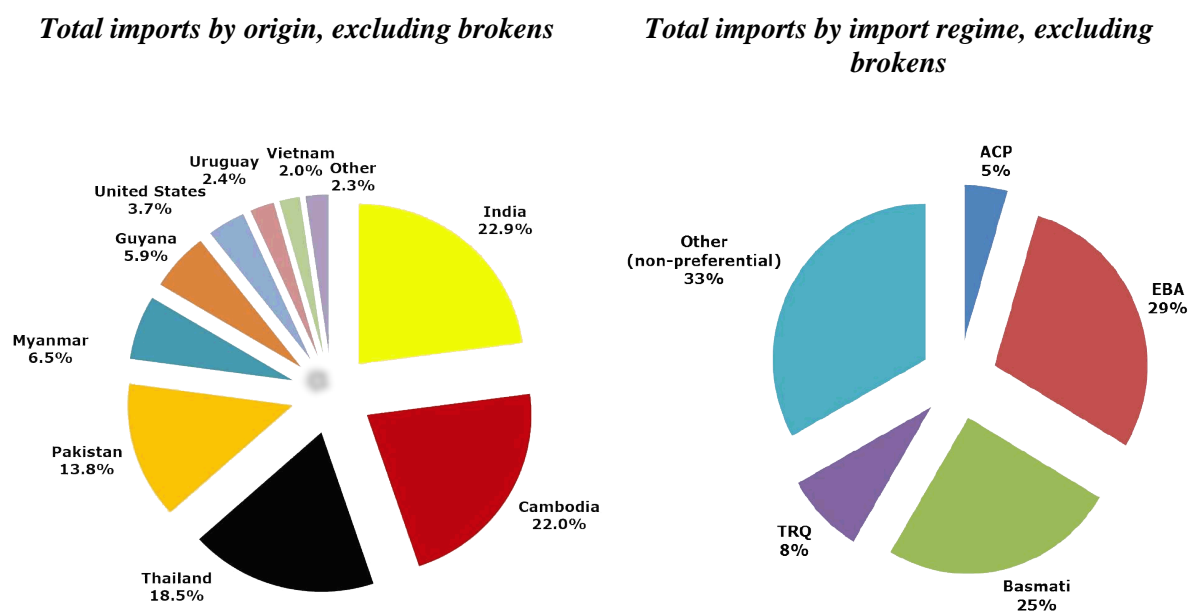
particularly Cambodia. Both actions directly enhanced the long-term competitiveness of other countries.

49. **Returning to other challenges, most increase in rice demand will come from the Middle East and Sub-Saharan Africa** (Table 17). Penetrating these markets will be difficult, however, especially in Sub-Saharan Africa, as they pursue a food self-sufficiency policy. Many rice importers such as Nigeria, Senegal, and Tanzania have significantly increased investment in domestic rice production, including in rice research and development, and raised import barriers, so only a portion of the higher demand for rice from African consumers will be available to Asian exporters.

50. **Demand for imported rice from traditional Asian importers (e.g., China, Indonesia, Malaysia, and the Philippines) will remain high but these countries will continue to use high import tariffs and government monopolies over import of rice.** Liberalization of rice trade in these countries is expected to continue to lag behind liberalization of other sectors under the ASEAN. Rice importers heavily subsidize rice production, aiming to fully cover domestic consumption with local production. Although full self-sufficiency will be hard to achieve for most of them (Dawe 2013), these countries will continue to restrict the free flow of imports, preferring government-to-government contracts and *ad hoc*, hard-to-predict tenders. Participation in this kind of trade arrangement requires good organization in the rice industry and large export volumes, both of which are still missing in the target countries.

51. **The EU will remain an important destination for the target countries but they will have to increasingly compete with others.** Trade under EBA is not the only source of rice imports in the EU. In 2014/15, rice imports under EBA accounted for only 29 percent (Figure 13) of all rice imported. The target countries will face increased competition, especially from Vietnam, who signed a free trade agreement with the EU in 2015.

Figure 13: The EU's rice imports (million tons) by origin and import regime, 2014/15



Source: The EU Commission.

52. **Vietnam's exporters have made steady progress in growing their global market share** (IFC 2015). As shown in Table 22, no longer is Vietnam the exporter of only low-quality rice, as when it captured the rice world's attention beginning in 1988. During 2010-2012, for example, Vietnam's high-quality rice exports averaged 2.85 million tons, or 40 percent of the country's total exports. This includes soaring volumes of fragrant rice. Combined exports of fragrant rice and fragrant broken rice are likely to hit 700,000 tons in 2013, nearly three times the volume shipped in 2010 and close to five times that exported in 2008.¹¹

Table 22: Rice exports ('000 tons) by quality, Vietnam

	High quality		Medium quality	Low quality	Brokens		Other	Total
	Fragrant	Non-fragrant			Fragrant	Non-fragrant	Un-known	
2008	164	1,585	1,089	1,525	45	160	110	4,679
2009	162	2,376	1,301	1,652	47	413	102	6,053
2010	222	2,270	1,561	2,232	18	251	199	6,754
2011	437	1,945	3,166	3,857	29	405	289	7,128
2012	438	3,242	2,145	117	117	442	430	7,720

Note: High-quality – less than 10% broken. Medium-quality – 10-20% broken. Low-quality – more than 20% broken.

Source: LIFT and World Bank 2014.

53. **An important recent feature of the world rice market is the increasing share of higher-quality rice demanded by consumers.** The largest growth since the mid-1990s has been in higher qualities – imports of aromatic, high-quality white, and parboiled rice have roughly tripled and in 2010-2012 represented over half of world trade (Table 23). The volume of these categories was in excess of 22 million tons or roughly double its volume in the mid-1990s. Trade is also growing for glutinous rice produced by Lao PDR. Low-grade white (Indica) rice represents a declining share of the world rice trade, as lower prices shift marginal import demand to higher grades of rice and higher incomes in many importing countries result in increased demand for better-quality rice.

54. **Higher incomes around the world largely explain this shift.** Even in Africa, demand for higher-quality rice is increasing. Removal of state-buying monopolies allowed the African market to diversify from importing just low grades of rice to a mix of qualities. Africa's share of the world trade climbed from 31 percent in the mid-1990s to 39 percent during 2010-2012. Government import agencies such as Bulog in Indonesia and National Food Authority in the Philippines changed their procurement standards to respond to consumer demand. For example, Bulog switched from 25 percent to 15 percent broken rice; National Food Authority added 5 percent and 15 percent to its 25 percent broken broken purchases; and Iran is shifting purchases from 5 percent white rice to Pusa 112, a Basmati variety.

55. **The target countries can join this higher-quality rice market.** Cambodia has already joined its fragrant rice segment. Myanmar is trying to enter the parboiled market segment. Yet all three countries will be better off if they take more actions to improve rice quality further and increase rice variety options to fully capitalize on the global market opportunities.

¹¹ During this period, Vietnam started to import a lot of paddy from Cambodia, including aromatic varieties. This paddy could have been milled and sold as Vietnamese rice, another example of interlinkages in GMS.

Table 23: Global rice trade estimates (million tons) by rice type, various periods

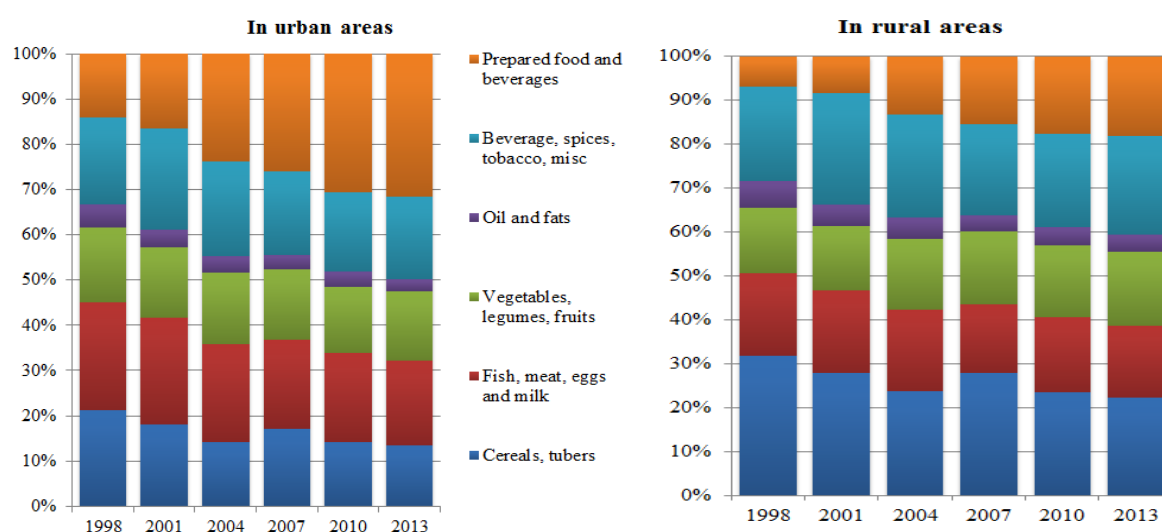
	Mid-1990s	2005-2007	2010-2012
<i>Higher-quality rice</i>			
Basmati	0.89	2.00	3.64
Jasmine (for mid-1990s, inc. fragrant broken)	1.20	1.90	2.52
High-quality Indica	3.20	5.10	8.32
Parboiled	2.15	4.37	6.07
Japonica	1.50	2.58	2.42
<i>Lower-quality rice</i>			
Jasmine broken (exc. Patum broken)	0.0	0.91	0.73
Glutinous	0.28	0.34	0.46
Rough Indica	0.50	2.07	2.36
Brown Indica	0.60	0.70	0.64
Medium-quality Indica	2.50	2.85	2.97
Low-quality Indica	3.86	5.27	4.63
Broken Indica	0.83	1.82	1.83
World total	17.51	29.91	36.59

Source: LIFT and World Bank 2014.

(ii) *Competition with other crops*

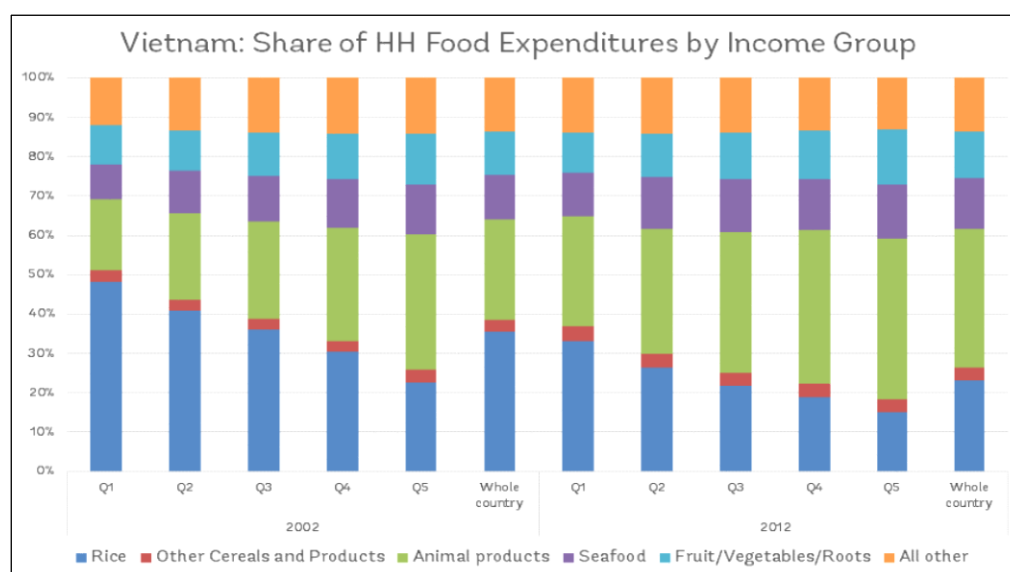
56. As incomes have risen across the world and urbanization increased, diets have diversified and substitution has occurred between types of food. The composition of diets changes as wealthier consumers shift to more preferred, income-elastic food. The pattern and speed of dietary change differ across countries, with a declining share of dietary calories from starchy staples and a switch toward more diversified food (World Bank 2015c). In East Asia as a whole, rice consumption is declining among urban populations and higher-income groups as shown by the examples of Indonesia (Figure 14) and Vietnam (Figure 15).

Figure 14: Change of food consumption patterns in Indonesia, 1998-2013



Source: World Bank 2015c.

Figure 15: Change of food consumption patterns in Vietnam, 2002-2012



Source: World Bank 2016a.

58. **The share of rice in regional caloric intake is projected to decline, continuing the earlier trend.** It fell from 48 percent in 1985 to 38 percent in 2009 (World Bank 2015c) and total calories from rice are projected to drop by 4 percent by 2030 (Table 24). Total caloric intake of cereals will grow slowly, but indirect cereal and oilseed consumption as feed will grow much more rapidly, in proportion to the demand for meat.

59. **The value of food demand in East Asia is expected to increase by 30 percent between 2009 and 2030 in constant dollars.** In 2030, the value of demand for fish, milk, meat, and vegetables is projected at five times the aggregate value for rice and other cereals (World Bank 2015c). The higher attractiveness of non-rice products will put huge pressure on rice production, which competes for land, labor, and capital with other crops and agricultural products.

Table 24: Daily caloric intake by commodity group in East Asia

	2009	2030 (proj.)	Change, %
Rice	889	850	-4
Other cereals	535	645	21
All meats	350	664	90
Fish	54	79	46
Milk	55	78	42
Vegetables	74	111	50
Fruits	160	280	75
Edible oil	143	210	47
Others	434	273	-37
Total	2,694	3,190	29

Note: "Others" includes sugar, other sweeteners, legumes, pulses, nuts, spices, and animal fats.

Source: World Bank 2015c.

60. **Furthermore, many other crops are already more profitable than paddy in the target countries.** In Cambodia, the gross profitability of non-paddy crops was found to be higher than that of paddy (Table 25), and the profitability gap favoring other crops increased between 2005 and 2013.

Table 25: Gross margins (\$/ha) of selected crops in Cambodia, 2005 and 2013

	2005	2013
Wet season rice	159	245
Dry season rice	195	296
Cassava	198	506
Maize	577	304
Vegetables	284	1,394

Note: Gross margin is defined as revenue less variable costs.

Source: World Bank and AusAid 2015.

61. **In Vietnam, the comparator country, paddy is also less profitable than other crops.** The estimated gross margins of paddy production in the Mekong Delta in 2012 were much below those of other crops, even in the most profitable autumn wet season (Table 26).

Table 26: Gross margins (million VND) of rice and other crops in the Mekong Delta, Vietnam

Crops	Growing duration (months)	Gross revenue (mill. VND)	Total cost (mill. VND)	Gross margin (mill. VND)	Benefit-cost ratio
<i>Other crops (n=38)</i>					
Bean	3.5	300.97	127.66	173.30	4.98
Chili	5.5	341.69	139.03	202.66	2.22
Gourd	6.0	159.94	26.09	133.84	4.23
Lotus	9.5	631.07	169.87	461.20	10.42
Flowers	3.5	170.00	51.85	118.15	2.34
All	5.3	269.68	100.03	169.65	3.42
<i>Paddy (n=101)</i>					
Wet season	3.5	36.61	19.34	17.26	1.01
Summer season	3.5	33.38	19.99	13.39	0.80
Autumn season	3.5	39.63	19.43	20.20	1.13

Source: World Bank 2016a.

62. **The situation of relative profitability is similar in Myanmar, but with more nuances.** The profitability of wet season paddy derived from a sample of 1,728 farm households was the lowest among all crops in 2013/14 (Table 27). Yet the profitability of dry season paddy was higher than that of chickpeas, while lower than that of all other crops studied. For example, the profitability of green gram was twice as high as that of dry season paddy. As paddy production is supported by various government programs, including subsidized working capital loans through the Myanmar Agricultural Development Bank, the financial profitability of dry season paddy is relatively higher than that of other crops, due to the higher cost of working capital available to producers of other crops. Even with this subsidy, paddy will continue to be challenged by the higher profitability of other crops, for the simple reason of its relatively high production costs.

Table 27: Net margins (\$/ha) of selected crops in Myanmar, 2013/14

Crop	Margin, \$/ha
Wet season paddy	114
Dry season paddy	246
Black gram	267
Green gram	581
Chickpeas	141
Groundnuts	324
Sesame	202
Sunflowers	377

Note: Net margin is defined as revenue less total costs (variable and fixed).

Source: LIFT and World Bank 2016.

63. **Rice is not only less profitable in many areas, it is also costlier to produce.** In Myanmar, for example, the total production cost of dry season paddy was estimated at \$626/ha in 2013/14 (Table 28). In comparison, the production cost of sunflower seeds was \$121/ha, black gram \$237/ha, and groundnuts \$421/ha. Other crops are also much less labor and water intensive than paddy, which makes a big difference in environments characterized by high capital costs, expensive inputs, and limited water.

