Cambodia, the Lao People’s Democratic Republic, Myanmar, and Viet Nam share many agrarian similarities, macroeconomic constraints, and development challenges. But they also have the opportunity now to harness the potential of their economies by introducing reforms to increase productivity and competitiveness in the agriculture sector.

In this collaboration between the Asian Development Bank Institute and Agence Française de Développement, national practitioners and regional experts propose specific policies to boost agricultural productivity in the countries of the lower Mekong.

The volume identifies common priorities for agricultural productivity, including improving agricultural bureaucracies and regimes; moving into organic and niche products; promoting farmer organizations, contract farming, and seed industries; and implementing certified international food and safety standards.
Boosting Agriculture in the Lower Mekong

Edited by
Grant B. Stillman
Aladdin D. Rillo

In collaboration with Adam Majoe
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## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Figures and Tables</td>
<td>iv</td>
</tr>
<tr>
<td>Foreword</td>
<td>vii</td>
</tr>
<tr>
<td>Contributors</td>
<td>ix</td>
</tr>
<tr>
<td>Abbreviations</td>
<td>x</td>
</tr>
<tr>
<td>1. Overview: Regional Synthesis of Reforms in CLMV Agriculture</td>
<td>1</td>
</tr>
<tr>
<td>Grant B. Stillman</td>
<td></td>
</tr>
<tr>
<td>2. Agricultural Productivity in Cambodia</td>
<td>13</td>
</tr>
<tr>
<td>Pisey Khin and Andrew McNaughton</td>
<td></td>
</tr>
<tr>
<td>3. Agricultural Productivity in the Lao People’s Democratic Republic</td>
<td>38</td>
</tr>
<tr>
<td>Phouang Parisak Pravongviengkham, Souklaty Sysaneth, and Linkham Douangsavanh</td>
<td></td>
</tr>
<tr>
<td>4. Agricultural Productivity in Myanmar</td>
<td>55</td>
</tr>
<tr>
<td>Tin Maung Shwe and Richard Vokes</td>
<td></td>
</tr>
<tr>
<td>5. Agricultural Productivity in Viet Nam</td>
<td>91</td>
</tr>
<tr>
<td>Nguyen Do Anh Tuan, Nguyen Trung Kien, and Tran Thi Thanh Nhan</td>
<td></td>
</tr>
<tr>
<td>6. Developing Competitive Seed Industries in CLMV Countries</td>
<td>116</td>
</tr>
<tr>
<td>Min Aung</td>
<td></td>
</tr>
<tr>
<td>7. Emerging Issues and Opportunities for Agricultural Productivity</td>
<td>138</td>
</tr>
<tr>
<td>Adam Majoe</td>
<td></td>
</tr>
<tr>
<td>8 Conclusion: Challenges and Agenda for Reforms of Agricultural Productivity</td>
<td>153</td>
</tr>
<tr>
<td>Aladdin D. Rillo and Mercedita A. Sombilla</td>
<td></td>
</tr>
</tbody>
</table>
Figures
1.1 Dimensions of Sustainable Agriculture and Food Security 3
2.1 Composition of Agricultural Gross Domestic Product in Cambodia, 2012 15
3.1 Public Investment in the Agriculture Sector in the Lao PDR, 2005–2012 41
3.2 Fish Production Trend in the Lao PDR 44
5.1 Growth in Agricultural Output and Land Productivity in Viet Nam 96
5.2 Growth of Agricultural Labor Productivity and Yield in Viet Nam 97
6.1 Current Seed Production and Distribution System in CLMV Countries 121
6.2 Seed Industry: Intervention Hierarchy 131
7.1 Rice Paddy Production in Selected Asian Countries 140
8.1 Gross Production Indices, 1961–2013 155
8.2 Growth Trends in Rice Area and Yield in CLMV Countries, 1961–2013 162
8.3 Comparing Average Rice Yields across Asia, 2011–2013 166
8.4 Average Yields of Various Key Commodities in Selected Asian Countries, 2006–2013 169

Tables
1.1 Agricultural Statistics for CLMV Countries 2
1.2 Rice Production in CLMV and Selected Countries, 2009–2010 6
2.1 Top Five Cash Crops in Cambodia: Cultivated Area 17
2.2 Top Five Cash Crops in Cambodia: Production 17
2.3 Strengths, Weaknesses, Opportunities, and Threats in Cambodia’s Agriculture Sector 21
2.4 Challenges, Implications, and Responses for Agricultural Growth in Cambodia 29
3.1 Livestock Production Trend in the Lao PDR 44
3.2 Wood Processing Production Trend in the Lao PDR 45
3.3 Agro-Processing Trend in the Lao PDR 46
3.4 Import and Export Value of Agricultural and Agro-Processing Products in the Lao PDR 47
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5 Strengths, Weaknesses, Opportunities, and Threats in the Lao PDR's Agriculture Sector</td>
<td>48</td>
</tr>
<tr>
<td>4.1 Composition of Gross Domestic Product in Myanmar, 2011</td>
<td>57</td>
</tr>
<tr>
<td>4.2 Sown Area of Major Crops in Myanmar</td>
<td>64</td>
</tr>
<tr>
<td>4.3 Share of Exports Earnings of Principal Commodities in Myanmar</td>
<td>68</td>
</tr>
<tr>
<td>4.4 Rice Exports in Myanmar</td>
<td>69</td>
</tr>
<tr>
<td>4.5 Pulses Exports in Myanmar</td>
<td>70</td>
</tr>
<tr>
<td>4.6 Strengths, Weaknesses, Opportunities, and Threats in Myanmar’s Agriculture Sector</td>
<td>71</td>
</tr>
<tr>
<td>5.1 Strengths, Weaknesses, Opportunities, and Threats in Viet Nam’s Agriculture Sector</td>
<td>109</td>
</tr>
<tr>
<td>6.1 Rice Production in CLMV Countries, 2009–2010</td>
<td>118</td>
</tr>
<tr>
<td>6.2 Analysis of Strengths, Weaknesses, Opportunities, and Threats for the Seed Industry in CLMV Countries</td>
<td>132</td>
</tr>
<tr>
<td>7.1 Human Development Index for ASEAN Countries</td>
<td>145</td>
</tr>
<tr>
<td>8.2 Paddy Rice in CLMV Countries: Area, Yield, Production Levels, and Growth Rates by Period, 1962–2013</td>
<td>163</td>
</tr>
<tr>
<td>8.3 State of Key Inputs to Agriculture</td>
<td>167</td>
</tr>
<tr>
<td>8.4 Level of Mechanization in Selected Asian Countries</td>
<td>168</td>
</tr>
<tr>
<td>8.5 Strengths, Weaknesses, Opportunities, and Threats of the Agriculture Sector in CLMV Countries</td>
<td>172</td>
</tr>
</tbody>
</table>
Foreword

As efforts to encourage a more integrated economic community among the Association of Southeast Asian Nations (ASEAN) intensify, there are emerging risks that the least developed countries may not fully realize the benefits of regional integration. The lower Mekong countries of Cambodia, the Lao People’s Democratic Republic, Myanmar, and Viet Nam, or CLMV as they are known within the Asian Development Bank (ADB), need particular assistance across the development agenda if they are to realize their potential in helping strengthen ASEAN connectivity.

The agriculture sector comprises a significant share of gross domestic product in the lower Mekong countries and the majority of the combined populations depend on agricultural production for their livelihoods. Boosting agricultural productivity has the potential to increase economic activity as well as aid development and greatly reduce poverty. However, lower Mekong countries in general still lack local capacity to design, implement, and monitor the agriculture policy reforms that can enable their economies to transform potential into actual growth through increases in productivity and competitiveness.

In July 2009, the United States joined these countries to launch the Lower Mekong Initiative,¹ which has attracted the interest of a broad spectrum of donors known as the Friends of the Lower Mekong (FLM)² to focus on areas such as water management, energy efficiency, environmental standards, food security, and smart agriculture.