64. **The higher profitability of non-paddy crops and growing demand for them put competitive pressure on paddy production in the target countries.** This pressure may not be very high during the wet season, as excessive moisture favors paddy over other crops, but it certainly matters during the cool and dry seasons. Seen from another perspective, the higher profitability of other crops offers a great opportunity to diversify rice-based farming systems, making them more profitable, sustainable, and resilient to climate change.

Table 28: Selected farm economic indicators in Myanmar, 2013/14

Crop	Net margin, \$/ha	Labor productivity, \$/day	Production costs, \$/ha	Labor use, days/ha
Monsoon paddy	114	4.75	510	103
Dry season paddy	246	9.20	626	63
Black gram	267	9.29	237	45
Green gram	581	15.92	355	51
Chickpeas	141	6.85	266	42
Groundnuts	324	8.32	421	65
Sesame	202	8.54	217	44
Sunflower seeds	377	15.68	121	30

Source: LIFT and World Bank 2016.

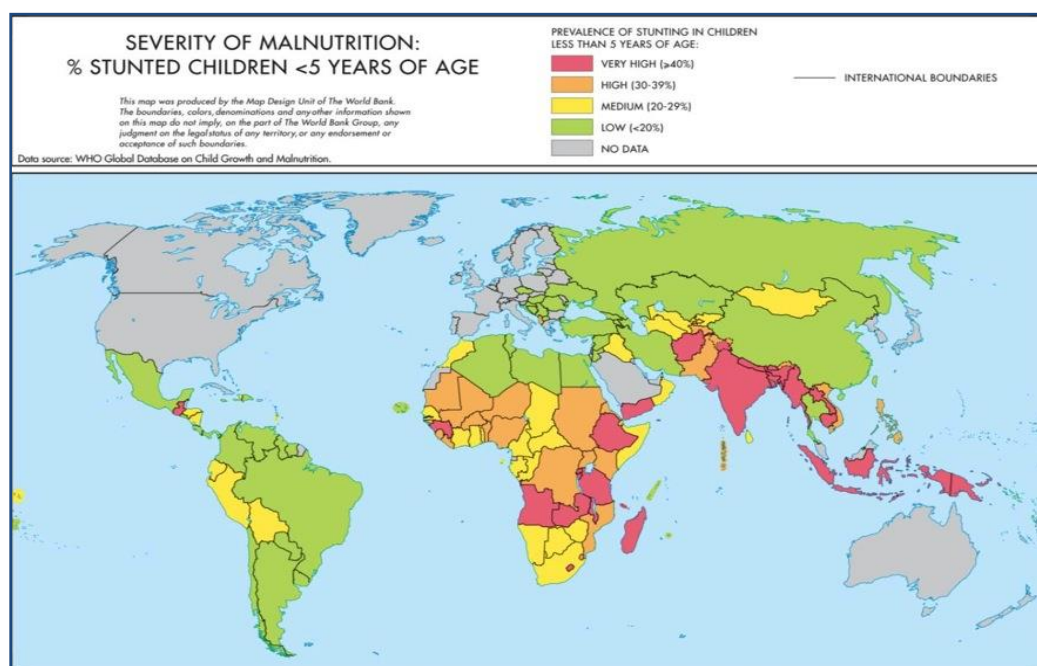
65. **It should be noted that direct comparison of gross and net margins among crops has its limits.** Margins convey “potential” but do not tell anything about perceived and actual risks for non-paddy crops arising from more limited knowledge about agronomics, lack of seeds, possibly higher post-harvest losses and possibly higher output price volatility, and less developed markets with fewer intermediaries, among other things. Weather also matters – it is much easier to diversify away from paddy in lowland areas during the dry season when water levels are low than during the monsoon season when most lowland is flooded. A farmer who is struggling with paddy productivity or quality is likely to have problems handling other crops

that require more specialized knowledge or more attentive care. Diversification would be more successful on the back of superior paddy cultivation performance than as an alternative to struggling paddy cultivation. There may also be a generational issue. In Indonesia it is relatively young farmers, in their 20s and 30s who have gone into horticulture. Many older farmers may want to simply promote diversified livelihood strategies, combining rice, other crops, small livestock, and off-farm activities where rice production provides food security, instead of diversifying entirely away from rice production.

(iii) Nutrition

66. **The target countries are confronted with nutrition-related challenges.** Although malnutrition has various types (e.g., stunting, wasting, underweight, micronutrient deficiencies, and overweight and obesity; World Bank 2013a), in GMS countries the largest current nutritional issue seems to be child stunting (Table 29). Cambodia, Lao PDR, and Myanmar are all in child stunting hotspots on the world map (Figure 16). While the target countries have made good progress in reducing extreme poverty in recent years, their progress on improving nutrition has been much slower.

Figure 16: Severity of child stunting across the world



Source: World Health Organization's Global Database on Child Growth and Malnutrition.

67. **Child stunting is among the most important malnutrition problems in GMS countries.** The prevalence of stunting among children under five is much higher than that of wasting and overweight, two other serious malnutrition problems in low-income countries (Table 29). Obesity of adults is also a lesser issue in the target countries than child stunting (Figure 17).

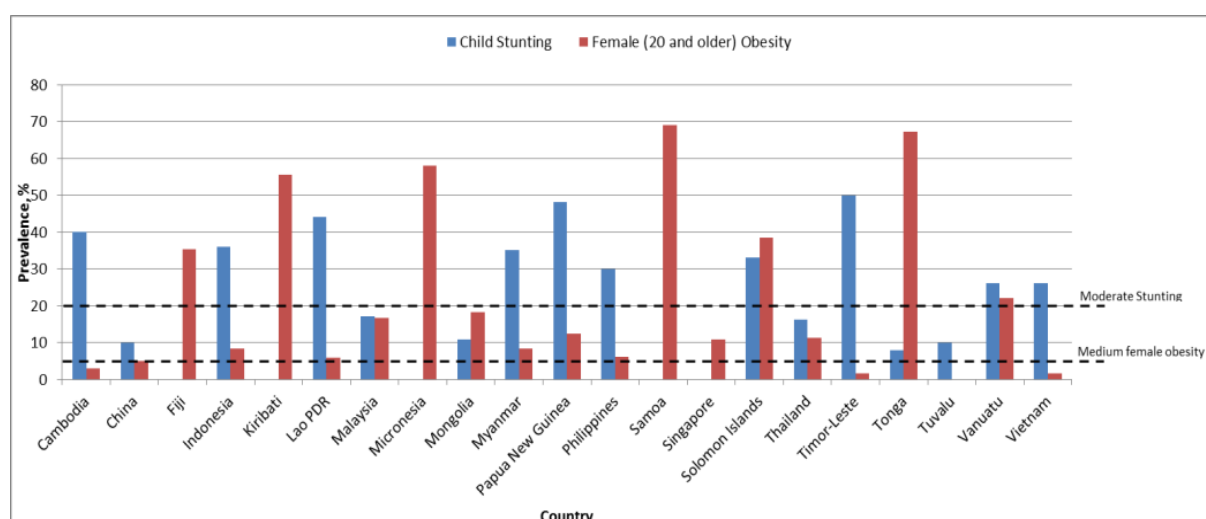
Table 29: Number (000's) of children under five affected by malnutrition in GMS countries

Type of malnutrition	Cambodia 2010	Lao PDR 2011	Myanmar 2009	Thailand 2012	Vietnam 2011
Stunting	683	385	1,542	608	1,679
Wasting	180	56	347	250	317
Overweight	32	18	114	407	322

Source: IFPRI 2014b.

68. **Child stunting in the target countries is well above the 20 percent threshold of moderate stunting countries** (Figure 17). During 2009-2013, the stunting rate among children under five years old was 44 percent in Lao PDR, 35 percent in Myanmar, and 33 percent in Cambodia (Table 30). Thailand and Vietnam had much lower stunting rates for the same period.

Figure 17: Child stunting and female obesity in Asia



Source: Most recent nationally representative survey for the range 2004-2013, World Bank.

Table 30: Rate (%) of child stunting in GMS countries

Country	2006	2009-2013
Cambodia	44	33
Lao PDR	48	44
Myanmar	41	35
Thailand	16	16
Vietnam	32	23

Source: IFPRI 2014b.

69. **High child stunting in the target countries is a result of many factors, and addressing it requires multisectoral approach, but rice also matters.** One of the reasons for high stunting in these countries is consumers' overreliance on rice in overall food consumption. Recall that Table 1 shows that rice accounts for more than 65 percent of total caloric intake in the target countries, while IRRI's recommended caloric consumption of carbohydrate-rich food (such as rice, bread, pasta, and potatoes) is less than 50 percent of total caloric intake. But rice is low in fat (4 percent) and protein (7 percent) and provides mainly carbohydrates (89 percent)

for energy. In addition, the most popular type of rice among consumers is white, well-polished rice, which has a low level of micronutrients, as these are lost when removing the bran layer during the milling and polishing process (Table 31).

70. **While better nutrition requires a diversification of diets, rice can still be part of the solution for improving nutrition.** First, profitability of rice production would need to increase to bring more income to rice-producing households. Second, rice prices cannot be artificially inflated, as consumers will overpay for rice and have less disposable income available to buy other, more nutritious food. And third, rice value chains are to be supported to become more nutrition-sensitive. Rice will continue to be important for hunger and poverty reduction and in this context it can be better utilized to improve nutrition.

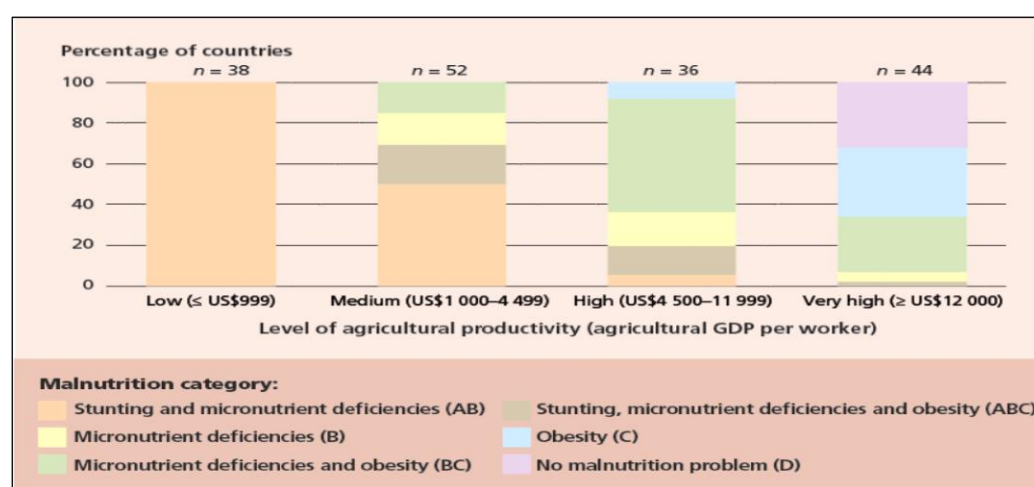
Table 31: Macro- and micronutrients of rice

Macronutrients	Micronutrients
Rice is low in fat and provides mainly carbohydrates for energy. The protein level of rice is the lowest among the cereals. Furthermore, it is deficient in some essential amino acids, including lysine, and contains an excess amount of other amino acids that negatively influence the body's protein utilization.	Unmilled rice is a good source of thiamine (vitamin B1), riboflavin (vitamin B2), niacin (vitamin B3), and dietary fiber. However, these B vitamins and other micronutrients are lost when rice is milled and/or polished (e.g., white and broken rice) due to the loss of the bran layer. These nutrients are retained in brown and parboiled rice. In addition, rice is not a good source of iron, zinc, or vitamin A.

Source: ACDI/VOCA 2014.

71. **Higher agricultural income from selling rice can indeed help reduce malnutrition.** Strong empirical evidence finds that income poverty and undernutrition are correlated (World Bank 2013a; 2014b) and that the higher the agricultural productivity, the better the nutritional situation in a country (Figure 18). Low agricultural productivity in Cambodia, Lao PDR, and Myanmar is a large contributing factor to the high prevalence of child stunting and micronutrient deficiency, so higher agricultural productivity in these countries is expected to help improve nutrition.

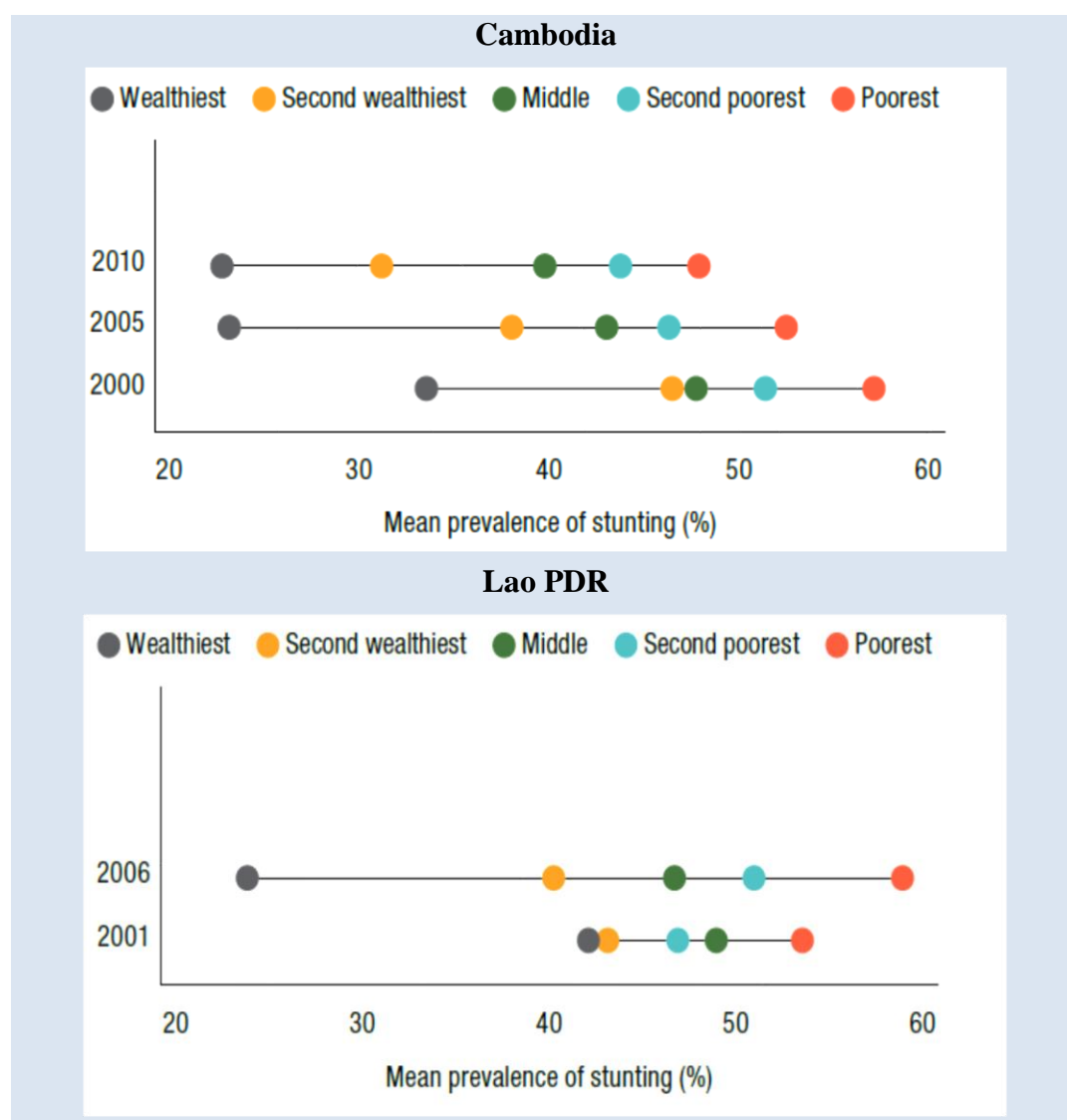
Figure 18: Global evidence on agricultural productivity and malnutrition



Source: FAO 2013.

72. In Cambodia and Lao PDR, for which empirical data are available, higher household income, to which agriculture contributes, is found to help reduce child **stunting**. Children residing in the wealthiest households have lower stunting rates and the impact of income on stunting seems to have increased over time (Figure 19).

Figure 19: Changes in stunting prevalence over time and wealth quantile



Source: IFPRI 2014b.

73. **Vietnam can also offer lessons on how agricultural income matters for nutrition.** Despite continuously increasing volumes of rice production and exports, malnutrition among paddy farmers in the Mekong Delta, Vietnam's rice bowl, remains high. This is because fewer and fewer households there can continue to earn a livelihood from intensive rice monoculture—even with improved yields over time. A 2010 survey found that in traditional rice-growing areas, households with landholdings of less than 1 ha earned the largest proportion of their income from non-farm (and especially non-agricultural) sources (Table 32). Households with between 1 and 3 ha shared their income sources evenly among paddy sales, animal product sales, and off-farm activity. Only households with more than 3 ha earned a large majority of

their (above poverty line) income from paddy sales, while even three crops of paddy would not allow small farmers to earn incomes above the poverty line.

Table 32: Composition of household income (VND) among sampled Mekong Delta farmers

Farm size		Total income per capita	Rice income per capita	Other crop income per capita	Animal and aquatic income per capita	Off/non-farm income per capita
< 1 ha	Mean	849	151	84	82	533
	%	100	18	10	10	63
1-2 ha	Mean	1,165	284	72	359	449
	%	100	24	6	31	39
2-3 ha	Mean	1,901	658	26	728	490
	%	100	35	1	38	26
> 3 ha	Mean	1,933	1,296	10	88	540
	%	100	67	0	5	28
Total	Mean	1,312	535	56	209	512
	%	100	41	4	16	39

Source: World Bank 2016a.

74. **Rice prices play a role in nutrition.** Prices are relatively low in Cambodia and Myanmar but are high in Lao PDR, partially explaining its higher stunting rates. Cambodia and Myanmar are the largest net exporters of rice amongst the target countries and their domestic prices are at levels similar to those of other rice exporters, such as India, Thailand, and Vietnam (Table 33).

Table 33: Rice prices (nominal \$/ton) in selected Asian countries, wholesale or retail, 2013-2015 (avg.)

Country (Location)	Rice trade position	Average price, nominal \$/ton, (2013-2015)
Cambodia (Phnom Penh, mix rice)	Net exporter	413
Lao PDR (Vientiane, glutinous, second quality)	Net (small) exporter	829
Myanmar (Yangon, Emata Manawthukha)	Net exporter	375
Thailand (Bangkok, 5% broken ordinary rice)	Net exporter	400
Vietnam (An Giang, 20% broken ordinary rice)	Net exporter	350
India (New Delhi, ordinary rice)	Net exporter	386
China (average of 50 main cities, Japonica)	Net importer	963
Indonesia (national average, medium quality)	Net importer	773
Philippines (Manila, regular milled)	Net importer	771

Source: FAO-GIEWS 2015.

75. **Continuing to keep them in line with the market and avoiding the temptation to artificially elevate prices to support domestic production are prerequisites for better nutrition as well as long-term competitiveness necessary to allow exports.** In Lao PDR, however, rice prices are closer to those of net importers (China, Indonesia, and the Philippines), which protect their domestic markets with high import barriers, resulting in high taxation of their consumers. High rice prices in Lao PDR are the result of many factors, including still low rice surpluses available for export, consumers' preferences for glutinous rice, and the small regional market for glutinous rice. Regardless of the reasons for high prices in Lao PDR, they

reduce consumers' purchasing power to buy more nutritious food. Efforts in Lao PDR could focus on increased farm productivity and reduced marketing costs to eventually reduce rice prices for consumers.

76. **To further increase its contribution to better nutrition, rice value chains can become more “nutrition-sensitive.”** This implies: (i) increasing the nutritional value of rice; and (ii) empowering women by increasing their discretionary agricultural income and reducing time and labor constraints. The empirical evidence suggests that the gender gains are powerful enough to improve the nutrition of all household members (IFPRI 2014a; World Bank 2013a; FAO 2012a). While rice cannot provide all nutrients and vitamins, its nutritional value can be increased through interventions at various stages of the value chain. Table 34 describes potential entry points for interventions, from input supply to consumers.

77. **The lack of readily available bio-fortified rice seeds and some consumers' reluctance to eat genetically modified foods such as Golden rice (a vitamin A bio-fortified seed variety) prevent quick improvements in the area of input supply.** Convincing consumers to switch from low nutrition (but easy to cook) white rice to higher nutrition brown and parboiled rice is difficult (Table 35 shows the key characteristics of various rice types). This underscores the importance of finding other ways to achieve quick results. The most promising entry points for interventions in GMS countries seem to be in paddy production and rice milling.

Table 34: Nutritional considerations in rice value chains

Part of value chain	Possible intervention	Likelihood of quick positive impacts
Inputs	Developing bio-fortified paddy seeds	<u>Hard to achieve</u> quick positive impacts due to the lack of bio-fortified paddy seeds; they are still mainly at research stage
Production	Promoting rotations (second crop and intercropping with fish)	<u>Easy to achieve</u> quick positive results by seasonally rotating legumes (and other crops) with rice. Legumes improve soil fertility and require less water than rice. They also directly improve nutrition via consumption. In addition, fish can be raised in fields with lowland rice.
Milling	Supporting rice fortification	<u>Hard to achieve</u> quick positive results due to the lack of cost-effective technologies, the large number of small mills that makes it difficult to introduce mandatory fortification, and high share of own produced rice in rice consumption.
Consumers	Shifting consumption from white well-polished rice to more nutritious brown, parboiled, and fortified rice	<u>Hard to achieve</u> quick positive impacts as changing eating habits has proven to be very difficult even in countries with high incomes.

Source: World Bank assessment based on ACDI/VOCA 2014 and the workshop in Bangkok.

78. **At the production level, promotion of crop rotations offers high rates of return for rice-based farming systems.** Legumes, for example, can complement rice in both production and consumption. During the production cycle, legumes improve soil fertility and require less water than paddy. Their rotation with paddy can also help control diseases and pests. And they are often more profitable than rice or can be consumed directly by the members of producing households, contributing to their better nutrition. Further, the amino acids in legumes are

complementary to those in rice so joint consumption of rice and legumes is especially nutritious. Intercropping with fish is also desirable. Fish can be raised in fields with lowland rice; this practice occurs in Indonesia and Vietnam, but is still rare in other GMS countries. The benefits from rice-fish cropping systems are many, including enhanced nutrition and reduced pesticide use (ACDI/VOCA 2014).

79. **At the processing/milling level, rice fortification is an emerging technology to increase the nutritional value of white milled rice.** Fortifying rice is conceptually similar to fortifying other staple foods but it involves additional processing and handling (USAID 2008). Coating, cold and hot extrusions, and dusting technologies are available but their uptake in Asia remains very low. Why? On the one hand, a fragmented milling sector with hundreds and often thousands of small mills increases the cost of compliance with fortification and makes it very difficult to enforce mandatory fortification, which is required for wide adoption of fortification technologies and consequent cost reduction. On the other hand, consumers are not yet familiar with fortified rice, increasing marketing risks for mills. Fortification is still a promising way to increase the nutritional value of rice but more efforts are required with respect to technology, policy, and consumer awareness to achieve high-impact results.

Table 35: Overview of processing of different rice types

	Brown rice	Parboiled rice	Well-milled rice
Other names	Wholegrain		White rice, broken rice, polished rice
Processing and storage	Only hull is removed; nutritious bran layer is kept; not good for long-term storage	Soaked, pressure steamed, milled, steamed, dried, and dehulled. Bran layer and other components are commingled	Hull and bran layer are removed by milling and further polishing
Nutritional value	High [B vitamins and fiber are retained]	Medium [Some B vitamins lost during steaming]	Low (if not enriched or fortified) [B vitamins and fiber are lost]
Cooking	Hard	Easy	Easy

Source: Adopted from ACDI/VOCA 2014.

80. **Empowering women is good for nutrition outcomes.** Several studies have estimated the impact (see van der Bold *et al.* 2013 for a literature review). For example, in Bangladesh greater empowerment of women (measured by attitudes towards abuse, decision-making power, and mobility) and maternal characteristics such as education and height were associated with greater dietary diversity scores and reduced child stunting. Cross-country studies found that over half of the reduction in child underweight from 1970 to 1995 was attributable to improvement in women's status. In agricultural activities, increasing women's discretionary income and reducing women's time and labor constraints appear to be especially important to improve nutrition (World Bank 2013a).

81. **Women play an important role in the rice sector of GMS countries.** Roles played by both men and women in rice production and cultivation vary to different degrees, depending on the country, geography, and culture (WOCAN 2015). Women in the countries along the Mekong Delta and throughout Asia usually take on the roles of weeding, transplanting, and harvesting rice, while men are tasked with preparing land/clearing fields, ploughing, making bundles, preparing seedbeds, transporting seedlings, irrigating, applying fertilizer, and spraying pesticides. With the high migration of Asian men to cities and other countries, women have taken on a greater workload in rice production. Yet they often face under-attention from

extension and other public programs. Women are often less educated than men, which affects their productivity. In some countries, women are still viewed as laborers or wives of farmers, not as farmers themselves, and they have unequal rights to own land or access credit. The above-mentioned constraints require urgent attention. Promising intervention areas include: (i) improvement of human capital and access to productive assets; (ii) access to factor and output markets; and (iii) strengthened voice and participation. Table 36 presents actions across these areas for Cambodia that are also highly applicable to other GMS countries.

Table 36: Gender empowerment in Cambodian agriculture

Area of intervention	Recommendations
<i>Women's Human Capital and Access to Productive Assets</i>	
Farming education	Combine agricultural and basic financial literacy training with rural vocational education programs as a way to help address gender inequalities in rural areas; work with microfinance institutions to provide training on financial literacy principles.
Agricultural extension	Tailor rural education and extension approaches to illiterate farmers (materials on inputs and machinery include pictures, farm demonstration activities). Increase the share of female extension staff, while also equipping male extension providers with the appropriate skills to reach female farmers. When delivering training, recognize different extension needs for women versus men due to their different roles in agricultural production chains, as well as women's time constraints and limited mobility.
<i>Access to Markets</i>	
Access to market information	Support use of technologies, particularly through mobile phones, to provide market and other information.
Land markets	Train staff in land registries/village authorities on how to improve land registration processes for agricultural households headed by women, particularly single women who often have difficulties documenting their status.
Access to financial services	Promote women's savings groups, which can be linked to microfinance institutions.
<i>Voice and Participation</i>	
Social capital	Encourage formation of savings groups and collective marketing that can provide farmers with access to markets and help overcome constraints in meeting demands of agricultural supply chains.
Representation in agricultural institutions	Promote a strong voice at the highest level to champion gender issues in agricultural policy and interventions.
Gender norms and voice	Involve men more closely in understanding the benefits of women having access to better jobs close to home. Building confidence in men to accept women's participation and leadership requires a keen understanding of gender relations and the capacity to influence it. This requires reevaluating gender roles at the community level, demonstrating the benefits of providing women with new employment opportunities, and rallying support from husbands, traditional chiefs, and male community leaders.

Source: World Bank 2015a.

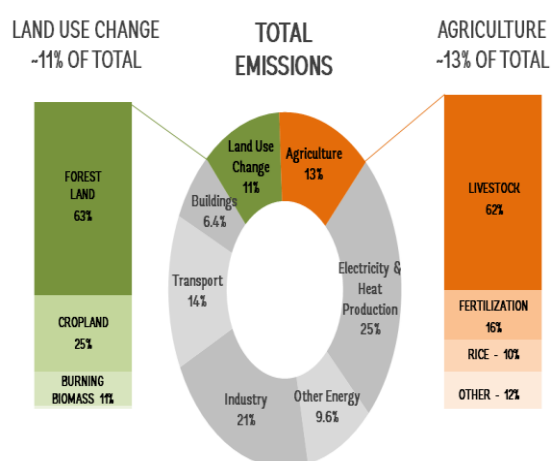
(iv) *Climate change*

82. **Environmental degradation associated with intensive rice production systems is an increasing concern.** Inappropriate and excessive use of agro-chemicals (fertilizers, pesticides) and increasing water use have resulted in an unsustainable level of water depletion, water pollution, soil erosion, and downstream silting in many Asian countries. Important ecosystem functions provided by rice fields are being compromised. The decline in biodiversity and loss of rice culture and heritage are other important manifestations of damage to ecosystem functions, sometimes resulting in a resurgence of pests that significantly threaten national production (FAO 2014b).

83. **Moreover, paddy production emits GHGs.** Paddy is often grown in flooded fields under anaerobic soil conditions that release methane (CH₄), a GHG about 20 times more potent than carbon dioxide. In addition, application of nitrogen fertilizers in rice cultivation may result in emissions of nitrous oxide, another type of GHG that is about 300 times more potent than carbon dioxide (Chen and Damen 2014). Paddy straw and husk residues are often burned or incorporated back into the soil after harvest. When returned to the soil, CH₄ is produced as decomposition occurs under waterlogged conditions; when burned, soot develops and contributes to GHG emissions.

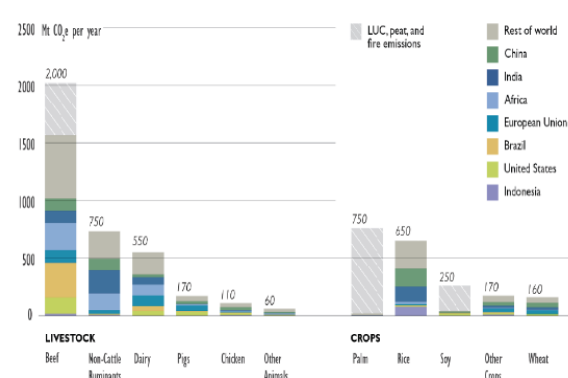
84. **Paddy rice cultivation is estimated to contribute 10 percent of the annual global GHG emissions originating in agriculture.** In addition, fertilization adds another 16 percent, in a process closely related to that of paddy cultivation (Figure 20). Paddy is the second largest crop contributing to emissions (Figure 21), and during 2000-2010, 94 percent of GHG emissions from paddy came from developing countries (Chen and Damen 2014), with Asia responsible for almost 90 percent of the total.

Figure 20: Sources of global GHG emissions



Source: FAO 2014a.

Figure 21: Global emissions by commodity, 2008



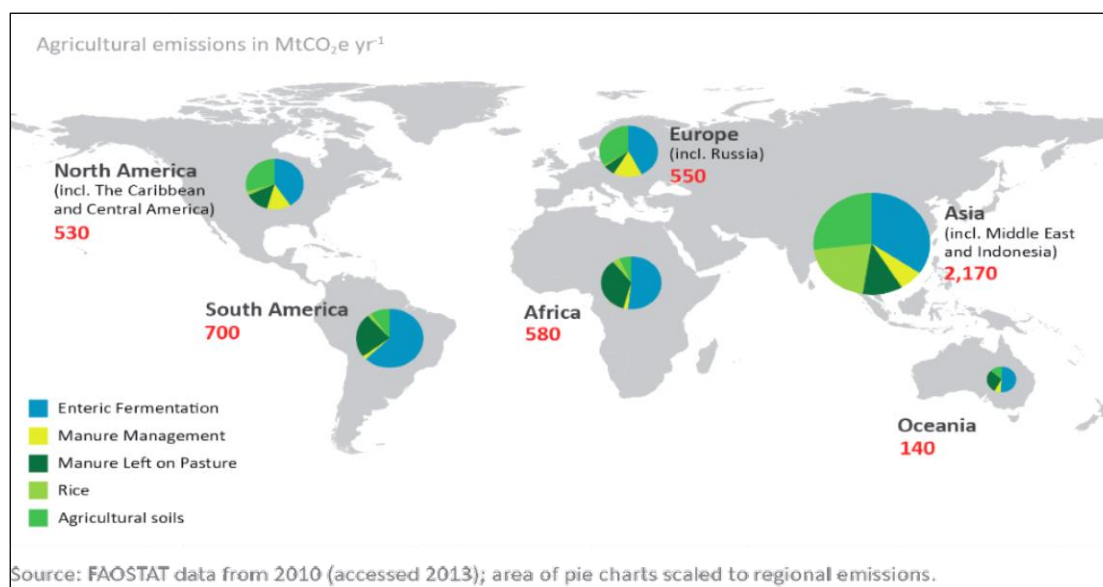
Source: CEA analysis based on: FAOSTAT 2008; Gerber et al., and personal communications with Paul West; Institute on the Environment, University of Minnesota.

Source: CEA analysis.

85. **Going forward, agriculture, which emits 13 percent of GHGs (Figure 20), is expected to contribute to mitigation of climate change, which itself seriously affects the sector.** To attain the goal of limiting global warming to less than 2 degree Celsius, total global

emissions must fall to 21-22 G tons of CO₂ equivalent by 2050. For the agriculture sector to contribute its fair share to meeting the 2 degree Celsius target, the required cuts are estimated at two-thirds of the current level (WRI 2013).

Figure 22: Agricultural emissions by region and source



86. **In GMS countries, the largest potential for mitigation seems to be in sustainable rice production and reforestation, as their livestock sectors are still weakly developed and fertilizer use is not yet excessive** (see Table 38 in Chapter 4). Sustainable increase in productivity will help reduce the need to cut forests, while improved water, nutrient, and residue management can further contribute to climate change mitigation (see more on sustainable rice cultivation in Box 1):

- Water-saving technologies such as alternate wetting and drying (AWD) reduce the time rice fields are flooded and can therefore reduce CH₄ emissions. This can reduce the amount of water use by up to 40 percent. Allowing the soil to dry out intermittently lets in air and prevents buildup of anaerobic bacteria responsible for CH₄ production; this has been shown to reduce CH₄ emissions from rice by up to 50 percent (World Bank forthcoming).
- Proper application of nitrogen fertilizers combined with water-saving technologies and good nutrient management can reduce field nitrogen losses and therefore nitrous oxide emissions. Nitrogen use efficiency can be improved by better matching the nitrogen supply from fertilizers with the nitrogen requirements of crops and through crop diversification by rotating paddy and legumes that fix nitrogen biologically (World Bank forthcoming).
- Charring or partly burning rice residues and adding the obtained black carbon to paddy fields could reduce field CH₄ emissions (Chen and Damen 2014).