Over the last couple of years, the ADB Institute (ADBI) and Agence Française de Développement (AFD) have been conducting a research and capacity building program with national scholars and sector experts to identify policies for enhancing agricultural productivity in the lower Mekong countries. The findings of this work have resulted in the suggested agendas for sector reform that are collected here.

The volume identifies important priorities for enhancing agricultural productivity in the studied lower Mekong countries. These include (i) improving agricultural bureaucracies and the administrative

¹ Thailand, which is usually included as a lower Mekong country, is not treated in this book, although its agribusiness experience is relevant as a useful exemplar for CLMV neighbors.

² Participating FLM members include, among others, Australia, Japan, the Republic of Korea, New Zealand, the European Union, ADB, and the World Bank.
regimes they implement; (ii) diversifying agricultural production and introducing seed industries; (iii) encouraging regional trade and public–private cooperation for greater market access; (iv) exploiting organic and value-added niche products in the global food market; (v) promoting farmers’ organizations, contract farming, and investment trusts; and (vi) implementing frameworks for certified international food standards and management of the environment and natural resources.

Thanks are due to the authors for preparing these interesting studies on the lower Mekong countries. On behalf of the editors, the support of Adam Majoe, Sununtar Setbooonsarng, Bruno Vindel, and their ADB, ADBI, and AFD colleagues is also gratefully acknowledged.

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Asian Development Bank Institute

April 2015
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### Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFD</td>
<td>Agence Française de Développement</td>
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<td>ASEAN</td>
<td>Association of Southeast Asian Nations</td>
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<td>CARDI</td>
<td>Cambodian Agricultural Research and Development Institute</td>
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<td>CASP</td>
<td>Core Agriculture Support Program</td>
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<tr>
<td>CLMV</td>
<td>Cambodia, Lao People's Democratic Republic, Myanmar, Viet Nam</td>
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<td>CPF</td>
<td>Country Programming Framework</td>
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<td>CSES</td>
<td>Cambodia Socio-Economic Survey</td>
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<td>DAR</td>
<td>Department of Agricultural Research (Myanmar)</td>
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<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<tr>
<td>FDI</td>
<td>foreign direct investment</td>
</tr>
<tr>
<td>FLM</td>
<td>Friends of the Lower Mekong</td>
</tr>
<tr>
<td>GAP</td>
<td>Good Agricultural Practice</td>
</tr>
<tr>
<td>GDA</td>
<td>Government Department of Agriculture (Cambodia)</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
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<tr>
<td>GMS</td>
<td>Greater Mekong Subregion</td>
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<td>GVA</td>
<td>gross value added</td>
</tr>
<tr>
<td>ha</td>
<td>hectare</td>
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<tr>
<td>HYV</td>
<td>high yielding variety</td>
</tr>
<tr>
<td>kg</td>
<td>kilogram</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>Lao People's Democratic Republic</td>
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<tr>
<td>LIFT</td>
<td>Livelihoods and Food Security Trust Fund</td>
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<tr>
<td>MAPCO</td>
<td>Myanmar Agribusiness Public Corporation</td>
</tr>
<tr>
<td>MARD</td>
<td>Ministry of Agriculture and Rural Development (Viet Nam)</td>
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<tr>
<td>MAS</td>
<td>Myanmar Agriculture Service</td>
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<td>MDG</td>
<td>Millennium Development Goal</td>
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<tr>
<td>MFI</td>
<td>microfinance institution</td>
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<tr>
<td>MOAI</td>
<td>Ministry of Agriculture and Irrigation (Myanmar)</td>
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<tr>
<td>MPBSA</td>
<td>Myanmar Pulses, Beans, and Sesame Seeds Merchants Association</td>
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<td>MRF</td>
<td>Myanmar Rice Federation</td>
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<td>MRIA</td>
<td>Myanmar Rice Industry Association</td>
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<tr>
<td>NAFES</td>
<td>National Agriculture and Forestry Extension Service (Lao PDR)</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>NAFRI</td>
<td>National Agriculture and Forestry Research Institute (Lao PDR)</td>
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<tr>
<td>NCDP</td>
<td>National Comprehensive Development Plan (Myanmar)</td>
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<tr>
<td>NGO</td>
<td>nongovernment organization</td>
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<tr>
<td>NGPES</td>
<td>National Growth and Poverty Eradication Strategy (Lao PDR)</td>
</tr>
<tr>
<td>NSEDP</td>
<td>National Socio-Economic Development Plan (Lao PDR)</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>PPP</td>
<td>public–private partnership</td>
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<tr>
<td>PRC</td>
<td>People’s Republic of China</td>
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<tr>
<td>R&amp;D</td>
<td>research and development</td>
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<tr>
<td>RSC</td>
<td>rice specialization company</td>
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<td>SMEs</td>
<td>small and medium-sized enterprises</td>
</tr>
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<td>SPS</td>
<td>sanitary and phytosanitary standards</td>
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<td>SRI</td>
<td>System of Rice Intensification</td>
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<td>SWOT</td>
<td>strengths, weaknesses, opportunities, and threats</td>
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<tr>
<td>t</td>
<td>ton</td>
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<tr>
<td>TFP</td>
<td>total factor productivity</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
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<td>VSA</td>
<td>Viet Nam Seed Association</td>
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<tr>
<td>VSTA</td>
<td>Viet Nam Seed Trade Association</td>
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<tr>
<td>WTO</td>
<td>World Trade Organization</td>
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<tr>
<td>WTSRPP</td>
<td>Whole Township Special Rice Production Program</td>
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1. Overview: Regional Synthesis of Reforms in CLMV Agriculture

Grant B. Stillman

Regional Setting and the Importance of Agriculture

Cambodia, the Lao People’s Democratic Republic, Myanmar, and Viet Nam—the CLMV countries—all share the opportunities promised by boosting agricultural productivity and developing their agro-processing sector. Comparative advantages in their rich natural environments could find profitable export markets for staple crops and niche products demanded by expanding neighboring and global markets.

Agriculture plays a dominant role in the economies of all the CLMV countries. With a large share of each country’s population relying on cultivation activities for their livelihoods, development of agriculture has the potential to reduce poverty and strengthen food availability and security. Governments are increasingly focusing on agriculture for achieving economic transformation and job creation. Demographically and economically it would seem the agriculture sector is the natural first target for greater CLMV development and regional integration.

As shown in Table 1.1, the majority of the workforce in the CLMV region is employed in the agriculture sector and relies on agriculture-related income for their livelihoods. Agricultural employment accounts for 56% of the population in Cambodia, 73% in the Lao People’s Democratic Republic (Lao PDR), 70% in Myanmar, and 48% in Viet Nam. The sector also contributes to a large share of gross domestic product (GDP), as much as 34% in Cambodia, 27% in the Lao PDR, 36% in Myanmar, and 18% in Viet Nam.
In the region, agriculture is mainly characterized by subsistence farming. This is largely due to the prominence of rice production, which currently has low productivity and margins compared to high-value, specialty crop alternatives. Among the CLMV countries, Viet Nam has made the most progress in diversifying toward high-value agricultural products and has moved away from the subsistence-based model toward commercialization.

Patterns and Constraints

The CLMV countries share the following constraints on their economies, with consequences within and beyond the agriculture sector: inadequate infrastructure; susceptibility to natural disasters and slow recoveries; limited research and technical education; uncertain land tenure, limited land-use planning and zoning; ineffective law enforcement; weak links among industry value chains; and lack of national branding and marketing. These constraints have to be overcome in order to achieve sustainable agriculture and food security in the region (Figure 1.1).

Endemic global problems, such as climate change and extreme weather, food price volatility, outbreaks of disease, food safety, and encouraging alternatives to the cultivation of illegal crops—although hard for developing economies to address on their own—cannot be ignored either.

Common socioeconomic features include small and fragmented landholdings, slow transfer of labor surplus away from agriculture, and persistently low farm–gate prices due to fragmented agricultural value chains. And eventually, the agriculture sector will have to face competition for its low-cost labor, land, and water by the faster growth of cities, and other industries, and services.