87. **In summary, all of the above-described challenges must be addressed and the opportunities capitalized on to leverage rice sector development for poverty reduction.** Chapter 4 presents an analysis of the strengths and weaknesses of rice value chains in GMS countries in view of their readiness to do so.

CHAPTER 4: RICE VALUE CHAINS: A COMPARATIVE ANALYSIS

88. **The previous chapters demonstrate that rice can play a large role in growth and poverty reduction in GMS countries.** Are the rice value chains in the target countries competitive enough to play such a role? Can they capitalize on the emerging opportunities and withstand/address the challenges? How do the problems differ across countries and what are the key areas for improvements? And how do the target countries fare compared to Thailand and Vietnam?

89. **This chapter presents a comparative analysis of rice value chains in five GMS countries.** It presents the situation for the main rice-producing areas in 2013/14 using a list of policy-applicable, easy-to-measure indicators. Cambodia is represented by the Southeast provinces; Lao PDR by Savannakhet province; Myanmar by Ayeyarwady region/Delta; Thailand by the Central Plains; and Vietnam by the Mekong Delta. The segments of the rice value chains include input supply, production, milling, and exports. These results are not nationally representative; they reflect the situation in these countries' main lowland rice-producing areas ("rice bowls"), which are the key to supplying rice for domestic markets and export. The information was collected and estimates made by rice experts with support from the WBG and FAO, as described in Box 2.

Box 2: Data Sources for Rice Value Chain Analysis

In **Cambodia**, the background report was prepared by Sok Muniroth, a rice expert. Sources of information included reports of the Ministry of Agriculture, Forestry, and Fisheries; data from the Ministry of Commerce, including the Single Window Service Unit; Cambodia Rice Federation; rice value chain studies; and interviews with traders, rice millers, and farmers.

In **Lao PDR**, the background report was prepared by Emerging Markets Consulting firm. Sources of information included reports and data of the Ministry of Agriculture and Forestry; data from the Ministry of Industry and Commerce; and rice value chain studies.

In **Myanmar**, the background report was prepared by Larry Wong and Daphne Khin Swe Swe Aye, consultants, in collaboration with the Ministry of Commerce. Sources of information included reports from the Ministry of Agriculture and Irrigation; reports from the Ministry of Commerce; Myanmar Rice Federation; rice value chain studies; and interviews with millers and traders.

In **Thailand**, the background report was prepared by Dr. Isriya Nitithanprapas Bunyasiri, Kasetsart University. Sources of information included data from the National Statistics Office; data of the Ministry of Agriculture and the Ministry of Commerce; surveys conducted by Kasetsart University; Thai Rice Exporters Association; and reports of the Knowledge Network Institute of Thailand, Thailand Research Fund, and Thailand Development and Research Institute.

In **Vietnam**, the background report was prepared by the Center for Agrarian Systems Research and Development (CASRAD). Sources of information included the statistical books of Vietnam; statistics of the Ministry of Agriculture and Rural Development and the Ministry of Industry and Trade; and the CASRAD database.

90. **The target countries produce various types of rice.** Cambodia produces ordinary (Indica) white rice varieties but in recent years it significantly increased production of aromatic/fragrant varieties (for export), which are higher valued. Myanmar produces ordinary

white rice varieties, exporting low-quality and broken rice. Lao PDR produces mainly glutinous (sticky) rice. In comparison, Thailand produces all mentioned types of rice (Indica, aromatic/Jasmine, and glutinous) in large quantities, while Vietnam mainly produces Indica rice, with a recent increase in the production of aromatic/fragrant varieties. The existence of so many different rice varieties makes it difficult to construct typical value chains and present a single cost breakdown from input to export markets. Yet where relevant and possible, the analysis below presents data for different types of rice.

91. The analysis shows that rice value chains in the target countries are less competitive than those in Thailand and Vietnam, and large room for improvement exists at all stages. Among the target countries, Cambodia has made the most progress in recent years, especially in the production, milling, and export segments. Raising paddy productivity in a sustainable manner remains the biggest challenge in all target countries, particularly due to problems with the availability of affordable, good-quality seeds and the lack of high-quality extension services. Increasing regional and global demand for higher-quality and safer rice is both a challenge and an opportunity, requiring the highest attention to these issues in the target countries going forward.

Input Supply

92. The profitability of paddy production depends on access to good-quality and affordable inputs, especially seeds and fertilizers. Table 37 presents the indicators of availability, access, and affordability of these inputs. It shows that adequate seed supply is a big problem in all target countries, while the main issue for fertilizers is their affordability and efficiency of use.

93. Availability of seed presents a large constraint to increasing paddy production and productivity. In Cambodia and Lao PDR, the current supply of paddy seeds meets only 10 percent of the demand.¹² In Myanmar this ratio is below 1 percent. In comparison, demand in Thailand and Vietnam is fully met by supply, so farmers have a large volume of seeds from which to select. Most farmers in the target countries use their own saved seeds, which can be used productively only for three years from the date of their purchase.

94. Most farmers in the target countries, though less so in Lao PDR, use fertilizers for paddy production. Cambodian farmers on average use a balanced mix of fertilizers, applying both urea and NPK, while Laotian and Myanmar farmers seem to use mainly urea, thereby underusing phosphorus and potassium. As the analysis below shows, the level of the overall fertilizer use is below the frequently recommended optimum of 90 kg of nitrogen per hectare. Yet a further significant increase depends on fertilizer affordability, which is linked to paddy profitability. Urea prices were about the same across countries, ranging from \$425/ton in Cambodia to \$460/ton in Myanmar in 2013/14, so not much gain can be expected from lowering fertilizer prices in the target countries as they are close to regional and global averages. At the same time, paddy prices differed significantly. Myanmar stands out as the least attractive location for using fertilizers for paddy production. The ratio of urea prices to paddy prices in Myanmar was 2.3 compared to 1.6 in Lao PDR and Vietnam and 1.8 in Cambodia.

95. The future productivity and profitability of paddy production in the target countries depends on the resolution of constraints for an increased supply of seeds. The

¹² Demand is estimated as follows: total paddy sown area is multiplied by 50 kg of seeds per hectare, and this figure is divided by three given that openly pollinated varieties maintain high yield characteristics during the three years of planting and replanting.

challenge is not only producing more seeds, but producing the right seeds of high quality. The future profitability also depends on reducing input prices, along with a relative increase of farm-gate output prices, which can be achieved through paddy quality improvements (drying and cleaning of paddy, for example, with the help of farmers' groups), shifts to higher-value rice varieties such as aromatic ones, and reduced transaction costs between producers and consumers.

Table 37: Indicators for development of input supply in GMS countries

Measure	Indicators	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Access to affordable fertilizers	Urea price at farm gate, \$/ton	425	450	460	426	357
	Ratio of price of urea to price of dry paddy	1.8	1.6	2.3	1.1	1.6
Depth of fertilizer market	% of farmers using urea fertilizer for paddy production	70 (100)*	40	90	100	100
	% of farmers using NPK ¹³ fertilizer for paddy production	80	20	30	90	100
Availability of seeds	Number of new rice varieties released during 2009-2014	3	n/a	19	18	34
	% of demand met by supply of good seeds	10	9	0.4	100	100
Depth of seed market	% of farmers using purchased seeds	20 (80)	10	9	60	53

*Note: * Data in parenthesis for Cambodia are for the dry season. All other data are either for the monsoon season or for all seasons on average where seasonal differences are small.*

Source: World Bank estimates.

Farm Production

96. Farm production is analyzed through the lens of land and labor productivity and profitability indicators. The target countries lag behind Thailand and Vietnam on these indicators in most respects. First, they have lower average yields. When paddy is harvested, the wet paddy yields of ordinary rice in the main producing areas of Cambodia and Myanmar average 3 tons/ha (Table 38). Wet paddy yields are twice as high in the Central Plains of Thailand and more than twice as high in Vietnam's Mekong Delta. The difference is even larger in dry paddy equivalent, a standard way of making cross-country yield comparisons. The issue is that harvested paddy contains different levels of moisture, reaching 25 percent in some countries, and foreign matter (dirt). Comparing yields across countries requires an adjustment of moisture content to 14 percent and of foreign matter to zero.

97. Note that the average yield of aromatic varieties is lower than that of ordinary varieties. Yet they are priced higher and therefore compensate for lower productivity. Yields are again the highest in Vietnam, but its aromatic varieties are considered to be of lower quality than those in Cambodia and Thailand, so they receive lower prices (Table 45).

¹³ In the NPK fertilizer, N stands for nitrogen, a source of protein and amino acids, P stands for phosphorus, a source of nuclear acids, and K stands for potassium, a catalyst and ion transport.

98. **Other clear differences arise between these two groups – the target countries and Thailand with Vietnam – which partially explain differences in land productivity (yields).** The average use of nitrogen fertilizers in the target countries is well below the recommended 90 kg/ha of nitrogen in the wet season (Table 38). Thai farmers are close to optimum while Vietnamese farmers overuse nitrogen fertilizers due to their subsidized price (Table 37) and the strong push from extension services to apply fertilizers. The vast majority of farmers in the rice bowls of Thailand and Vietnam use machines for land preparation and harvesting, while the use of machinery is much smaller in the target countries, especially for harvesting. Myanmar farmers still widely use animal power for paddy cultivation. Most farmers in the target countries transplant paddy in the wet season, which is often considered to lead to higher yields. Yields still lag behind those in Thailand and Vietnam, where the majority of farmers broadcast seeds, indicating that they compensate for losses from broadcasting by other means such as better seeds, more fertilizers, better nutrient management, and smaller harvest losses.

Table 38: Indicators for land productivity in GMS countries

Measure	Indicators	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Land productivity	Yield, wet paddy	3.2* 3.0**	4.0***	3.1*	6.1* 2.6** 2.3***	7.4* 6.5**
	Yield, dry paddy	2.8* 2.7**	3.4***	2.5*	5.0* 2.2** 1.9***	6.8* 6.0**
	Conversion factor****	0.884	0.849	0.814	0.824	0.917
Seed technology used	Transplanting, % of paddy area in monsoon season	60	90	70	7	0
Fertilizer use	Kg of nitrogen per ha	32	12	55	79	230
	Actual vs. optimum fertilizer use, %	-64	-87	-39	-12	156
Extent of mechanization	% farmers using oxen power	24	21	58	0	0
	% of farmers using machinery for land preparation	76	78	45	100	100
	% of farmers using machinery for harvesting	68	low	18	100	100

*Note: * Ordinary rice. ** Aromatic rice. *** Glutinous rice.*

***** Conversion factor converts wet paddy into dry paddy equivalent to allow cross-country comparisons as different countries have different moisture content and impurities in wet paddy. Dry paddy moisture is assumed at 14 percent and impurities at zero.*

Source: World Bank estimates.

99. **Low land yields in the target countries lead to low land profitability.** The average profit of the wet season paddy production was \$142/ha in Lao PDR and \$135/ha in Myanmar (Table 39). Land profit was more than twice as high in Cambodia, at \$342/ha, but still much

lower than the profits achieved in Vietnam and Thailand.¹⁴ Profit from aromatic varieties in Cambodia was higher than that of ordinary varieties.¹⁵ Lao PDR and Myanmar do not produce a large quantity of fragrant varieties so their farmers could not benefit from higher profitability of fragrant rice.

Table 39: Indicators for land profitability in GMS countries

Measure	Indicators	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Remuneration	Farm-gate prices, \$/ton, wet paddy	240* 310**	275***	200*	376* 504** 401***	220* 245**
Costs	Production costs, \$/ha	426* 434**	903***	487*	849*	552*
Profit	Profitability, \$/ha	342* 496**	142***	135*	1,253*	829*
Higher value-added opportunity	% of land under aromatic rice varieties	35	small	small	13	28

*Note: * Ordinary rice. ** Aromatic rice. *** Glutinous rice.*

Source: World Bank estimates.

100. **The difference in land profits was a result not only of yield differences, but also different output prices and production costs.** For ordinary varieties, paddy prices were the lowest in Myanmar, which also had the lowest production costs (Table 39). Paddy prices were a bit higher in Cambodia and its production costs were lower than in both Myanmar and Vietnam. Glutinous paddy prices in Lao PDR were much lower than in Thailand, but higher than in Vietnam.

101. **The gap between Cambodia, Lao PDR, and Myanmar on one hand and Thailand and Vietnam on the other was even larger for labor productivity and profitability than for land-related indicators.** The labor indicators are most important as they reflect on labor income, the key indicator of economic development. Labor productivity expressed in both kg and \$ per working day was lowest in Myanmar and highest in Thailand (Table 40). Differences among countries were very large, and Lao PDR together with Myanmar lag significantly behind their neighbors. The highest labor productivity was in Thailand, as labor has been replaced by mechanization. Only an estimated 6 days/ha were used for paddy production in Thailand compared to 100 days in Lao PDR and 130 days in Myanmar. The difference in labor use is a result of labor cost differences. The cost of one day's work was \$9.5 in Thailand compared with only \$2.2 in Myanmar during the wet season of 2013/14.

102. **Labor productivity is a more useful indicator than land productivity for policy makers to monitor the progress achieved in farm incomes.** Higher land productivity can be achieved through higher input use, including more labor input, and sometimes the costs of higher labor use exceed the benefits of extra yield. Alternatively, lower labor use can lead to lower yields but still generate higher income per capita. Going forward, policy makers are

¹⁴ Profit and other price-related data in Thailand need to be carefully interpreted as they are influenced by the rice pledging scheme, which artificially increased paddy prices. After the discontinuation of this scheme in 2014, paddy prices and profits reportedly now approach the levels observed in Vietnam.

¹⁵ Again, the rice pledging scheme in 2013/14 distorted relative profitability figures in Thailand. Fragrant varieties were not provided with a price premium over ordinary rice, resulting in a temporary increase of profitability of ordinary over fragrant rice.

recommended to pay the same attention to labor productivity as they pay to land productivity. This does not mean that yield data can be written off. It is still useful to show the extent of realization of land use potential and these data are readily available for cross-country comparisons in contrast to labor productivity data.

103. The target countries lag behind their peers in their capacity to produce two crops per year. In Lao PDR, only 87,000 farm households reported producing dry season paddy compared to 775,000 households producing paddy during the monsoon period in 2010/11 (MAF 2012). In the primary survey of 1,728 farming households in four regions of Myanmar, only 336 households were found to have produced dry season paddy compared to 1,373 households producing paddy during the monsoon season (LIFT and World Bank 2016). As a result, dry season paddy production accounts for a small share in total paddy production. In Lao PDR, it accounts for 13 percent (Table 39). Its share is higher in Cambodia (23 percent) and Myanmar (18 percent), but these are still much lower than in Thailand (43 percent) and Vietnam (54 percent). This reduces income-generation opportunities as dry season paddy is more profitable in many countries than monsoon paddy (recall Table 25 for Cambodia and Table 27 for Myanmar). This also disrupts the flow of paddy for milling and eventually exports, requiring longer storage and more working capital to process paddy harvested only during 2-3 months in a year (monsoon season harvest).

Table 40: Indicators for labor productivity and profitability in GMS countries

Measure	Indicators	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Labor intensity	Labor use, days/ha	52	100	130	6	23
	Cost of labor, \$/day	4.0	6.3	2.2	9.5	7.2
	% of hired labor in total labor use	60	70	54	55	43
Labor productivity	Yield/labor use, kg/day	54	34	19	836	294
Labor profitability	Profit, \$/day (ordinary rice)	7.5	1.4	1.3	253.5	39.3
	Profit, \$/day (aromatic rice)	9.4			111.7	

Source: World Bank estimates.

104. The target countries' low capacity to produce paddy in the dry season is a result of low irrigation coverage and inefficiencies. Irrigation serves between 15-25 percent of monsoon paddy areas in the target countries, providing complementary water (Table 41). In the dry season, however, most irrigation systems supply water to only a fraction of the irrigated areas serviced in the monsoon season. The situation is different in Thailand and Vietnam's main producing areas, where irrigation water is available year round.

105. In principle, low production of paddy in the dry season can be compensated for by higher production of other crops. Rotation with other crops and crop diversification are actually beneficial for restoration of soil nutrients, farm incomes, and consumers' nutrition. In practice, however, rice farming systems in the target countries remain weakly diversified. A small fraction of Cambodian and Laotian farmers produce vegetables, cassava, and maize, but most production of these crops occurs in uplands, not in lowland rice farming systems (MAF 2012; World Bank and AusAid 2015). Rice-based farming systems are more diversified in Myanmar's dry season: 60 percent of farmers produce a second crop, mainly beans and pulses and oilseeds (LIFT and World Bank 2016). But even in Myanmar, the sown area covered by

second crops remains limited as farmers lack access to good seeds, finance, and extension services, and are sometimes forced to produce summer paddy or nothing on the land assigned for paddy production, a policy still practiced in public irrigation systems.

Table 41: Indicators for farm productivity in the dry season in GMS countries

Measure	Indicators	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Risk of high seasonal volatility	% of dry season paddy in total paddy production	23	13	18	43	54
Opportunity for producing second crop	% of paddy area equipped with irrigation	25	15	18	100	100
	% of wet paddy area irrigated during dry season	16	6	10	80	100
Cropping intensity	Paddy area in dry season divided by paddy area in wet season, multiplied by 100	119	110	118	124	154

Source: World Bank estimates.

Rice Mills

106. **Rice mills are important actors in rice value chains.** They are intermediaries between farmers and traders, and eventually consumers. In open economies, where farm-gate prices are determined by the difference between export prices and marketing and milling costs, rice mills are expected to be efficient and service-oriented to increase farmers' incentives and to strengthen the rice value chain. Rice mills are expected to be not only cost-efficient but also able to produce high-quality rice for different market segments. They are expected to provide various services to farmers such as post-harvest and extension services. In this report, the strength of rice mills in GMS countries is measured by four groups of indicators: market competitiveness, attractiveness for FDI, milling efficiency, and cost-effectiveness.

107. **In all GMS countries, there are many rice mills in operation.** Many of them are small and are not officially registered (Table 42). But even the number of larger and registered mills is high in GMS countries. Although some larger mills have a monopoly position in local markets in some countries, competition among mills appears to be very high at the national level. Some consolidation may even be necessary to increase the industry's competitiveness vis-à-vis peers without the loss of free competition in the domestic market.

108. **Cambodian mills attract the most FDI, which has allowed them to rapidly converge with more modern Thai mills.** In 2013/14, about 25 percent of registered Cambodian mills obtained FDI, while in 2009 this figure was close to zero (Sok 2015; World Bank 2014a). Most FDI to Cambodia originates in Thailand. In contrast, FDI is still a rarity in Lao PDR and Myanmar, in spite of recent efforts to attract it, especially in Myanmar since the start of its economic and political transition in 2011 (LIFT and World Bank 2014). FDI in rice mills is also small in Thailand and Vietnam due to preferential treatment of local investors in these countries, but Lao PDR and Myanmar lack the domestic capital and international trade expertise of Vietnam and especially Thailand. They would benefit from following Cambodia's

strategy of creating a favorable environment for FDI in their rice milling industry to overcome these weaknesses.

Table 42: Indicators for rice mill development in GMS countries

Measure	Indicator	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Existence of competitive market	Number of rice mills, excl. hullers	12,148	34,632	n/a	2,730	249,059
	Number of registered mills	60	8,778	n/a	560	150
Competitive edge	% of mills for FDI	25	< 5	< 5	0	3
Efficiency	Running period, hours/year	1,944	n/a	2,016	5,400	4,855
	Average milling ratio, %	64	60	60	66	66
	Capacity utilization, %	50	50	50	58	71
Cost-effectiveness	Milling costs, \$/ton	26-30	25-30	23	22	21
	Electricity price, \$/kilowatt	0.16-0.23	0.08	0.08-0.16	0.12	0.08
	% of mills using gasifier	50	5	5	0	0
	% of mills running on diesel	30	5	35	0	0

Source: World Bank estimates.

109. **The efficiency of rice mills in the target countries is lower than that found in Thailand and Vietnam.** Target countries' mills are run half of the period observed in Thailand and Vietnam and their capacity utilization is only 50 percent (Table 42). In comparison, capacity utilization is estimated at 58 percent in Thailand and 71 percent in Vietnam. The milling ratio, which shows the conversion of paddy into rice, averages 60 percent in Lao PDR and Myanmar; thanks to recent FDI, it rose to 64 percent in Cambodia. Yet this is lower than the 66 percent observed on average in Thailand and Vietnam. If Myanmar could increase its average milling ratio to 66 percent, however, its production of rice in 2013/14 would have risen by 10 percent without the need to increase paddy production (Table 43).

Table 43: Impact of milling efficiency on rice production in Myanmar, 2013/14

Milling efficiency rate	Paddy production, '000 tons	Rice production, '000 tons
60 percent	18,683	11,210
66 percent	18,683	12,331

Source: World Bank estimates based on paddy production data from FAS-USDA 2015.

110. **Myanmar's average milling costs are closer to those of Thailand and Vietnam.** This is partially due to comparable electricity prices among these three countries, although an estimated 35 percent of mills in Myanmar run on diesel, the largest share in the GMS (Table 42). In Lao PDR, milling costs are high in spite of relatively low electricity prices, while Cambodian mills suffer from high electricity prices, forcing them to use diesel or gasifiers. FDI in Cambodian mills reduced milling costs but they still remain the highest in the region,

partially explaining why Cambodian mills have difficulty competing with Vietnamese traders for paddy produced in Cambodia.

111. Many mills face electricity cutoffs, so they either idle their plants or use diesel generators. But diesel is much more expensive than electricity. Gasifiers burning readily available rice husks offer an alternative to diesel, cutting diesel usage by three-fourths if good equipment is used. Rice millers in the target countries are generally aware of this alternative, especially in Cambodia where about half of all mills use them (Table 42). But many in Lao PDR and Myanmar are uncertain about employing gasifiers as they realize that the technology can pollute the environment and poison workers. There is a pressing need for governments and donors to provide information on sources of “green” biomass gasifiers and proper operating practices, and promote them in partnerships with the private sector, as improving access to reliable and affordable electricity in rural areas will take much time.

Exports

112. As all GMS countries are net exporters of rice, the strength of the value chain depends on export competitiveness. A common feature of the target countries is that their export volumes are still much lower than those of Thailand and Vietnam (Table 44). Another common feature is their high reliance on cross-border trade. Yet in terms of other aspects of export performance, Cambodia is closer to Thailand and Vietnam than to the other two target countries. Cambodian openness to trade is high, reflected in: (i) its export of 39 percent of rice production, a ratio even higher than in Thailand and Vietnam (in contrast, Lao PDR and Myanmar export only a fraction of their production, up to 10 percent); and (ii) its permission to export both paddy and rice, with paddy exports accounting for 70 percent of its total exports (while both Lao PDR and Myanmar ban the export of paddy).

113. Cambodia is also closer to Thailand and Vietnam in terms of extent of competition on the export market. The five largest rice exporters in Cambodia control 42 percent of FOB trade, compared to 34 percent in Vietnam and 54 percent in Thailand (Table 44). Myanmar’s export market is much more concentrated: the five largest exporters account for 89 percent of FOB exports. This high concentration increases the risk that exporters will transfer their inefficiencies and losses to domestic traders and millers, and eventually to farmers.

114. Cambodia is performing superbly in terms of export profitability. While it sells mainly paddy across the border to Vietnam, FOB exports consist of high-quality ordinary rice (5 percent broken and less) and fragrant rice (Table 45). For its rice it gets FOB prices much higher than Myanmar and Vietnam do, although its fragrant rice is sold cheaper than Thai Jasmine rice. As a result, the effective price of Cambodian exports in 2013/14 was \$412/ton, compared to \$342/ton in Myanmar, \$404/ton in Vietnam, and \$656/ton in Thailand. Cambodia still has a large potential to improve the quality of its existing export portfolio to catch up with Thailand and to add more types of rice (for example, parboiled rice).

115. Myanmar must do more work to increase the profitability of its exports. Its main export item is low-quality broken rice with an average FOB price of only \$339/ton. The dominance of this type of rice is a result of many factors, including poor paddy quality, multiple rice varieties, a poor seed quality control system, and inefficient rice mills (LIFT and World Bank 2014). Addressing these issues is essential to increase export profitability to generate higher profits for millers and paddy producers.

Table 44: Indicators for rice export performance in GMS countries

Measure	Indicator	Cambodia	Lao PDR	Myanmar	Thailand	Vietnam
Export volumes	Rice export, million tons (2013)	1.86	0.08	1.23	10.43	6.60
Cross-border trade	% of cross-border in total export	73	93	70	0.4	26
Trade with paddy	% of paddy in total rice exports	70	30	0	0	0
Openness to trade	% of export in rice production	39	5	10	37	23
Extent of competition	Number of FOB exporters	86	n/a*	30	200	150
	Share of 5 largest exporters in total exports, %	42	n/a	89	54	34

Note: * As Lao PDR is landlocked, it does not have FOB exporters.

Source: World Bank estimates.

Table 45: Indicators of rice export profitability in GMS countries

Measure	Indicator	Cambodia	Myanmar	Thailand	Vietnam
Export diversification	<i>Share in total exports, %</i>				
	Paddy (in milled rice equivalent)	79	0	0	0
	Ordinary rice (5% broken or less)	8	8	32	37
	Ordinary rice (10-25% broken)	0	90	4	46
	Parboiled rice (5% broken)	1	2	34	0
	Fragrant/Jasmine rice (5% broken)	11	0	28	12
	Glutinous rice	0	0	3	5
Export prices	<i>Average export price, FOB, \$/ton</i>				
	Paddy (in milled rice equivalent)	344	n/a	n/a	n/a
	Ordinary rice (5% broken or less)	450	350	466	410
	Ordinary rice (10-25% broken)	430	339	434	352
	Parboiled rice (5% broken)	490	453	478	434
	Fragrant/Jasmine rice (5% broken)	850	n/a	1096	507
	Glutinous rice	n/a	n/a	911	600
Export profitability	Weighted-average export price, \$/ton	412	342	656	404

Note: Similar statistics are not available for Lao PDR.

Source: World Bank estimates.

116. **Increasing export volumes and profitability requires cost-effective export logistics.**¹⁶ Export competitiveness can be assessed by comparing the costs of port services and export service and document fees charged by government agencies. It is five times more expensive to serve a 20,000-ton vessel in Myanmar's Yangon Port than in HMC Port in Vietnam and three times more expensive than in Bangkok Port in Thailand (Table 46). Yangon Port's high costs lead to high deductions from the export value of rice required to keep Myanmar rice competitive on global markets. Myanmar, however, fares well with regard to export processing costs and costs charged by government agencies. Export procedures there cost \$2.80/ton compared to \$2.34/ton in Thailand and \$8.75/ton in Vietnam. Costs of export procedures are very large in Cambodia (\$16.7/ton), although these are down from \$20/ton in 2012 (World Bank 2014a). As most FOB export in Cambodia is fragrant rice with an average price of \$850/ton, these high export costs do not restrict exports, but they still result in lower incomes for rice actors across the value chain, and make the export of ordinary rice uncompetitive.

Table 46: Indicators of cost-effectiveness of export logistics in GMS countries

Measure	Indicator	Cambodia	Myanmar	Thailand	Vietnam
Port efficiency	Costs, \$/20,000-ton vessel	22,743	145,000	65,000	34,539
	Port disbursement account	17,700	65,000	45,000	22,755
	Stevedore	5,043	80,000	20,000	11,784
Export procedures	Costs, \$/ton	16.69	2.80	2.34	8.75
	Sanitary and phytosanitary certificate	1.25	0.10	0.07	
	Export license	6.50	0.60		
	Inspection fee	7.00	0.60	1.32	
	Fumigation certificate	0.95		0.95	0.55
	Certificate of origin	0.41	0.50		
	Estimated informal charges	0.58			8.20
	Other costs (handling and loading)		1.40		
	Taxes (inc. withholding tax)		7.00	3.50	4.10

Note: Similar statistics are not available for Lao PDR

Source: World Bank estimates.

¹⁶ Increasing export and profitability also depends on good management of exchange rate. Analysis of the link between the exchange rate and export competitiveness of rice in GMS countries goes beyond the scope of this report, however.

CHAPTER 5: FUTURE RICE POLICY AGENDA

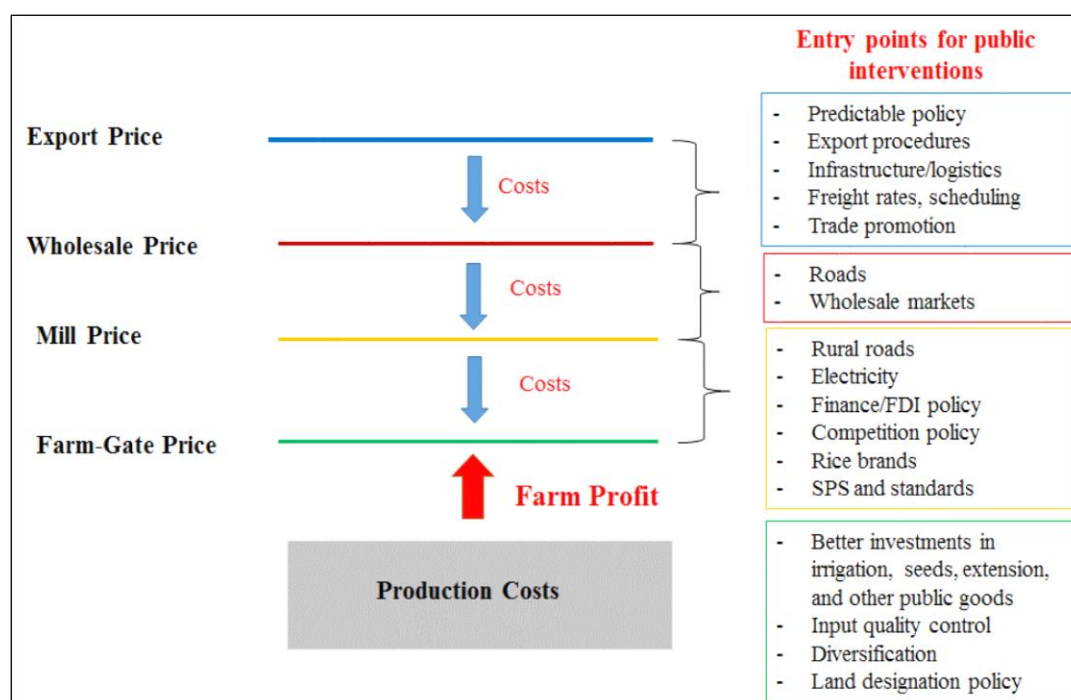
117. **Across Asia, governments have traditionally viewed food and food security through the lens of rice production.** Public policy and public expenditures on agriculture centered predominantly on raising productivity and expanding rice output, and on domestic market margins and international trade or farm income support. Output and input subsidies, agricultural research, advisory services, and investments in irrigation were all oriented primarily to achieving national targets of rice output and, recently, gross exports. This policy and public spending bias persisted in the face of changing economics and consumer behavior. Issues such as productivity and diversification, food quality and safety, sustainability of production and processing, trade promotion, rice branding, efficiency of rice mills, and overall increased competitiveness are gradually gaining importance, yet they remain overshadowed by the more traditional policy focus.

118. **Supporting rice production and trade will remain important in the target GMS countries.** Yet in the context of emerging opportunities and challenges discussed in Chapter 3, governments are advised to expand their focus from rice production to a multidimensional value chain support policy to effectively leverage the rice sector for poverty reduction. With the policy shift from production support to value chain facilitation, farm income would be a good indicator of success of policy interventions. Higher income of other value chain actors is also important, but poverty is highest among producers so moving that part of the value chain is the key to achieving the poverty reduction objective.

119. **Focusing on farm incomes from paddy production is especially important in the era of low global prices projected for the next 10 years.** Achieving higher farm profit and thus income is a more difficult task when output (paddy) prices are low than when they are high. Artificial elevation of paddy prices is not a viable option for the target countries as it would undermine their export competitiveness and would cost a substantial amount of public funds as the recent example of Thailand has shown. Attention instead is to be paid to reduction in costs along all segments of value chain and productivity improvements. Figure 23 illustrates key entry points for policy actions to reduce costs and raise productivity, thereby increasing profits along the value chain in a sustainable manner.

120. **Applying a more balanced approach to food security and facilitating the modernization of rice value chains will involve mandates extending well beyond ministries of agriculture.** Ministries of agriculture are generally slow to adjust to changes in food demand and market situation and often do not comprehend the business-enabling conditions required by the private sector. The target countries' ministries of agriculture have yet to develop the capacity for effective, proactive support for agricultural diversification and inclusive agribusiness. Further, many emerging issues fall outside of their traditional boundaries and mandates, relating rather to technical and regulatory bodies involved with commerce, manufacturing, public health, and social and environmental protection. Multidisciplinary and collaborative approaches across ministries and with a range of stakeholders (private, public, and civil society organizations) is required. In more developed value chains, the private sector is expected to play a dominant role in commercial activities, with important roles for the government in facilitating investment and trade, promoting competition, monitoring and protecting the environment, and promoting better nutrition.