### Table 1.1: Agricultural Statistics for CLMV Countries (%)

<table>
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<tr>
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<th>Cambodia</th>
<th>Lao PDR</th>
<th>Myanmar</th>
<th>Viet Nam</th>
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<tr>
<td>Share of labor force engaged in agriculture (2009–2012)</td>
<td>56</td>
<td>73</td>
<td>70</td>
<td>48</td>
</tr>
<tr>
<td>Agriculture share of GDP (2013)</td>
<td>34</td>
<td>27</td>
<td>36</td>
<td>18</td>
</tr>
<tr>
<td>Share of arable land (2012)</td>
<td>33</td>
<td>11</td>
<td>19</td>
<td>35</td>
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GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.  
Source: World Bank World Development Indicators; CIA World Factbook.
Progress in performance and productivity has been mixed. The dominance of subsistence rice production and the limited use of improved inputs for agriculture, such as better seed varieties, fertilizers, and livestock breeds, are some of the factors that have suppressed productivity growth. The small number of farmers’ organizations, cooperatives, and networks has also kept many agricultural activities at the individual level, and limited capacity building and training, as well as bargaining power for market participation and commercialization.

For example, in Cambodia, productivity has remained low during the past decade. While land is available for agriculture in the country, the majority of farmers lack the knowledge and skills required for more sophisticated production techniques (Muyhong 2014), and the sector requires significant investment in order to realize the development results that have been achieved in other countries, such as Thailand and Viet Nam. However, potential for improvement exists, particularly through development in irrigation systems, and increased productivity and efficiency associated with the effects of rising access to education and health centers.
Despite these obstacles in the region, there are some signs of improvement. In Myanmar, technological progress has contributed to growth through more efficient use of land and labor, and helped to lower production costs. In comparison with other countries in the region, Viet Nam has seen relatively fast growth in value added. This has been attributed to a shift toward higher-value agricultural products.

**Exports and Market Access**

Agricultural exports have a significant role to play given their contribution to the growth of trade, and improving export market access is becoming an increasing priority among the CLMV countries. Yet, many agricultural products in the region are still exported in their primary forms due to the low capacities of domestic agro-industries. This results in significant losses in value added and there remain substantial opportunities for investment in manufacturing and further value-added processes. The prevalence of informality in the export system is also responsible for losses in tax revenue, and this should be improved with development of the export process.

Agriculture-based products account for a sizable proportion of exports. For example, in 2007, they comprised 15% of the Lao PDR's total exports, although this has fallen in recent years. Myanmar's agricultural exports have risen in the last decade as a result of increasing liberalization of production, such as the cut in the 8% tax on exporting commodities in 2011. In Viet Nam, greater access to export markets for agricultural products has been facilitated through investment in irrigation and land expansion. The country is now a solid agricultural exporter and this has helped to establish industrialization and further economic growth.

**Challenges and Solutions**

It is trite to observe that if most of the macroeconomic constraints were ameliorated and serious improvements could be introduced and sustained for the common problems of the sector, agricultural production would rise. What governments and development partners are more interested in knowing is where the most likely tipping points are that could be prioritized immediately for faster and better results at hopefully lower cost.
Better Bureaucracies and Regimes

As a starting point, improvements in the efficiency and resources of agricultural bureaucracies (including laboratories), both central and local, and the transparency and predictability of the rules and practices they introduce and administer are clearly warranted. Later policies could be undermined by unaddressed systemic weaknesses persisting in these areas.

Seed Industry

From the country survey perspectives, it could be promising for CLMV governments to concentrate on promoting formal national and transregional seed markets with third-party quality assurance as a first step. After the re-opening of Myanmar, the certified seed industry was recognized for priority attention and the seed industry has been identified as a key area for potential growth in the CLMV countries.

Improvements in the quality of seeds means greater yields, crop disease prevention, and increased variety, which in turn contribute to increased food security, resistance to environmental and natural hazards, increased competitiveness, and higher value added for agricultural products. Factors that have constrained seed development in Cambodia, the Lao PDR, and Myanmar include the lack of investment and availability of high-quality seeds at the right times and at affordable prices. There is a continuing need for research and development, private sector participation, and foreign direct investment (FDI) for agricultural production.

Table 1.2 illustrates the opportunity for growth through the seed industry and effects on rice production. Rice is the main staple crop in the CLMV countries, but production yields are low, with the exception of Viet Nam. Viet Nam has the most developed seed industry of the CLMV countries, with strong support from the public sector and involvement of private companies and farmers’ organizations. Growth of the seed industry has contributed to greater productivity and overall growth in the agriculture sector, and increases in productivity could also be realized through further support and development of similar industries in Cambodia, the Lao PDR, and Myanmar.

Exploiting Organic and Niche Markets

The promise of moving decisively into green and organic products for these relatively late-starting competitors in the global food market
should be grasped. International market demand for selected organic products has been increasing, along with a shift in diet patterns to generally higher levels of nutrition and quality, which is expected to continue. There are few downsides to this specialization and while satisfying the global consensus to go green, organic, and safe, there is a chance that new and lucrative niche markets could be found and exploited.

### Diversification, Value Chains, and Contract Farming

CLMV countries would do well to wholeheartedly embrace comprehensive national policies on the promotion of diversified agricultural production using modern agribusiness systems and technology, coupled with support for crop-zoning initiatives and the packaging, branding, and export of green products. Increasing government investment in agricultural science and technologies, although involving hard trade-offs with other sectors, would help to improve total factor productivity.

The promotion of contract farming is one way to bring about green transformation and strengthen agribusiness in the CLMV countries.
Through the arrangement of contract farming, benefits can be realized in partnerships between smallholder agriculture participants and large-scale agribusinesses within robust export-oriented value chains.

Contract farming still faces challenges in the region, but there have been successful examples in Myanmar for poultry and horticulture. In Cambodia, there is increasing government interest in encouraging contract farming in order to connect farmers to value chains and to achieve economies of scale. In Viet Nam, however, contract farming accounts for less than 2% of total agricultural sales due to a lack of willingness of enterprises to form partnerships with a large number of smallholder farmers.

With appropriate support, contract farming can provide opportunities for farmers to enjoy more advanced technology and information and production practices, greater domestic and international market access, sustainable and inclusive growth, and occasionally even financial support.¹

Within each country’s capability, farmer-to-farmer social networks and organizations should be encouraged (Nakano et al. 2015), and access to rural education and finance for smallholders improved. At the same time, CLMV governments need to be open and welcoming to foreign companies and entrepreneurs setting up or relocating their agribusiness operations and investments, particularly for seed research, testing, grading, distribution, cold storage, and agro-processing, and to benefit from being in privileged countries that supply to world trade markets.

**Natural Resources and the Environment**

Given the importance of agriculture in the CLMV countries, environmental variability and natural disasters can have significant and wide-reaching consequences. Environmental factors can, for example, reduce crop yields; induce erosion, flooding, and drought; and jeopardize water availability; and in turn affect infrastructure, income, poverty, and overall agriculture sector development (FAO 2015).

Agriculture itself can also negatively impact environmental quality. Deforestation is becoming an increasing concern as many forests are being cut down to allow for increased agricultural production, and this is likely to increase if yields fall due to climate change. Many rural communities also suffer from poor land management practices, including safe pest control, and a lack of knowledge of the importance of sustainability for their natural resources. In Viet Nam, it is estimated

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¹ For a detailed analysis of global contract farming, see Setboonsarng and Leung (2014).
that there are 60% less mangrove forests than were recorded in the 1940s (VietNamNet Bridge 2014). Effective government intervention may be required to mitigate the overexploitation and degradation of further natural resources.

The effects of erratic weather patterns and climate change could also be devastating for CLMV countries, many of which have areas susceptible to flooding. Viet Nam, for example, is particularly vulnerable to rising sea levels, and water levels have been rising in the Mekong Delta and the coastal middle region. In 2008, Cyclone Nargis caused extensive damage to areas of the Ayeyarwaddy Delta in Myanmar, including widespread infrastructure disruption. The agriculture sector is also the largest emitting sector of greenhouse gases in the CLMV countries, so it is important to promote agricultural practices that will reduce emissions while improving resilience to climate extremes. Training for increasing knowledge and skills on soil improvement for food safety and carbon sequestration will also be needed to achieve these goals.

**Hometown Investment Trust Funds**

One of the novel ways that has been proposed for mitigating the effects of natural disasters, among other things, is the use of hometown investment trust funds (Yoshino 2014). These financial instruments allow fund-sharing, and differ from financial institutions or usual microfinance programs by allowing direct participation by individual investors. Hometown funds let concerned individuals react to specific events or local circumstances—be they droughts or human-made or natural disasters—to provide investment and financial support to those affected. Some of the benefits of such funds are that investors can invest easily using the internet, they allow funds to be utilized quickly, and they encourage “goodwill” financing for reconstruction efforts.

These funds are also a promising new way of supplying risk capital. Accordingly, credit can be facilitated for agricultural production and reconstruction by agriculture sector participants, who might otherwise face difficulties in borrowing from banks and other traditional financial institutions, ensuring flexibility and greater stability.²

**CLMV and ASEAN**

The recognized importance of agriculture is reflected in the policies being enacted by the CLMV governments to actively grow and enhance the sector.

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² For more information on hometown investment trust funds, see Yoshino and Kaji (2013).
Cambodia’s Rectangular Strategy Phase III specifically places importance on increasing agricultural productivity, diversity, and promoting Cambodia’s position in the value chain with the objectives of combating poverty and ensuring food security and sustainability. The Lao PDR has enacted its National Socio-Economic Development Plan (NSEDP), which aims to secure high-quality food in large quantities, and sustainable systems for agricultural production, and in turn enable the country to reach its Millennium Development Goals (MDGs) related to poverty and hunger reduction and improvement of health and environmental sustainability. Myanmar’s Framework for Economic and Social Reform has similar objectives of increasing agricultural competitiveness, advancing knowledge and technical skills, developing rural productivity and infrastructure, and promoting FDI and market access.

ASEAN 2030 Outlook
In a forward-looking analysis of the outlook for all ASEAN countries (ADBI 2014), the Asian Development Bank Institute has identified key agriculture-related objectives and challenges for Cambodia, the Lao PDR, and Myanmar, in particular. These include the need for diversification in the economies of Cambodia and the Lao PDR by boosting investment in smart and ethical agriculture and becoming more engaged in integrated agricultural supply chains. Myanmar’s agriculture sector could be strengthened through the extension of support and services for enhancing agricultural productivity, and through schemes to increase value added, develop infrastructure, and promote agribusiness. The seed industry has also been noted as having significant potential for investment, as well as increased development of rural areas and advances in land titling and tenure.

Big Picture: Summary and Conclusions
Agricultural productivity in the CLMV countries has been improving, but there are still many challenges to overcome and opportunities for enhancement, as explained in more detail throughout this book.

Continuing volatility in world prices for staples can be expected to push the recent trend of foreign investment from food-deficit countries to countries having either under-utilized land or a strong tradition of surplus food production. Helping small and poor farmers move beyond subsistence in a sustainable and ecologically friendly way to increase their crop yields should contribute measurably to poverty reduction and nutrition and food security for the least-developed members of
ASEAN. Contract farming of green products produced by smallholders is one important way to shift traditional agricultural practices into more market-oriented, quality production so as to become part of global agri-food value chains and retail marketing systems. Smallholders generally respect their parcel of land and can often be good stewards and innovators, but are usually short on capital and insurance.

The private sector and governments need to cooperate closely to ensure successful, safe, and equitable outcomes for agribusiness in poor communities. Tailored agribusiness support services in collaboration with existing or improved local and regional programs make sense. To this end, Cambodia and the Lao PDR have started experimenting with initiatives, and learning lessons from ASEAN neighbors, such as Thailand (Srimalee 2015), on successful paths of agricultural diversification toward industrial and high-value crops.

As experienced by Viet Nam, the agriculture sector is also able to grow steadily even in times of macroeconomic stagnation and contribute to net export surpluses that help balance the terms of trade. Therefore, continual improvements in the productivity of rural labor, land use, and the other inputs of agricultural production and investment must be pursued by the CLMV countries.

Finding effective and sustainable solutions for boosting agricultural productivity remains a major part of ensuring a green and inclusive future for Cambodia, the Lao PDR, Myanmar, and Viet Nam. Sustainable reforms and innovative actions need to be taken by both public and private participants, but the potential benefits promised by the enhancement of agriculture for economic and social development are vast.

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2. Agricultural Productivity in Cambodia

Pisey Khin and Andrew McNaughton

Introduction

Enhancing productivity in the Cambodian agricultural system will require addressing the linked constraints that affect productivity in all three major components of agricultural value chains: production, processing, and marketing.

The productivity constraints are well known to Cambodian policymakers and some progress is being made to address them. They include limited availability of high-quality seeds, inadequate and poorly maintained infrastructure (irrigation and rural roads), limited access to finance, high energy costs, ineffective land-use planning and zoning, limited export promotion programs and a lack of national branding, and unsustainable agricultural and natural resource management practices. There is also a significant lack of farmers’ organizations and of a regulatory framework for contract farming, and a need for effective extension services for educating farmers and supporting farmer operations; improvements in secure land tenure; private sector investment in agro-processing enterprises; and appropriate standards for product quality regulation.

All of these constraints are serious. The most critical, though, is the lack of agro-processing enterprises to link diversified agricultural production to domestic and export markets.

The government’s approach to agricultural productivity growth has three major themes: increasing productivity, diversification, and commercialization through value chain development—all within a framework of poverty reduction, food security, and environmental sustainability. The policy platform for the legislature (the Rectangular Strategy) explicitly calls for implementation of the “National Strategic
Plan on Green Development 2013–2030,” which makes general provisions for increasing and sustaining agricultural productivity through green approaches.

Growing regional and global urban markets for green products will create win–win opportunities for resource-conserving, safe, green, and organic approaches to diversified agriculture. These will serve to enhance commercial demand-pull for improvements in the agricultural business environment, encourage investment, and enhance productivity along agricultural value chains.

Cambodia should seize these opportunities through the implementation of its national Policy on the Promotion of Diversified Agricultural Production and Green Products Export, similar to its Policy on the Promotion of Paddy Production and Rice Export (Rice Policy), which was implemented in 2010.

Other members of the Cambodia, Lao People’s Democratic Republic, Myanmar, and Viet Nam (CLMV) group face similar challenges and opportunities. Harmonized green agriculture policies, such as the Association of Southeast Asian Nations (ASEAN) Good Agricultural Practices (GAP) and the ASEAN Standards for Organic Agriculture, and coordinated initiatives within a possible CLMV “food cluster” will create synergies in access to markets and productivity enhancement.

Importance of Agriculture to the Cambodian Economy

Role of Agriculture in the Economy

Agriculture contributes to a third of Cambodia’s gross domestic product (GDP). About 70% of the population depends on agricultural activities for their livelihoods, mostly as smallholder semi-subsistence farmers and fishers. Agriculture serves as a safety net for the Cambodian economy in times of crisis. In the economic crisis of 2009, the agriculture sector re-absorbed a large portion of the workforce that had lost jobs in other sectors, particularly in garment production and construction.

Agriculture is divided into four main subsectors: crops (including cash crops, perennial and industrial crops, and vegetables and fruits), fisheries, animal husbandry (including livestock and poultry), and forestry (including non-timber forest products and logging) (Figure 2.1). The crops subsector is the largest contributor to agricultural GDP, representing 60% in 2012. The three major cash crops are paddy rice, cassava, and maize. Paddy rice is the dominant crop, accounting for
more than half of the total crop gross value added (GVA) and almost 80% of the total crop area in Cambodia (Siphana 2011).

Agriculture is also fundamental for the industrialization and transformation of the economy. Expanding rice production and increasing rice surplus have induced more investment and processing activities from paddy rice into milled rice for export. Likewise, the processing of cassava and maize has grown significantly in the economy, though many constraints and challenges remain.