Figure 23: Entry points for policy actions along rice value chains



Source: Authors' presentation.

121. **At the input supply and farm-gate segments of the value chain, the priority is to increase profitability of rice production that is the result of individual farmers' choices in combination with crop rotations for income generation and increased resilience.** This requires improving the quality of existing public programs for rice, promotion of diversification by avoiding or abolishing the designation of rice land, and broadening the scope of agricultural public programs to all crops.

122. **The quality of existing public programs for rice can be improved substantially in all target countries.** Most resources are spent on irrigation, so the largest gains will come from making irrigation investments more efficient and effective. Construction of irrigation systems is to be accompanied by sustainable arrangements for operation and maintenance of these systems through water users' participation and adequate budget allocations. In most cases, more gains can be achieved from rehabilitation and upgrade of existing systems by adding drainage, reshaping canals, and ensuring better management than from new capital investments in dams and primary infrastructure. Considerations of water security are to be made at the basin level rather than at the irrigation system level so irrigation design is informed by more accurate estimates of future water inflows and water availability for irrigation.

123. **Among other public programs, large gains can be achieved from better extension services, input quality assurance, and seeds.** Access to fertilizers and chemicals is not a problem in most parts of the target countries, but access to "good" quality inputs and their efficient use are problems everywhere. Extension and quality assurance programs can cost-effectively mitigate these deficiencies. Improvements in the seed sector are more time consuming and complex. Yet as discussed above, the rice market consists of many varieties and different qualities. They all have their consumers but to benefit from evolving demand, producers must have good-quality seed. Seed systems are to be prepared to supply varieties aligned with the evolving demand, which in turn requires close collaboration between

agricultural ministries' seed divisions and rice mills, traders, and the ministries of commerce responsible for trade promotion.

124. **Diversification can benefit rice farmers.** In many cases, diversification is only possible during dry seasons, but even for that to happen public programs and policies are to expand beyond supporting rice. One such policy is land use restrictions. Through zoning laws, land-use plans, and other means, many countries have long sought to restrict or otherwise manage the pace and location of agricultural lands being converted to other uses. For example, China set a national target for maintenance of aggregate agricultural lands linked to estimates of current and future demand for cereals (Jaffee and Do Ahn Tuan 2014). Vietnam has a longstanding policy of designating and controlling the use of rice land, on which a farmer is not permitted to shift to perennial crops and is mandated to grow one or two seasonal rice crops. As land restrictions often encourage production of rice at any cost, even when it is less profitable than other crops, or production in fragile ecosystems, Vietnam is currently reconsidering its land policy to allow a conversion of at least 10 percent of rice land for non-rice production (Box 3).

Box 3: Designated Land for Rice Production in Vietnam

Since *doi moi* reforms, farmers' rights over land use in Vietnam have been greatly extended. However, farmers still do not have full flexibility over crop choice. The government has always followed a strict policy of maintaining a certain proportion of agricultural land for rice cultivation. In 2009, the total rice land area in Vietnam was 4.1 million ha. In the face of pressure to convert rice land for other agricultural and non-agricultural uses, the government plans to keep rice land at 3.8 million ha by 2020 (designated land), which constitutes about 40 percent of total agricultural land in the country. The government's aim in pursuing this policy is to ensure a sufficient supply of rice to meet domestic and export demands.

In 2010-2011, a collaborative multi-institutional research program supported by the World Bank estimated that about 70 percent of designated land is considered by farmers to also be suitable for production of various crops. But in case of removal of land use restrictions, along with other reforms, the decline of paddy land is projected to be less dramatic than the government fears. It is projected to drop from 4.1 million ha in 2009 to 3.1-3.5 million ha by 2030. Paddy production will continue to be relatively profitable vis-à-vis other crops on most designated land, while even this small projected land conversion would have a large positive impact on economic growth and poverty reduction. Having this information helped the government to start the gradual removal of its designated land restrictions.

Source: World Bank 2012b.

125. **This is also an important issue in the target countries.** Among the three, Myanmar has the strictest rice land rules. Since 2011, this policy has been relaxed and the majority of farmers can make their own crop decisions. But it remains enforced in public irrigation systems. Farmland is still classified as "Le" (designated for rice) and "Ya" (designated for other crops), and "Le" land cultivators continue to receive more support from the government than "Ya" land cultivators. Going forward, fully eliminating this crop-specific land classification while maintaining broadly defined farmland classification in land use plans to give farmers clear freedom over crop selection to better meet more diversified food demand, and to provide

support to all farmers irrespective of their land classification, would be a good strategic policy decision for Myanmar.

126. Cambodia and Lao PDR designate a large share of their irrigated land area strictly to rice cultivation, and both are considering adopting a stricter rice land designation policy similar to Vietnam's. The experience of Vietnam and other countries demonstrates that this approach can lock farmers into unsustainable production and such land restrictions are hard to remove once introduced. Allowing flexibility in agricultural land use will help meet evolving goals, and at the same time will allow a shift back to rice cultivation if economic or national food security conditions warrant this.

127. In addition to agricultural land use flexibility, efforts can be made to help rice farmers introduce rotation crops or a rice-aquaculture farming system, and in doing so, raise their annual income, break the “pest and disease” cycle, and reduce adverse environmental impacts. Farmers with diversified income sources can remain viable seasonal rice producers, producing rice during the wet season and other crops during the dry season, for example. Without this flexibility it may be hard to reduce the poverty of rice-producing farmers. To support diversification, public programs financing seed sector development, soil nutrient management, or input quality control are to go beyond rice and cover all major crops. In addition, adjustments will be required in water management and drainage services to provide options for crop diversification in irrigation systems. More flexible irrigation is important not only from the point of view of profitability, but also of environmental sustainability. In addition to traditional concerns over the operation and maintenance of irrigation systems, attention is merited to redesign systems to allow wide adoption of climate-sensitive approaches such as AWD and sustainable rice intensification and production.

128. In the segments of rice mills and trade, the target country governments can benefit from entering into effective partnerships with the private sector. These partnerships could help avoid or remove restrictions to private investment, improve logistics, establish rice brand(s), be more proactive in rice market due diligence and market promotion, facilitate linkages between farmers and rice mills, and improve food safety and quality.

129. Cambodia is a clear example of how the absence of restrictions attracts FDI in rice mills. Yet, Cambodia can do more to open up for investments in seed production. Lao PDR and Myanmar can follow Cambodia's example by removing all restrictions on foreign investors. In Myanmar, for example, this means permitting foreign investors to establish joint ventures with “existing” rice mills, not just allowing them to make “green” investments. It also means streamlining the approval process by the authorities to grant permission for foreign investment in rice mills (LIFT and World Bank 2014).

130. The costs of export procedures, logistics, and electricity can be decreased. As shown in Table 42 and Table 46, the scope for cost reduction and efficiency improvements in all target countries is large. The use of green gasifiers and their proper operation by rice mills can be promoted in Lao PDR and Myanmar to reduce the cost of milling. In regard to reduction in port costs, for example, attraction of private investments in the Port of Yangon can be complemented by public investments in equipment that allows loads to be covered during the monsoon season, and lighted buoys and a radar system that would facilitate nighttime sailing of vessels (LIFT and World Bank 2014).

131. The emerging new task for target countries' governments is to establish recognizable rice brands. This is especially important for Cambodia and Lao PDR, the small exporters who can go for higher-end markets instead of competing on volumes/commodities. This will help them compete with other exporters and command higher import prices. The

private sector alone cannot carry out this task as it needs to be reinforced with a government-approved certification process and stamp to gain the confidence of importers and distributors. The brands ideally would combine a unique rice name and a visual portrayal of the country's rich cultural heritage. Brand creators for higher-value fragrant rice, for example, may also consider creation of a protected geographical identification for specific, limited regions in the country. Such a designation allows marketers to tell a story of why this area is important, how this rice is produced, and how the designation ensures traceability and standards above the levels of other areas that produce fragrant rice (IFC 2015).

132. Consistency and reliability are critical to reinforce rice brands, requiring governments to work with farmers and mills, including through contract farming. Unless small farmers work with rice mills with the support of agricultural extension and some sort of matching conditional grants, they will find it very difficult to comply with new, stricter requirements for quality, safety, and consistency, pointing to another important governmental role going forward.

133. Establishing rice brands takes time and effort. Cambodia began this process in 2012, and despite being awarded multiple times at many global rice events for its high-quality rice, the Cambodian rice brand is not yet fully established. The first brand will be launched in mid-2016. Lao PDR and Myanmar can learn from Cambodia's experience.

134. In an era of rising competition on global markets, governments are expected to play a more active role in market intelligence and promotion campaigns. Market transparency and reliable information on domestic prices, production, trade, and stocks can help reduce uncertainty, so governments can initiate establishment of market due diligence units to collect and disseminate such information. This can be done in partnership with rice federations and associations. Regarding exports, the target countries are expected to present the right product to the right market and the more knowledge of market preferences and opportunities exporters can accrue, the more effective their attempts at market penetration will be. Governments, together with rice federations, can facilitate learning about foreign market preferences and restrictions.

135. More can also be done to promote their rice brands. Facilitating personal contacts of sellers and buyers through trade missions and participation in food trade shows would help. Rice federations should be expected to distribute various promotional materials through their websites and to interested visiting potential clients, and these materials need to make buyers understand the country's quality standards and certification procedures. Many global promotional activities can be done at minimal cost, given the ease of online advertising and up-to-date company, trade, and association websites with direct contact links (IFC 2015).

136. Governments also have a large role to play in improving quality and food safety management at rice mills. Food safety is important for continued rice exports so it is more than just a public health issue, it is also a competitiveness issue. Overseas regulators, importers, and consumers are concerned with biological and chemical contamination of rice, and these concerns are manifested in produce consignment retentions or rejections, price discounts, and difficulties in accessing certain market segments. Thus programs that assist rice mills to adopt the Hazard Analysis and Critical Control Point (HAACP) system are to be promoted, in partnership with the private sector.

137. While better nutrition requires a multisectoral approach, rice can be part of the solution for improving nutrition. First, higher rice profitability will bring more income to rice-producing households; yet, farmers rely on better-quality public programs and policies for that to occur. Second, rice prices cannot be artificially inflated to bring short-run benefits to

rice farmers, as consumers will overpay for rice and have less disposable income available to buy other, more nutritious food. And third, rice value chains themselves can be more nutrition-sensitive through fortification programs, smart marketing of more nutritious types of rice, and empowerment of women (by increasing their discretionary agricultural income and reducing time and labor constraints). Rice will continue to be important for hunger and poverty reduction, and in this context it can be better utilized to improve nutrition.

138. **In the export part of the value chain, large gains can be expected from predictable and open trade policy, reduction in exporting costs, and trade promotion.** Export success depends on the predictability and openness of export policy, for both cross-border and FOB trade. The governments in the target countries will not be able to achieve their export targets when export license commitments are not honored, export is periodically restricted, and indicative export prices put additional burden on traders. In addition, export would benefit from lower export costs and trade promotion efforts, which are discussed in the sections above for mills and trade.

139. **The policy shift from rice production to rice value chain facilitation requires many actions.** These actions are in line with the overall shift from production to multidimensional food agenda promoted in East Asia to enable agriculture to capitalize on new opportunities and withstand emerging challenges. In the context of falling per capita rice consumption, increasing competition from other crops, and rising climate change and nutrition-related concerns, the rice production focus (Figure 24) can be replaced by a multidimensional food policy (Figure 25) to effectively leverage the rice sector for poverty reduction. Within a new food policy framework, government attention shifts to agricultural productivity and diversification, value chain facilitation, food safety and nutrition, and development of the non-farm rural economy (to create more job opportunities for farm workers increasingly replaced by mechanization to spend less time on field works and more on non-farm activities).

Figure 24: Traditional food policy expressed in the form of rice self-sufficiency

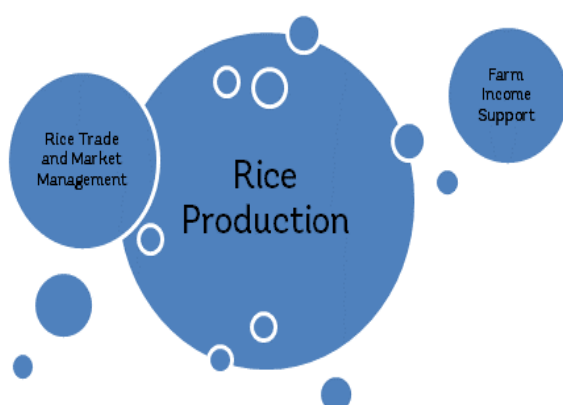
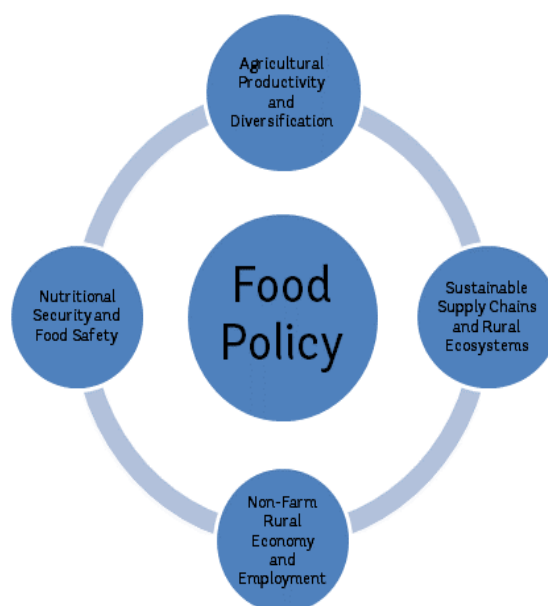


Figure 25: A food policy framework for the Greater Mekong Subregion



Source: World Bank 2015c.

140. **Table 47 presents a short summary of policy instruments for the target countries to apply for better leveraging of their rice value chains for poverty reduction.** As presented in the table, the importance or urgency of various policy instruments varies by country and many entry points exist for successful public-private partnerships (PPPs). All three target countries have a large scope for improvement and are advised to use the opportunities identified in this report to produce results for their countries.

Table 47: Policy instruments for leveraging rice value chain for poverty reduction in the GMS target countries

Policy instruments	Cambodia	Lao PDR	Myanmar	PPP
<i>Input supply</i>				
Invest more in production of better quality and more diverse breeder and foundation seeds of all major crops	***	***	***	
Improve enabling environment for private sector investments in seed production and multiplication	***	***	***	X
Strengthen quality control of farm inputs (seeds, fertilizers, chemicals)	***	***	***	X
<i>Paddy production</i>				
Remove rice land use requirements	*	**	***	
Improve quality of irrigation investments by				
- Proper O&M of existing systems	***	***	***	
- Drainage improvements and multipurpose	***	**	***	
- Systems upgrades to allow alternate wetting and drying	**	**	**	
Strengthen public extension services and link them better with research	***	***	***	
Develop vocational training for agricultural mechanization	***	**	***	X
Invest in programs for soil nutrient and integrated pest management	***	***	***	
Design programs supporting women farmers and nutrition	***	***	***	
<i>Milling</i>				
Remove cumbersome requirements for FDI	*	**	***	X
Support contract farming with rice mills	**	***	***	X
Facilitate rice mill food safety management certification	**	***	***	X
Promote rice fortification	**	**	**	X
Invest in electricity generation and distribution	***	*	*	
Promote the use of green gasifiers by mills	**	*	***	X
<i>Trade</i>				
Maintain predictable trade policy	*	***	**	X
Promote competition among exporters	*	**	**	X
Develop rice brand(s)	**	***	***	X
Support market intelligence and marketing campaigns	***	***	***	X
Improve trade facilitation services for cross-border trade	***	***	***	
Reduce export processing costs	***	**	**	X

*Note: Urgency/significance: * low; ** high; *** very high. PPP – public-private partnership.*

Source: Authors' presentation.

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ANNEX 1: REGIONAL WORKSHOPS IN BANGKOK, MARCH-MAY 2015

Summary of the Workshop

1. **The meetings of rice experts took place in Bangkok, Thailand, on March 20 and May 29, 2015 to develop indicators of rice value chain development in GMS.** These meetings gathered 17 rice sector experts from all GMS countries, and experts with the global knowledge. These meetings produced the set of measurable indicators along various segments of the rice value chains as well as the empirical data, which were used in Chapter 4 of this report.