**Agriculture in Cambodia’s Policy Framework**

Cambodia’s development strategy, the Rectangular Strategy Phase III (Government of Cambodia 2013a), makes enhancement of the agriculture sector its first priority, along with the further rehabilitation and construction of physical infrastructure, private sector development and employment generation, and capacity building and human resource development. Good governance is an overarching theme. The approach to agricultural growth has three closely linked components: productivity enhancement, diversification, and value chain development—all
within the related themes of poverty reduction, food security, and environmental sustainability. These policy directives are emphasized in the government’s Agriculture Sector Strategic Development Plan.

The Policy Document on the Promotion of Paddy Production and Rice Export (Rice Policy) (Supreme National Economic Council 2010) identifies the major constraints on productivity in the rice value chain, and by implication on productivity in all Cambodian agricultural value chains. These constraints are now quite well understood by policymakers in the country and, while they remain a significant challenge overall, there has been some progress in addressing them. However, neither the Rectangular Strategy nor the Rice Policy provides particular guidance on Cambodia’s role in regional agro-industrial value chains within ASEAN.

The Rice Policy is intended as a means of moving quickly to overcome the constraints on Cambodia’s production and export of milled rice. It makes provisions for special access to government services for agro-enterprises and other industry participants, and allows policy and program coordination between concerned ministries while acting as a national rice marketing strategy that includes niche market diversified and organic rice products. It also warns of the sustainability risks associated with intensified conventional rice production, but makes no specific recommendations for management of these risks.

Agricultural Productivity and Trade: Patterns and Performance

Agricultural Productivity

Patterns of Agricultural Productivity

The value added to agriculture outputs per unit of labor or land represents the productivity of the agriculture sector. The degree of linkages across the agro-industry value chain, including agricultural production, processing, and marketing, largely influences the level of income and efficiency of agricultural production. This in turn affects agricultural productivity.

In Cambodia, rice is by far the top cash crop in terms of both cultivated area and quantity of production (Tables 2.1 and 2.2).

The growth of agricultural productivity has been nearly flat during the last decade, constrained by persistent challenges in the sector. The GVA of all Cambodian crops measured in 2000 prices
Agricultural Productivity in Cambodia was around $300 per hectare (ha) in 2010, up from $225 a decade ago and equating to an annual average rate of 3%. This relatively low rate is due to the dominance of paddy rice production for subsistence, which is a low margin enterprise relative to vegetables and high-value specialty crops.

Table 2.1: Top Five Cash Crops in Cambodia: Cultivated Area ('000 hectares)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>2,086</td>
<td>2,318</td>
<td>2,438</td>
<td>2,796</td>
<td>2,969</td>
<td>3,008</td>
</tr>
<tr>
<td>Dry season</td>
<td>216</td>
<td>260</td>
<td>322</td>
<td>405</td>
<td>472</td>
<td>496</td>
</tr>
<tr>
<td>Wet season</td>
<td>1,870</td>
<td>2,059</td>
<td>2,116</td>
<td>2,391</td>
<td>2,497</td>
<td>2,512</td>
</tr>
<tr>
<td>Cassava</td>
<td>14</td>
<td>16</td>
<td>30</td>
<td>206</td>
<td>392</td>
<td>362</td>
</tr>
<tr>
<td>Maize (yellow)</td>
<td>52</td>
<td>44</td>
<td>67</td>
<td>172</td>
<td>148</td>
<td>176</td>
</tr>
<tr>
<td>Soybeans</td>
<td>...</td>
<td>33</td>
<td>119</td>
<td>103</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td>Mung beans</td>
<td>26</td>
<td>25</td>
<td>61</td>
<td>69</td>
<td>68</td>
<td>67</td>
</tr>
<tr>
<td>Other</td>
<td>52</td>
<td>82</td>
<td>143</td>
<td>149</td>
<td>124</td>
<td>161</td>
</tr>
<tr>
<td>Total crop area</td>
<td>2,229</td>
<td>2,519</td>
<td>2,858</td>
<td>3,496</td>
<td>3,772</td>
<td>3,844</td>
</tr>
<tr>
<td>Area of irrigated land</td>
<td>...</td>
<td>...</td>
<td>588</td>
<td>1,153</td>
<td>1,296</td>
<td>1,443</td>
</tr>
<tr>
<td>Irrigated land share of total crop area (%)</td>
<td>...</td>
<td>...</td>
<td>21</td>
<td>33</td>
<td>34</td>
<td>38</td>
</tr>
</tbody>
</table>

... = not available.
Source: Ministry of Agriculture, Forestry and Fisheries; Ministry of Water Resources and Meteorology (for irrigated land).

Table 2.2: Top Five Cash Crops in Cambodia: Production ('000 tons)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>3,448</td>
<td>4,026</td>
<td>5,986</td>
<td>8,249</td>
<td>8,779</td>
<td>9,291</td>
</tr>
<tr>
<td>Dry season</td>
<td>645</td>
<td>814</td>
<td>1,252</td>
<td>1,701</td>
<td>2,079</td>
<td>2,155</td>
</tr>
<tr>
<td>Wet season</td>
<td>2,803</td>
<td>3,212</td>
<td>4,734</td>
<td>6,549</td>
<td>6,700</td>
<td>7,136</td>
</tr>
<tr>
<td>Cassava</td>
<td>82</td>
<td>148</td>
<td>536</td>
<td>4,249</td>
<td>8,034</td>
<td>7,614</td>
</tr>
<tr>
<td>Maize (yellow)</td>
<td>55</td>
<td>122</td>
<td>192</td>
<td>652</td>
<td>668</td>
<td>807</td>
</tr>
<tr>
<td>Soybeans</td>
<td>...</td>
<td>28</td>
<td>179</td>
<td>157</td>
<td>115</td>
<td>120</td>
</tr>
<tr>
<td>Mung beans</td>
<td>20</td>
<td>15</td>
<td>45</td>
<td>72</td>
<td>76</td>
<td>75</td>
</tr>
</tbody>
</table>

... = not available.
Source: Compiled from Ministry of Agriculture, Forestry and Fisheries estimates.
The yield of paddy rice production, which contributes to overall agricultural productivity, remains low in comparison to regional levels. However, this yield has shown a marked improvement in recent years, increasing from 1.5 tons (t) per ha in 1994 to 3 t in 2011.

**Underlying Factors of Agricultural Productivity**

Using the same approach as the World Bank (2006), Markussen (2008), and CDRI (2011), we have re-examined the main factors affecting Cambodia’s agricultural productivity with a focus on paddy product. Differing from previous studies, which rely on cross-sectional data, our study is based on pooled data from the Cambodia Socio-Economic Survey (CSES) of 2004, 2007, 2008, 2009, 2010, and 2011.

Agricultural productivity at the farm production level is measured by the total crop value divided by the total harvested area within each plot. Although our approach does not capture all agricultural activities, such as fishing, livestock, and forestry, it is the best proxy for agricultural productivity given the available household survey data. In this regard, paddy productivity is measured by the total amount of paddy divided by the total harvested area within each plot.

We assumed that agricultural productivity is a function of land and household head characteristics, agricultural capital, labor, other inputs, and village and regional characteristics. Both ordinary least squares (OLS) and two-stage least squares (2SLS) were used to estimate the defined equation. As noted by Besley (1995), land rights could be endogenous variables since households will make improvements to enhance their rights. This implies that the OLS estimators will be biased and inconsistent.

To address the endogeneity problem, the method of instrumental variables or 2SLS was used, requiring additional variables that could possibly determine land rights but not affect productivity directly.

Previous studies have used instruments such as whether there is a transfer deed for the land, whether there has been legal action related to the use of the field, the number of years the field has been owned, and the method through which the plot was acquired (Besley 1995). Following Besley (1995) and Markussen (2008), we used the mode of acquisition of the land as the instrument for land rights.

Our empirical evidence suggests that land tenure contributes positively to agricultural productivity. This finding is in line with Markussen (2008) and CDRI (2011), who found that plots with official certification were associated with increased productivity of 20%–30%.

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1 The Government of Cambodia (2013b) has noted that approximately 28% of all plots (around 6 million–7 million plots) have been provided with land titles. Given
Access to irrigation improves the productivity of all crops by 7%. For paddy rice, the effect of having access to irrigation is a productivity improvement of 10%. Community access to lower secondary schools and health centers is also linked to higher productivity of crops (9% and 6%, respectively).

We also note that average land size per plot declined from 0.85 ha in 2004 to 0.75 ha in 2011. Similarly, average land size per household dropped from 1.59 ha in 2004 to 1.40 ha in 2011. It is widely noted that land fragmentation is one of the factors that constrains farm income and household food security (Gebreselassie 2006). The decline in landholding reduces food production and farm income per capita and severely limits the productivity of farms, even with improvements in technology. Farmers with such small landholdings typically have extremely limited or no capacity for investment or purchase of inputs.

### Agricultural Trade

Most Cambodian agricultural exports are primary commodities traded informally with Viet Nam and Thailand. Exported commodities mainly include forest products (logs, sawn timber, resins, etc.), grains (paddy rice, soybeans, maize, cashew nuts, mung beans, and sesame), rubber, cassava, livestock, and fish. The low capacity of the domestic agro-industry is the major reason for this outflow of unprocessed products from the country, creating a significant loss of value added.

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2. It has been estimated that there are approximately 2,000 irrigation schemes in Cambodia, but the total irrigated area in the dry season is merely 15%, while in the wet season it covers around 35% of total cultivated land. Having recognized the lack of infrastructure, the Cambodian government invested $290.22 million in 2009/10, and committed to inject an additional $220 million in 2011 in order to expand the irrigation system nationwide (Ministry of Economics and Finance 2011). To raise the effectiveness of irrigation, the government delegated responsibility for the operation and maintenance of irrigation systems to Farmer Water User Communities (FWUC) in 2006. Since then, farmers are required to pay fees to FWUC and water is no longer a free public good. A recent study conducted by Wokker, Santos, and Bansok (2014) revealed that farmers are not willing to pay for water, particularly during the wet season, which in turn limits the feasibility of cost-recovery policies and decisions on infrastructure investment and maintenance.
The informality of the export system causes a further loss of tax revenue. The value of unrecorded agricultural exports represented around 27% of Cambodia’s total domestic exports in 2009, according to the National Bank of Cambodia’s estimations. The value is likely to have been even higher in recent years, given the marked increase in production.

On the import side, lack of effective competition from local products against cheap, reasonable quality, and regularly supplied imported fruit and vegetables means that at least half of fruit and vegetables (and livestock products including pork, fish, and poultry) sold on domestic markets is imported, mostly from Viet Nam and some from Thailand. This is the case even though there is available arable land suitable for production of these items. Again, lack of agro-processing enterprises to link farmers to markets is the key constraint.

Imports of vegetables in 2011 were valued around $2.5 million at a weight of around 5,000 t, of which around 1,700 t (34%) were from Viet Nam, equivalent to roughly $0.9 million (36%) in import value. However, this recorded data may cover only 50%–70% of the actual imports.

Inability to enforce sanitary and phytosanitary standards (SPS) creates the potential for low-quality or adulterated food products to enter the domestic market, and reduces export potential. High-cost production compared to imports and irregularity of supply will be increasingly significant challenges affecting Cambodian producers in the open-trade context of higher integration into ASEAN and World Trade Organization (WTO) membership.

Challenges for Agricultural Development in Cambodia

The identification of challenges focuses mainly on the crop subsector of Cambodian agriculture. It considers basic components of the agricultural production function, including land and inputs, labor, capital, and technology; and linkages with agro-industry value chains in both national and regional contexts (Table 2.3).

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3 Using data from the General Department of Customs and Excise of Cambodia, by summing imports of HS code 07, which represents “edible vegetables.”
Table 2.3: Strengths, Weaknesses, Opportunities, and Threats in Cambodia’s Agriculture Sector

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Government’s explicit policy recognition (Rectangular Strategy III) of the need for sustainability in agriculture sector, endorsed and supported by development partners</td>
<td>• Limited availability of improved seed</td>
</tr>
<tr>
<td>• Abundant agricultural land with areas of good quality soils for rice, rubber, and other crops</td>
<td>• Inadequate and poorly maintained infrastructure (irrigation, rural roads)</td>
</tr>
<tr>
<td>• Abundant water resources (Tonle Sap, Mekong River, and their tributaries)</td>
<td>• Difficult access to finance</td>
</tr>
<tr>
<td>• Diverse agro-ecological zones with high potential for a wide range of products and still relatively intact ecological functions</td>
<td>• High energy costs</td>
</tr>
<tr>
<td>• Large agricultural labor resource (around 70% of the population are farmers)</td>
<td>• Limited support for contract farming and farmer cooperatives</td>
</tr>
<tr>
<td></td>
<td>• Problems with land tenure, land-use planning, and zoning</td>
</tr>
<tr>
<td></td>
<td>• Limited agricultural research and extension services</td>
</tr>
<tr>
<td></td>
<td>• Underdeveloped standards for agriculture (sanitary and phytosanitary measures, Good Agricultural Practices, national standards)</td>
</tr>
<tr>
<td></td>
<td>• Lack of agro-processing enterprises to link farms to export markets</td>
</tr>
<tr>
<td></td>
<td>• Limited agricultural diversification to high-value products</td>
</tr>
<tr>
<td></td>
<td>• Ineffective legal framework</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Emerging availability of regional urban markets for value added and diverse food products, especially “safe” and “green” products</td>
<td>• Loss of productive capacity due to the destruction of environmental services, unsustainable agricultural and natural resource management practices, and climate change</td>
</tr>
<tr>
<td>• Worldwide potential market access through the Generalized System of Preferences, Everything but Arms initiative, World Trade Organization, Association of Southeast Asian Nations (ASEAN), and other trade agreements with Europe, the People's Republic of China, India, Australia, and New Zealand</td>
<td>• Introduction of genetically modified crop varieties will limit access for Cambodian products to European and other export markets</td>
</tr>
<tr>
<td>• Harmonized agriculture policies will create synergies among the CLMV group for access to markets, e.g. through the new ASEAN Regional Organic Standard</td>
<td>• Competition from neighboring countries for both domestic and regional market access for Cambodian agricultural products</td>
</tr>
</tbody>
</table>

CLMV = Cambodia, Lao People’s Democratic Republic, Myanmar, and Viet Nam.
Source: Authors.
Challenges

Inadequate and Poorly Maintained Infrastructure: Irrigation and Rural Roads

Agricultural activities are limited due to a lack of irrigated land in Cambodia. Irrigated land area accounted for only 38% of total crop area in 2012, preventing the majority of farmers from cropping multiple times per year. Greater access to irrigation has the potential to improve crop productivity by at least 6%–10%.

The proportion of paved roads in 2011 was around 56% for national roads and 15% for provincial roads, with rural roads remaining limited in both quantity and quality (IRITWG 2012). This lack of roads puts an additional constraint on crop productivity and a marked loss of value added: difficult access to farms may lead to a prolonged harvest, resulting in a deterioration of the quality of harvested products, especially of paddy rice, and impedes farmers from accessing technology and participating in agro-industry value chains due to limited access to markets and information. As is the case for irrigation, a weak enforcement of construction contracts—resulting in reduced durability and high maintenance costs—along with tight financial resources to build rural roads are significant challenges for the road sector.

Limited Agricultural Research and Extension Services

Activities related to agricultural research and development (R&D) and extension services are limited, mainly due to budget constraints and a lack of human resources. Cambodia’s agricultural research capacity is mostly centered at the Cambodian Agricultural Research and Development Institute (CARDI) and mainly focused on rice. There has been a lack of applied research on diversified and sustainable farming systems in the Cambodian context and on the development of high-value marketable food products. This is partly because of low participation from the private sector and academic institutions.