List of participants

No.	Name	Position	Institution
1	Sergiy Zorya	Senior Economist	World Bank, Thailand
2	David Dawe	Senior Economist	FAO, Thailand
3	Larry Wong	Rice Expert	Myanmar
4	Daphne Aye	Rice Expert	Myanmar
5	Munichan Kung	Rural Development Officer	World Bank, Cambodia
6	Sok Muniroth	Rice Expert	Cambodia
7	William Wyn Ellis	Secretary of the Secretariat	Sustainable Rice Platform, Thailand
8	Somporn Isvilanonda	Rice Expert	KNIT, Thailand
9	Nipon Poapongsakorn	Rice Expert	TDRI, Thailand
10	Boonjit Titapiwatanakun	Rice Expert	Kasetsart University, Thailand
11	Isriya Bunyasiri	Rice Expert	Kasetsart University, Thailand
12	Prapinwadee Sirisuplaxana	Rice Expert	Kasetsart University, Thailand
13	Sean Power	Rice Expert	Emerging Marketing Consultants, Lao PDR
14	Rizwan Yusufali	Nutrition Specialist	WFP, Thailand
15	Katrien Ghooos	Regional Nutrition Advisor	WFP, Thailand
16	Tinh Thai Van	Researcher	CASRAD, Vietnam
17	Bas Rozemuller	Operations Officer	IFC, Cambodia

ANNEX 2: REGIONAL WORKSHOP IN BANGKOK, NOVEMBER 2015

Summary of the Workshop

1. **The cross-country knowledge sharing on rice sector development in GMS and its leveraging for accelerated poverty reduction started with the regional workshop in Bangkok on November 10-12, 2015.** The workshop was attended by 47 participants. These included the delegations from Cambodia, Lao PDR, and Myanmar, with the representatives of the ministries of agriculture, commerce, finance, and private sector. These also included the representatives of donor organizations (World Bank, IFC, FAO, WFP, and Myanmar's Multidonor Trust Fund for Livelihoods for Food Security) and academia and think tanks (Myanmar Development Research Institute, Kasetsart University of Thailand, Knowledge Network Institute Thailand, and Thailand Development Research Institute). The World Bank was represented by the staff of several Global Practices of the World Bank, i.e. Agriculture, Poverty, Human Development and Nutrition, and Rural, Social and Urban Development.
2. **The first day of the workshop discussed a *rice-poverty-nutrition nexus*.** Sergiy Zorya (World Bank) introduced the rationale and objectives of the workshop, including the value added of: (i) sharing cross-country experiences among three low income target countries where rice sector has a big potential to contribute to poverty alleviation and (ii) using the rich volumes of existing studies and analyses to develop easy-to-understand story and messages for policy makers. Then, David Dawe (FAO) presented the framework of links between rice sector and poverty reduction in three target countries, all net exporters of rice. In these countries, there are usually more net sellers of rice than buyers among the poor so better price incentives and low costs for rice production and marketing help generate growth and reduce poverty. Such a growth also triggers shared prosperity as the recent Cambodian experience has shown.
3. **Next presentations focused on the country specific experiences in rice and poverty reduction.** Sergiy Zorya (World Bank) presented the case of Cambodia where higher rice prices in 2008 triggered the substantial increase in rice production and, consequently, agricultural wages. These factors explained more than 60 percent of reduction in poverty between 2004 and 2011. Economic growth was very inclusive, including due to solid agricultural growth (5.3 percent annually), resulting in the higher growth of the income of 40 percent of the lowest income quantile people compared to other 60 percent (shared prosperity). Obert Pimhidzai (World Bank) presented the experiences from Lao PDR, where rice sector also did the large contribution to poverty reduction but failed to produce similar large effects for twin goas as in Cambodia. The poverty reduction from 2008 to 2013 was modest and the growth was not inclusive. Min Ye Paing Hein (World Bank) presented the case of Myanmar where information is still limited but it shows that poor performance of the rice sector has been among the key reasons of high poverty in the country. The rice-poverty session was closed by Christopher Jackson (World Bank), who presented the experiences from Vietnam. In 1990s, the growth in rice production and productivity and consequently exports made significant contribution to poverty reduction in that country. At current stage of the country's development, further contributions from rice to poverty reduction is expected not so much from the increase in rice productivity but from improved quality of rice, liberalization of rice export arrangements, and removing the restrictions on land use to allow farmers produce other crops where it is more profitable than rice.
4. **The final session of the first day focused on linking rice and poverty reduction with nutrition.** Sergiy Zorya (World Bank) presented the current situation of high malnutrition, especially stunting among children, in the target countries and the framework for leveraging rice for better nutrition, in addition to converting higher income from selling rice into better

nutritional outcomes. In principle, actions can be taken at various stages of the rice value chain to improve nutritional rice sensitivity. These include biofortification of seeds, crop diversification/rotations at farm level, rice fortification by mills, and awareness creation about higher nutritious values of brown and parboiled rice over ordinary, well-polished rice largely consumed in Asia. Rice fortification is an emerging promising solution to increase nutritious value of rice, and Rizwan Yusufali (WFP) presented opportunities offered by this technology. Yet, he also stressed out many implementation challenges, which result in the non-adoption of scaled up rice fortification in Asia beyond few pilots in Bangladesh, India, and the Philippines.

5. **The second day of the workshop was devoted to the *current situation and outlook for rice value chain developments in the target countries*.** The key questions are the preparedness of rice value chains to give their best to achieve twin goals and the understanding of the main gaps in three target countries compared to more developed Thailand and Vietnam. Bas Rozemuller and Sarak Duong (IFC) presented the key features of rice value chains in Cambodia, Lao PDR, and Myanmar. Sergiy Zorya (World Bank) and David Dawe (FAO) presented the comparative analysis of rice value chain indicators in GMS that measure competitiveness and vulnerabilities at various stages of rice value chains (input supply, production, milling, exports, and consumer vulnerabilities). These indicators were developed by the group of rice experts under the current project, with the focus on the limited number of easy to understand and measurable indicators, with the data for 2013/14 in main production areas in each country.

6. **The second part of the second day was devoted to rice market outlook.** All three target countries are already net exporters of rice, even Lao PDR, and all three countries seek to increase productivity and production. Therefore, they also need markets for anticipated surpluses. The session started with the presentation from Larry Wong (Consultant), who discussed the medium-term outlook for the global rice market and opportunities and challenges for Cambodia and Myanmar. Global demand for rice is projected to increase in the next 15 years but at lower pace than in the past due to the declining per capita rice consumption in Asia. Growing markets are in Africa and Middle East, which our target countries would need to penetrate into, in addition to the traditional markets in Asia and in the EU. Premium is also increasingly paid for higher quality and safety, putting pressures to move from low value commodity approach practiced by Myanmar, for example, to high quality differentiated rice types. This was followed by three presentations on cross-border trade, made by Munichan Kung (World Bank) for Cambodia, Larry Wong (Consultant) for Myanmar, and Sergiy Zorya (World Bank) for Lao PDR. Cross-border trade has been and will continue to be important for the target countries so a stronger regional integration is necessary to pursue to guarantee markets for their rice exports.

7. **The third day of the workshop discussed the *role of rice sector in overall agricultural and food policy*.** Rice will remain important in policy considerations in all target countries but it is not the only sector with growth opportunities. Other crops are often more profitable than rice, especially in dry season. Urbanized population demands variety of food, including higher quality and safer rice. Monoculture paddy production tends to emit a lot of CO₂ and lead to other environmental problems such as water overuse, soil degradation, and pollution caused by high use of fertilizers and chemicals. And rice has low nutrition values. Thus, agricultural and food policy in the target countries would need to shift from rice production centered approach to multidimensional approach that includes the aspects of agricultural productivity and diversification, sustainable supply chains, nutritional security and food safety, and non-farm economy and employment. Going forward it implies “yes” to programs that raise rice sector competitiveness, profitability, and environmental sustainability, and “no” to programs that crowd out or ignore other crops such as land restrictions for rice

production, rice price support and input subsidies, subsidized credit for rice producers, under-financing of other public programs (research, extension, seeds, soil nutrient management, food safety, etc.), and rice-focused irrigation systems.

8. **The workshop's participants have in general endorsed the above messages and points.** The feedback from the workshop's participants was extremely positive. They said to highly value the following: (i) simulation of public debate on important policy issues; (ii) the exposure to cross-country experiences and best practices, and a large variety of very relevant topics; (iii) clear and informative power point presentations that can be used in the future for many purposes; (iv) access to the library of useful reports; (v) opportunities to network with colleagues from neighboring countries and development partners; and (vi) opportunities to share and compare views of private and public sectors.

9. **The country participants asked for similar in-country events, with the several first ones already identified.** The Laos delegation asked to learn more about Cambodian experiences and seed sector development more broadly in the region and around the globe. The delegates from Cambodia asked to make a deeper dive in regional competitiveness issues, including evolving trends in export competitiveness of Myanmar and Vietnam. The Myanmar delegation discussed the need to learn more about rice reserves and addressing its rice competitiveness issues. The World Bank and IFC will follow up on these requests to continue facilitating the cross-country knowledge and experience sharing as envisaged under this regional task.

Agenda

Time	Speakers/Presentation
Day 1: Rice-Poverty-Nutrition Nexus Tuesday, November 10, 2015	
8:30-9:00	Registration
9:00-9:30	Opening welcome remarks and introductions
9:30-10:00	Introduction of the Workshop Sergiy Zorya, World Bank
10:00-10:45	Rice and Poverty Reduction: Framework and Global Experience David Dawe, FAO
10:45-11:15	Coffee/Tea Break
11:15-12:00	Rice and Poverty Reduction in Cambodia: Recent Developments Sergiy Zorya, World Bank
12:00-13:00	Lunch
13:00-13:45	Rice and Poverty Reduction in Lao PDR: Recent Developments Obert Pimhidzai, World Bank
13:45-14:30	Rice and Poverty Reduction in Myanmar: Recent Developments Min Ye Paing Hein, World Bank
14:30-15:15	Rice and Poverty Reduction in Vietnam: Lessons Learned Christopher Jackson, World Bank
15:15-15:45	Coffee/Tea Break
15:30-16:15	Rice, Poverty, and Nutrition: Framework and Situation in Asia Sergiy Zorya, World Bank
16:15-17:00	Rice and Nutrition: Implementation Experiences Rizwan Yusufali, World Food Program
Day 2: Rice Value Chain Development: Current and Outlook Wednesday, November 11, 2015	
9:00-9:15	Rice Value Chain Performance: Introduction Sergiy Zorya, World Bank

9:15-10:15	Rice Value Chains in Cambodia, Lao PDR, and Myanmar: Current Situation Bas Rozemuller and Sarak Duong, IFC
10:15-10:45	Coffee/Tea Break
10:45-12:00	Comparative Analysis of Rice Value Chain Indicators in the Greater Mekong Sergiy Zorya, World Bank and David Dawe, FAO
12:00-13:00	Lunch
13:00-13:45	Medium-Term Outlook for Global Rice Market Development Larry Wong, Rice Expert
13:45-14:30	Situation and Outlook for Cross-Border Trade: Cambodia Munichan Kung/Muniroth Sok, World Bank
14:30-15:00	Coffee/Tea Break
15:00-15:45	Situation and Outlook for Cross-Border Trade: Myanmar Larry Wong, Rice Expert
15:45-16:30	Situation and Outlook for Cross-Border Trade: Lao PDR Sergiy Zorya, World Bank
Day 3: Rice and Food Policy Agenda Thursday, November 12, 2015	
9:00-10:00	Participants' reflection on the first two days of the workshop "Defining Rice Policy Agenda"
10:00-10:15	Coffee/Tea Break
10:15-11:15	Food Policy Agenda and the Role of Rice Sector Sergiy Zorya, World Bank
11:15-11:45	Discussion of the in-country disseminations and other next steps
11:45-12:00	Closing of the official part of the workshop
12:00-13:00	Lunch
13:00-17:00	Networking and unofficial meetings

List of participants

No.	Name	Position	Organization
1	So Khan Rithykun	Director General, General Directorate of Agriculture	Ministry of Agriculture, Forestry and Fisheries, Cambodia
2	Mak Mony	Deputy Director, Department of Planning and Statistics	Ministry of Agriculture, Forestry and Fisheries, Cambodia
3	An Sitha	Deputy Director of Business Department of Green Trade Company	Ministry of Commerce, Cambodia
4	You Mab	Director, Private Sector Development Department	Ministry of Commerce, Cambodia
5	Poliveth Lao	Economist, Department of Macroeconomics and Fiscal Policy	Ministry of Economy and Finance, Cambodia
6	Phun Khemra	Communications Officer	Cambodia Rice Federation
7	Phun Khemra	Assistant to Secretary General	Cambodia Rice Federation
8	Muniroth Sok	Rice Expert	Consultant, World Bank
9	Dethsackda Manikham	Deputy Director General of Khammouane Province of Agriculture and Forestry Office	Ministry of Agriculture and Forestry, Lao PDR
10	Phanpradith Phandala	Director of Planning and Cooperation Division, Department of Agriculture	Ministry of Agriculture and Forestry, Lao PDR

11	Sengpaseuth Rasabandith	Deputy Director of Agriculture Association, Cooperatives and Business, Department of Agricultural Extension and Cooperatives	Ministry of Agriculture and Forestry, Lao PDR
12	Phommy Inthichack	Deputy Director of International Cooperation Division, Department of Planning and Cooperating	Ministry of Agriculture and Forestry, Lao PDR
13	Ekkalack Oudomdeth	Trade Promotion and Product Development Department	Ministry of Industry and Commerce, Lao PDR
14	Viset Khothsouvanh	Head of Trade Promotion and Product Development Unit, Khammouane Province Office of Industry and Commerce	Ministry of Industry and Commerce, Lao PDR
15	Phetsamone Bouaphanthavong	Head of Committee of Rice Mill Cooperatives of Khammouane Province	Private Sector, Lao PDR
16	Chansamone Lomany	Paddy Purchase Manager, Indochina Development Partners Lao Ltd., Champassak Province	Private Sector, Lao PDR
17	Tin Tin Myint	Deputy Director General, Department of Agricultural Research	Ministry of Agriculture and Irrigation, Myanmar
18	Theingi Myint	Associate Professor	Yezin Agricultural University, Myanmar
19	Toe Aung Myint	Permanent Secretary	Ministry of Commerce, Myanmar
20	Myo Thu	Director, Department of Trade Promotion and Consumer Affairs	Ministry of Commerce, Myanmar
21	Yi Yi Mon	Commercial Counselor	Myanmar Embassy to Thailand
22	Myo Aung Kyaw	Vice President	Myanmar Rice Federation
23	Ming Aung	Advisor	Myanmar Rice Federation
24	Ko Zaw Ming Naing	Researcher	Myanmar Development Resource Institute
25	Myat Thida Win	Researcher	Myanmar Development Resource Institute
26	Khin Swe Swe Aye	Rice Expert	Consultant, World Bank
27	Larry Wong	Rice Expert	Consultant, World Bank
28	Libera Antelmi Dazio	Program Officer	LIFT, Myanmar
29	Nipon Poapongsakorn	Distinguished Fellow	TDRI, Thailand
30	Kamphol Pantakua	Fellow	TDRI, Thailand
31	Somporn Isvilanonda	Senior Fellow	Knowledge Network Institute Thailand
32	Isriya Nitiithanprapas	Research Fellow	Kasetsart University, Thailand
33	Rizwan Yusufali	Nutrition Specialist	World Food Program, Thailand
34	Kathrien Ghooos	Senior Regional Nutrition Advisor	World Food Program, Thailand
36	Tiina Joosu-Palu	Communication Specialist	Consultant, World Bank
37	David Dawe	Senior Economist	FAO, Thailand
38	Sergiy Zorya	Senior Agricultural Economist	World Bank, Thailand
39	Nathan Belete	Practice Manager, Agriculture	World Bank, Vietnam

40	Chris Jackson	Lead Rural Development Specialist	World Bank, Vietnam
41	Munichan Kung	Rural Development Officer	World Bank, Cambodia
42	Chanhson Manythong	Rural Development Specialist	World Bank, Lao PDR
43	Min Ye Paing Hein	Poverty Economist	World Bank, Myanmar
44	Obert Pimhidzai	Poverty Economist	World Bank, USA
45	Nkosinathi Vusizihlobo Mbuya	Senior Nutrition Specialist	World Bank, USA
46	Sarak Duong	Operations Officer	IFC, Cambodia
47	Bas Rozemuller	Operations Officer	IFC, Cambodia

ANNEX 3: WORKSHOP IN VIENTIANE, NOVEMBER 2015

Summary of the Workshop

1. **The November 17, 2015 workshop focused on learning from the experiences of rice sector development in Cambodia to inform the implementation of the rice development strategy in Lao PDR.** The specific focus was on the role of private sector in rice value chain. The workshop was organized jointly by Agriculture GP of the World Bank and the IFC as a part of the regional policy dialogue on leveraging the rice sector development for accelerated poverty reduction in GMS. The meeting was chaired by Mr. Xaypladeth Choulamany, Director General of Department of Planning and Cooperation, Ministry of Agriculture and Forestry (MAF). Other participants (30 in total) included the representatives of MAF, Ministry of Industry and Commerce, Chamber of Commerce, Ministry of Finance, Khammouane and Champassak Provincial Governments, and rice millers. The meeting was also attended by the head of the IFC office in Vientiane and the representatives of FAO and WFP.
2. **The knowledge transfer was made through presentations and discussions.** Sergiy Zorya (World Bank) discussed the last decade's development of rice sector in Cambodia. Bas Rozemuller and Sarak Duong (IFC) presented the lessons learned from the IFC Rice Sector Support Project in Cambodia. Puthyvuth Sok, President of CRF, presented the private sector perspectives on Cambodian rice sector development.
3. **The first presentation discussed the significant contribution the rice sector has made to growth, poverty reduction and shared prosperity in Cambodia in the last decade.** It also emphasized the big role the markets and exports played in releasing the paddy surpluses resulted from the increase in production. While the success of Cambodian rice sector is often associated with the sharp increase in formal rice exports, especially to the EU, another salient feature of success is the rise in cross-border trade with Vietnam and Thailand, mainly with paddy. The traders from these neighboring countries often pay higher price for paddy than Cambodian mills, so Cambodian farmers greatly benefit from open trade policy. *These are important lessons for Lao PDR, who has only recently begun to appreciate the role of markets and value chains in rice sector, and the need to promote cross-border trade for successful growth in paddy production.*
4. **The presentation of the IFC project focused on activities and achievements.** The project includes three components: (i) improving paddy quality; (ii) improving milling efficiency; and (iii) promoting rice exports. On component 1, the project works with the selected mills to engage them in seed multiplication for fragrant rice seed varieties, develop radio programs to educate farmers on importance of good seeds, and develop the innovative interactive voice response system for questions related to seeds. On component 2, the project helps improve efficiency and quality through rice mill management software, advice on milling operation and equipment, and food safety certification. On component 3, the project builds capacity of rice exporters and CRF, help identify new export markets in addition to the EU, and develop and promote Cambodian rice brand. The project is proud for making the rice mills sector more competitive and Cambodian rice more known around the world as it was recognized as the best world rice three years in a row from 2012 to 2014. *The important lessons learned for Lao PDR are: (i) the need to explore the pluralism in delivering extension services and seed sector development; (ii) the importance to pay attention to quality, not only quantity of rice; (iii) the need to provide technical assistance to rice mills to make them stronger and incentivize the closer contacts with farmers; and (iv) the importance of marketing promotion to find new outlets for Lao rice.*

5. **The President of the CRF discussed the important role of the rice federation to play in strengthening rice value chain working together with the government**, in addition to presenting the recent developments in the sector and challenges going forward.