Regarding extension services, government extension staff are limited in terms of number and skills, and only a few agricultural personnel are concentrated at the community level (Ngo and Chan 2011). As a result, only 17% of villages across Cambodia are reached by extension services, according to the Cambodia Socio-Economic Survey (National Institute of Statistics of Cambodia 2007).

In a 2012 survey carried out by the Economic Institute of Cambodia, more than 80% of interviewed farmers had never received any training regarding rice farming. Improper use of seed, fertilizers, and pesticides

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4 The survey by the Economic Institute of Cambodia (EIC) of 200 rice farmers in three major rice provinces (Battambang, Banteay Meanchey, and Siem Reap) was commissioned by the International Finance Corporation (IFC).
is common among farmers, entailing negative externalities for agricultural productivity. Traditional farming techniques are still widely used. Around 65% of interviewed farmers used their own seed obtained from their previous harvest to grow white rice, and the prevalence is only slightly lower at around 52% in the case of fragrant rice. Only 1% of rice farmer respondents used the System of Rice Intensification (SRI) farming techniques, while the rest used sowing or other traditional planting techniques.

**Problems with Land Tenure, Land-Use Planning, and Zoning**

Lack of secure land titling and landlessness are two major issues for land tenure. The land titling system was destroyed during the civil war period in the 1970s and has not yet been implemented nationwide, leaving many Cambodians with no land title. This consequently enables land-grabbing and hinders private investment among farmers. Analysis shows that farms with a secure land title have a higher productivity than those without a secure title.

Around 21% of Cambodian rural households were reported as landless, while another 45% possess less than 1 ha of land, implying a fragmentation of land distribution. The landlessness reduces agricultural productivity as farmers must resort to renting land and have no incentive to save for investment or for improvement of soil fertility.

Land-use planning and zoning activities are found only in some communes because of national budget constraints. This lack of land-use planning and zoning at the national level has resulted in a loss of agricultural land due to industrialization and urbanization, and deforestation from land concessions (economic and social).

**Weak Information Systems in the Agriculture Sector**

Two further challenges can be identified: poor quality of statistics, and a lack of commodity market information. There is a high demand for high-quality data, including on production and prices of agriculture commodities in Cambodia, as the quality of data reported by the government authorities is perceived as poor and unreliable. This consequently generates a high uncertainty factor among agricultural stakeholders, including policymakers, traders, and farmers.

Formal commodity markets in Cambodia are inactive or nonexistent, although there have been some initiatives in recent years.\(^5\) The absence of this market platform stalls business matching and trade processing between buyers and sellers of Cambodian agricultural commodities and hinders information flows, for example of supply, demand, prices, and within agro-industry value chains.

\(^5\) For example, see http://www.mexcambodia.com.
The government has so far initiated and implemented an information program on agricultural commodity prices. However, it has had limited success due to the low quality of data, narrow outreach to audiences, and lack of sustainability. Another attempt by the government to deal with this issue was the implementation of the first ever Cambodia Agriculture Census in 2013 (Renzenbrink and Kunmakara 2013).

**Underdeveloped Standards for Agriculture**

Limited capacity of SPS tests and overlapping administrative responsibilities remain serious challenges for Cambodia. Underinvestment and lack of equipment and human resources limit Cambodian capacity in conducting SPS monitoring. This limited capacity reduces the export potential of Cambodian agro-based products to enter into markets of developed countries and creates opportunities for inflows of unsafe agro-based products into Cambodia. It also affects compliance with the WTO and ASEAN.

Only a few agricultural products have a national standard, namely milled rice, tapioca and cassava starch, dried chili, pepper, coffee powder, corn, and soybeans. This lack of national standards, along with limited enforcement, has caused a significant variation in the quality of domestic agricultural products and confusion in the domestic agricultural market, mostly resulting in a discount of prices of products sold, such as rubber products. Regional cooperation on standard setting, testing, and monitoring promise worthwhile gains for countries like Cambodia.

Another factor reducing the effectiveness of implementation is the overlapping administrative responsibilities among government agencies, such as the Ministry of Agriculture, Forestry and Fisheries, the Ministry of Commerce, and the Ministry of Health.

**Limited Support for Contract Farming and Farmer Cooperatives**

Contract farming can be an effective way to regulate supply, while cooperatives enhance the bargaining power of farmers on the demand side. Currently, these two mechanisms have quite limited roles in the agriculture sector in Cambodia, albeit a number of interventions have been implemented so far. Contract farming at present appears only to work where monopsony conditions prevail, due to the unenforceability of legal contracts.

The Government of Cambodia is promoting farmer cooperatives as the key modality for linking farmers to value chains through contract farming, but institutional and financial resources for implementation are weak or lacking. While the adoption of the law on farmers’ cooperatives
in May 2013 created legal assurance, only the effective implementation of the law can successfully and comprehensively promote the roles of cooperatives in Cambodia.

Ineffective Legal Framework and Enforcement

The ineffective legal framework remains a major constraint for all sectors, and Cambodia suffers from a weak judicial system, inadequate laws and regulations, an absence of enforcement mechanisms, overlapping responsibilities between government institutions, and a lack of human resources. This situation creates opportunities for corrupt practices and uncertainty in the enforcement of laws and regulations, and contributes to the poor overall governance of Cambodia’s agriculture sector.

For instance, the implementation of laws on plant seed management, plant breeder rights, and agriculture fertilizer use is weak and has resulted in inflows of poor-quality agricultural inputs, including seeds and fertilizers. A similar problem exists in the case of laws relating to land, water, and the environment (Siphana 2011).

Despite WTO membership, some key laws in the agriculture sector still do not exist, including laws on plant protection and SPS controls, laws on animal health and protection, and laws on agricultural land use. This lack of crucial laws hinders the implementation of SPS and agriculture land-use planning and zoning.

Lack of Agriculture and Agribusiness Financing and Crop Insurance for Farmers

In 2011, the World Bank carried out a survey on the financing of agribusiness in Cambodia, focusing on maize, paddy, cassava, soybeans, and sesame, and covering processors, input suppliers, machinery sellers, crop collectors, and rice sellers (World Bank 2012). The results showed that about 90% of agribusinesses are family owned, more than half have less than $500,000 annual turnover, and over 20% have less than $50,000 annual turnover. They are mainly engaged in paddy processing, crop collecting, rice selling, and input and machinery sales. The larger agribusinesses accounted for 70% of business growth in 2010–2011, with 56% of the growth among processors and 33% among input suppliers.

The role of the financial sector for financing agribusinesses is limited. Only 44% of the surveyed agribusinesses had bank accounts, of which 96% were with the four top banks. Of the large firms, 83%

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had bank accounts. Almost none of the surveyed firms had accounts with microfinance institutions. Around 64% had taken loans, of which 75% of the loans (of an average size of $90,000) were from banks. Agribusinesses are largely self-financing entities. Only 20% of the working capital needs of medium and large processing firms are funded by way of credit. About 91% of surveyed businesses used their own funds to finance their investments, while about 87% of agribusinesses used their own funds to finance their working capital needs. Overall, informal lenders, family, and friends are perceived as better sources of finance than commercial banks.

The microfinance sector in Cambodia has grown quickly since microfinance institutions (MFIs) have been allowed to take deposits. In 2011, MFIs held around $100 million in deposits and had $600 million in loans outstanding. These were mostly to farm households and microenterprises.

Yet, banks and MFIs play only a small role in the financing of Cambodian agribusinesses. The World Bank study found that agribusinesses have very low levels of assets that can be leveraged, and their gross margins are generally not sufficient to service credit (on average 10.5%). Given the total assets of agribusinesses, an estimated $110 million of additional lending would be possible and could be handled by the financial system; however, virtually all categories of agribusinesses do not have sufficient margins to repay. Thus, not borrowing or lending is regrettably rational. There is also a deep-rooted ambivalence in the business community toward any formal engagement with financial institutions. This is fueled by fear of taxation and costly government inspections, and distrust of financial institutions concerning their ability to keep financial information confidential.