6. **The participants thanked the World Bank and the IFC for facilitating the exchange of best practices and information sharing with Cambodia.** They learned about many similar challenges for the rice sector development in Cambodia, but the importance given to the development of private sector there. The discussion centered on the issues related to development of rice mills and what the public sector can do to make them stronger, how to promote a country rice brand, on the role of the rice federation and how to establish a similar federation in Lao PDR, the roles the private sector can play in seeds sector development, and how to create incentives for rice mills to work closer with small farmers.

7. **The workshop created the awareness among Lao stakeholders about experiences in the neighboring country and the important role of private sector in strengthening of rice value chains, and stimulated policy debate.** It also helped establish the contacts of MAF and other Lao stakeholders with CRF for follow up discussions, experience sharing, and visits.

Agenda

Time	Presentations
9:00-9:30	Opening remarks and introductions
9:30-10:00	Rice Sector Development in Cambodia: Story of the Last Decade Sergiy Zorya, World Bank
10:00-10:45	Rice Sector Development in Cambodia: Private Sector Perspectives Peter Sok, Cambodia Rice Federation
10:45-11:00	Coffee break
11:00-12:00	Rice Mills Project: Lessons Learned Bas Rozemuller and Sarak Duong, International Finance Corporation
12:00-13:00	Lunch
13:00-15:00	Discussions and exchange of ideas/or visiting the rice mill(s)

List of participants

No.	Name	Position	Organization
1	Thongsavanh Bounmy	Managing Director	Phanpheude Company
2	Khankeo Meungvang	Technical official	DOA, MAF
3	Panya Pranakhone	Project coordinator	DOPC, MAF
4	Pasonsay Insixiengmai	Director of planning division	DOI, MAF
5	Chai Bounphanousay	Head of Napork Research Center	NAFRI, MAF
6	Khamlien Nolasing	Deputy Director, Planning Division	DOPC, MAF
7	Phommy Inthichack	Deputy Director, Planning Division	DOPC, MAF
8	Sarak Duong	Head of Office	IFC, Cambodia
9	Bas Rosemullek	Program Manager	IFC, Cambodia
10	Thongsa Homesombath	Deputy Director of Budget Department	MOF
11	Sergiy Zorya	Senior Economist	World Bank, Thailand
12	Rizwan Yusufah	Nutrition Specialist	WFP, Thailand
13	Sok Puthavuth	President	Cambodian Rice Federation
14	Stephen Rudgard	Country Representative	FAO, Lao PDR
15	Bounthong Bouahom	DG	NAFRI, MAF
16	Phetsamone	President of Lao Rice Miller Association	Lao Rice Miller Association
17	Sengpaseuth Rasabadandith	Deputy Director of Extension Division	DAEC, MAF
18	Khamsone	Khammouane PAFO Director	Khammouane Province
19	Xaypladeth Choulamany	DG	DOPC, MAF
20	Khamxay Sipaseuth	Deputy Head, Standard Division	DOA, MAF
21	Somnuek Thirasack	DDG	DAEC, MAF
22	Somhack	Deputy Head of Diversion Division	DOI, MAF
23	Phonesavath Vongsackda	Officer	PSO, MAF
24	Ai Bounmy	Technical officer	DOPC, MAF
25	Khamtanh Khamdeng	Director of Project Management Division	DOPC, MAF
26	Khamalison	Deputy Head of Vientiane	Vientiane PAFO
27	Somsack Kethongsa	Director	Green Field Company
28	Chanhsom Manythong	Rural Development Specialist	World Bank, Lao PDR
29	Souvanthong Namvong	National Project Coordinator	DAEC, MAF
30	Phongsavanh Phomkong	Head of Office, IFC	IFC, Lao PDR

ANNEX 4: WORKSHOP IN PHNOM PENH, DECEMBER 2015

Summary of the Workshop

1. **The Roundtable Discussion, which was held on December 1, 2015, focused on competitiveness pressures to the rice sector in Cambodia, including pressures from Myanmar and Vietnam.** The meeting was organized jointly by Trade and Competitiveness GP and Agriculture GP as a part of the country policy dialogue and also the broader regional policy dialogue on leveraging the rice sector development for accelerated poverty reduction in GMS. The participants included the President of the CRF and the CRF members, rice traders and millers.

2. **The participants first discussed the state of logistics in the rice value chain in Cambodia, triggered by the presentation made by Julian Clarke (World Bank).** They largely agreed with the Bank diagnostic of the major issues and solutions. They confirmed that the cross-country cost breakdown in rice value chain is a simple and powerful way to benchmark competitiveness. High costs of transportation on roads in Cambodia compared to Thailand and Vietnam, due to the poor quality of roads, 30 ton limits for truck loads (compared to 60 tons in Thailand), aged trucking fleet (mainly due to the high cost of financing for the trucking industry), and the lack of alternatives, e.g. rail and water, is one big issue. Another issue is the long and costly procedures in the Sihanoukville port. The port also has infrastructure bottlenecks: it can service only small vessels, up to 20,000 tons, which are more expensive to use for transportation than the larger ocean vessels. The use of containers instead of bulk for rice transportation also adds to the costs, yet bulk transportation requires cheap transport system (e.g. rail) and large quantities of rice, which are missing in Cambodia. The use of the HCMC port for transit of Cambodian rice to overseas destinations is the expensive proposition: it costs \$120/container from Sihanoukville to HCMC while only \$30/container from HCMC to the EU ports. It was agreed that investments are urgently needed to remove these logistics bottlenecks to increase the competitiveness of Cambodian rice.

3. **During the second half of the roundtable, participants discussed various threats posed by regional competitors, following the presentation made by Sergiy Zorya (World Bank).** Myanmar is an emerging rice exporter. It exported 0.5 million tons of rice in 2010/11, increasing the export volumes to 1.3 million tons in 2012/13 and 1.8 million tons in 2014/15. Most exports from Myanmar go to China through cross-border trade, but Myanmar has also increased its exports to the EU under the EBA that provides duty-free and quota free access to the EU market for Least Developed Countries. Until recently, Cambodia was the largest exporter of rice under the EBA – 91 percent in 2012/13. But by 2013/14, its share had dropped to 63 percent while Myanmar increased its exports, accounting for 35 percent of total EBA exports. Myanmar's increased exports under the EBA does not pose an immediate competitiveness threat to Cambodia due to the different varieties of rice exported by each country: Cambodia sells mainly fragrant and low broken ordinary rice (less than 5 percent broken) for direct human consumption while Myanmar's main rice exported to the EU has been the high broken ordinary rice (with 25 percent and more broken), often added to cereal products and pet food. In the longer run, however, Cambodia would need to take the competition from Myanmar seriously as the latter can eventually improve the quality of its rice and thus directly compete with Cambodian rice.

4. **In addition to Myanmar, participants discussed the impact of the recent regional trade agreements on Cambodian rice sector.** The Trans Pacific Partnership (TPP) is unlikely to affect Cambodia, and in general non-TPP countries' rice exports. Large TPP-members rice importers, such as Japan and Malaysia, have not committed to removing their high import

tariffs for rice, with Japan only committing to increase the tariff rate quota for Australia and the USA. The EU-Vietnam Free Trade Agreement, on the other hand, will affect Cambodia and the net effect may be likely to be negative unless Cambodia improves its competitiveness. The EU offers the time bound tariff rate quota for Vietnam rice, with fully liberalized trade in 2020. Vietnam has increasingly exported aromatic/fragrant rice at lower prices than Cambodia. In 2013/14, the average FOB price of fragrant rice in Vietnam was \$507/ton compared to \$850 in Cambodia. It can therefore replace Cambodian rice in the EU unless Cambodia strengthens the marketing links with the EU buyers, keeps improving quality and reducing the costs of its rice, and removing inefficiencies and high costs in its rice value chain.

5. The participants then discussed the CRF vision on priority areas to strengthen the rice value chain in Cambodia, based on the presentation made by Puthyvuth Sok, President of CRF. They include: (i) lack of good quality seeds; (ii) lack of storage facilities and dryers; and (iii) lack of access to affordable working capital and long-term finance and access to markets. The participants shared experiences on seed sector development and what can be done to improve access to finance. The establishment of warehouse receipt system was discussed based on the earlier analytical input provided by the Bank and IFC on this topic.

6. It was agreed to continue this kind of experience sharing events and the overall involvement of the private sector, including CRF, in the preparation of recommendations to the government on rice sector development by the WBG. The participants have provided the positive feedback on the WBG contribution to the development of rice sector, including the IFC rice project, and they asked the WBG to stay involved in this sector due to its importance to growth and poverty reduction in the country.

Agenda

Time	Presentations
9:00-9:30	Opening remarks and introductions
9:30-10:00	Rice Sector Development in Cambodia: Key Issues Julian Clarke, World Bank
10:00-11:00	Competitiveness Issues for Cambodian rice industry: Myanmar and Vietnam, Sergiy Zorya, World Bank
11:00-12:00	Rice Sector Development in Cambodia: Challenges and Opportunities from the Private Sector Perspectives, Peter Sok, Cambodia Rice Federation

List of participants

No.	Name	Position	Organization
1	Song Saran	Chairman	AMRU Rice
2	Kann Kunthy	CEO	BRICO
3	Andy Lay	Chairman	City Rice Group
4	Chan Sokheang	Chairman	Signatures of Asia
5	David Sok	Vice President	Golden Rice Cambodia
6	Sok Puthyvuth	President	Cambodia Rice Federation
7	Moulsarith	Acting Secretary General	Cambodia Rice Federation
8	Horn Theara	Assistant	Cambodia Rice Federation
9	Jean-Marie Brun	Project Management Adviser	SNEC SCCRP Project
10	Matt van Roosmalen	Senior Consultant	Emerging Markets Consulting
11	Julian Clarke	Senior Economist	World Bank
12	Sergiy Zorya	Senior Economist	World Bank
13	Vannara Sok	Operations Officer	World Bank
14	Sheila Scopis	PSD Consultant	World Bank

ANNEX 5: WORKSHOP IN YANGON, JANUARY 2016

Summary of the Workshop

1. **The workshop, which was held on January 15, 2016 in Yangon, Myanmar, gathered 32 participants to discuss the rice sector development and competitiveness pressures in Myanmar.** The meeting was organized by the Livelihoods and Food Security Multidonor Trust Fund (LIFT), as a part of the joint analytical and policy dialogue program with the World Bank. The participants included the rice sector experts, think tanks, academia, and development partners.

2. **The workshop was opened by Andrew Kirkwood, Director of the LIFT, describing the partnership with the World Bank that among other things, promotes knowledge generation on rice sector development in Myanmar.** The opening remarks were followed by the presentation made by Sergiy Zorya (World Bank). The presentation was based on the analysis of farm production economics in selected regions of Myanmar and cross-country comparisons using the work under the GMS Rice Policy Dialogue. The key messages of the presentation are presented below:

- a. Most farmers in Myanmar produce paddy during monsoon season but switch to other crops during cool and dry seasons.
- b. In international comparison the rice sector productivity and overall agricultural productivity in Myanmar is low, irrespective of what indicators are used. It limits the sector's contribution to poverty reduction and shared prosperity.
- c. Low productivity is a result of multiple factors, many of them associated with the undersupply of quality public services such as research, extension, and rural infrastructure, in delivery of which the government has a key role to play.
- d. Going forward and given that paddy is less profitable and more costly to produce than other crops, especially during the cool and dry seasons, it is desirable to redesign public programs from high support for paddy production to support for a broad-based agricultural development

3. **During the Q&A session, the participants discussed policy implications of the above findings.** Main policy implications were agreed to be the following:

- a. Low productivity and profitability are a result of undersupply of public goods
- b. More funds to be allocated to seed, extension, quality controls, and research
- c. Public programs need to go beyond paddy/rice
- d. Irrigation needs attention as it does not bring high rates of return
- e. Farmers must have freedom of production decisions, including farmland classification
- f. The gap with other countries is large so right investments in agriculture will bring high rates of return

4. **It was agreed to continue this kind of workshops.** The participants have provided the positive feedback on the World Bank contribution to fill knowledge gaps about rice sector in Myanmar and asked the World Bank to stay involved in this sector due to its importance to growth and poverty reduction in the country.

Agenda

Time	Presentations
9:00-9:10	Opening remarks, Andrew Kirkwood, LIFT Director
9:10-10:30	Rice Sector Development in Myanmar and its Regional Competitiveness Sergiy Zorya, World Bank
10:30-12:00	Question and Answers Session

List of participants

No.	Name	Position	Organization
1	Aung Hein	Researcher	Centre for Economic and Social Development
2	Peyre Adrian	Sector Coordinator	CESVI
3	Claudia Antonelli	LIFT FB	EU
4	Hnin Hnin Wai	Training Officer	FSWG
5	Khin Win Myint	Policy Officer	FSWG
6	Dolly Kyaw	M&E Officer	IFDC Fertilizer Sector Improvement Project
7	Madonna Casimero	Scientist	IRRI
8	Bae Do Chan	ODA Expert	Korea International Cooperation Agency
9	Nay MYO	Ag & Livestock Officer	LIFT FMO
10	Antoine Deligne	Programme Officer Uplands	LIFT FMO
11	Anne Coghlan	M&E Officer	LIFT FMO
12	Pa Pa Win	Programme Officer	LIFT FMO
13	Sandar AUNG	Programme Officer	LIFT FMO
14	Andrew Kirkwood	LIFT Fund Director	LIFT FMO
15	Libera Antelmi Dazio	Delta Programme Officer	LIFT FMO
16	Myat Khet Nyo	National Policy Officer	LIFT FMO
17	Curtis Slover	Programme Officer	LIFT FMO
18	Jacquetta Hayes	Communications Officer	LIFT FMO
19	Ben Belton	Assistant Professor	Michigan State University and Centre for Economic and Social Development
20	Duncan Boughton	Ag Economist	Michigan State University and Centre for Econ & Social Dev.
21	U Aung Min	Research Director	MMRD
22	U San Thein	Agri Specialist	MMRD
23	Yo Yo	Sector Advisor	MMRD
24	Larry Wong	Advisor	MRF
25	Hnin Hnin Wai	Training Officer	Organization - Food Security Working Group
26	Zoe Disselkoen	KSI Consultant	Proximity Designs
27	Karin Eberhardt	Livelihoods Specialist	Swiss Development Cooperation
28	Lelise Marbury	LIFT FB	USAID
29	Saw Thein	Consultant	VIDA/MMRD
30	Peter Hinn	Country Director	WHH
31	Daphne Khein Swa Swa Aye	Consultant	World Bank
32	Sergiy Zorya	Senior Economist	World Bank