Access to credit sources that specialize in farming activities is limited. Farmers mostly borrow from private money lenders or MFIs, annual interest rates can range from 20% to 30%. Loans from these sources are mainly used for fertilizer purchases. As a result of high interest costs, farmers prefer to sell their agricultural produce, especially paddy rice, upon harvest, contributing to the informal outflow of commodities to neighboring countries and putting a heavy burden in terms of short-term working capital requirements on domestic processors.

There is no national crop insurance scheme for farmers, leaving them vulnerable to natural disasters and unprecedented farming issues, with potentially severe consequences for smallholder farmers. So far, there have been some disaster relief schemes supported by the government, including provision of seed for farmers affected by natural disasters. However, these schemes are limited in coverage.
Lack of Agro-Processing Enterprises to Link Farms to Export Markets

Agro-enterprises in the rice-milling subsector are modernizing, but value-adding agro-processing enterprises for most other products are lacking in Cambodia. While there are many constraints on agricultural productivity, this lack of farm-to-market linkages is the key impediment to implementing the government's policies for increasing productivity, diversifying production, and promoting agricultural product exports.

Limited domestic agro-industry capacity and the resulting significant (informal) outflows of unprocessed agricultural products to Thailand and Viet Nam lead to a dramatic loss of value added from the country. High operational costs—caused by high electricity, transportation, and export document processing costs—along with limited working capital are two major issues faced by the Cambodian agro-industry. Cambodia may be trapped as a supplier of raw agricultural products for its neighbors if no concrete special support is given for the agro-industry to remain competitive, especially under the context of the ASEAN Economic Community, which aims for the free flow of products by 2017.

Climate Change and Deforestation

In recent years, Cambodia has been affected by increases in flooding, drought, and variability in the timing of rainfall. Climate change poses significant risks for water resources and agricultural production, with detrimental impacts on water availability, crop yields, and increased exposure to water-borne diseases, among others (Ministry of Environment 2006). A climate change vulnerability reduction assessment carried out by the Cambodian Ministry of Environment showed that the frequency and duration of drought have increased steadily over the past 40 years, with a similar pattern for flooding, except that the frequency of flooding has begun to decline since 2002 (Theng, Keo, and Khiev 2013).

There is an unfortunate synergy between climate change and the extensive deforestation through conversion to agriculture (taking place in Cambodia's upland watersheds), which feeds much of the irrigation infrastructure in Cambodia's most important rice growing areas. Loss of tree cover reduces rainfall incidence, leading to increased drought and therefore less water available to feed reservoirs, while at the same time deforestation increases the rate of siltation, dramatically reducing the service life of irrigation infrastructure. The watersheds that drain directly into Tonle Sap from the Cardamom Mountains, Battambang, and the northern plains provide essential environmental services to millions. They have a key role in the provision of water to downstream
consumers, urban and rural. Moreover, their contribution to the maintenance of the dry season water flows and lake levels, in support of maintaining fisheries production in Tonle Sap, is highly significant for ecosystem stability and food security.

**Implications of the ASEAN Economic Community**

There should be no significant impact of the ASEAN Economic Community on Cambodian agriculture from the perspective of reductions in import tariffs. There is already a marked informal outflow of unprocessed agricultural products to neighboring countries, primarily Thailand and Viet Nam, under the current tariff regime. As mentioned earlier, this informal outflow is generated by the limited capacity of the Cambodian agro-industry.

Cambodia’s agro-industry may be hit hardest by tariff reductions due mainly to its infancy and lower competitiveness in comparison to that of Thailand and Viet Nam. This consequently can be a trap for the growth of agro-industry and outflow of unprocessed agricultural products.

**Overcoming the Challenges: Options to Enhance Agricultural Productivity**

The approach of the Government of Cambodia to achieving sustainable agricultural growth has three major themes: productivity increase, diversification, and value chain development, to be implemented without compromising the natural resource base of the country upon which long-term sustainability depends. Table 2.4 describes the well-understood challenges to Cambodian agricultural growth. It shows how the challenges are related to productivity in value chains and suggests appropriate policy responses to begin to meet them.
### Table 2.4: Challenges, Implications, and Responses for Agricultural Growth in Cambodia

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Implications for Productivity in Agriculture Value Chains</th>
<th>Specific Policy Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Inadequate and poorly maintained infrastructure (irrigation, rural roads)</td>
<td>• Poor infrastructure increases the cost of delivering water and other inputs to the farm and getting products to market, thus reducing farm margins</td>
<td>• Establish an irrigation master plan &lt;br&gt; • Improve governance in construction contracting &lt;br&gt; • Target infrastructure development in locations where farmer cooperatives are linked to agro-industries</td>
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<td>2. Limited access to finance</td>
<td>• Farm credit is available but tends to be diverted to family consumption purposes &lt;br&gt; • Capital is available for agro-enterprises but margins are usually too low to carry the cost</td>
<td>• Provide farm–business advisory services to farmers &lt;br&gt; • Provide management advisory services to farmer cooperatives &lt;br&gt; • Increase availability of soft loans for emerging agro-enterprises</td>
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<tr>
<td>3. High energy costs</td>
<td>• Reduced margins due to high cost of water pumping, transportation, and processing operations</td>
<td>• Implement existing national policies for rural electrification &lt;br&gt; • Facilitate electricity transmission and distribution to rural areas &lt;br&gt; • Promote appropriate renewable energy systems</td>
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<tr>
<td>4. Limited availability of improved seed</td>
<td>• Low productivity of traditional varieties and farmer-produced seed reduces farm margins</td>
<td>• Facilitate private sector participation in seed supply &lt;br&gt; • Support R&amp;D on appropriate improved rice varieties, and on farming systems for niche market traditional varieties</td>
</tr>
<tr>
<td>5. Lack of effective research and extension services to educate farmers</td>
<td>• Application of improved technology and correct use of inputs will increase efficiency and lower costs &lt;br&gt; • Applied farming systems research linked to extension will support diversified agriculture linked to export value chains</td>
<td>• Promote private agricultural extension services based on the farm–business advisory services model, linked to agro-enterprises (embedded services), and emphasize green and climate-resilient agriculture approaches &lt;br&gt; • Increase applied research on diversified agricultural production systems</td>
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### Table 2.4 continued

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Implications for Productivity in Agriculture Value Chains</th>
<th>Specific Policy Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. Few farmers’ organizations, with limited capacity</td>
<td>• Farmers’ organizations increase bargaining power through group purchasing and marketing operations, and improve the efficiency of production through economies of scale, increasing margins</td>
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<tr>
<td></td>
<td>• Farmers’ organizations provide a more workable channel for contract farming</td>
<td>• Increase efforts to establish and support farmer cooperatives</td>
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<td></td>
<td>• Support farmer cooperatives in certification and compliance with GAP, sustainability and organic agriculture standards consistent with regional norms (e.g., ASEAN GAP and ASEAN Regional Organic Standard)</td>
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<tr>
<td>7. Lack of regulatory framework for contract farming</td>
<td>• Contract farming linkages between farmers’ organizations and agro-processing enterprises enable cost-efficient delivery of inputs and product intake, increasing margins for both</td>
<td></td>
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<td></td>
<td>• Fast-track the approval and implementation of the sub-decree and guidelines on contract farming, including a transparent, pluralistic, and non-judicial mechanism for dispute resolution</td>
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<td>8. Lack of secure land tenure</td>
<td>• Without security of tenure, farmers are reluctant to risk investment in improvements to productivity and are more likely to use unsustainable farming practices</td>
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<td></td>
<td>• Provide free land-tenure registration services to members of farmer cooperatives linked to agro-processing industries</td>
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<td></td>
<td>• Prioritize farmer cooperatives engaged in diversified, export-oriented value chains</td>
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<tr>
<td>9. Ineffective land-use planning and zoning</td>
<td>• Lack of conservation of agricultural land and not growing the appropriate crops according to agro-ecological and economic geographical conditions reduce resource use efficiency</td>
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<td></td>
<td>• Establish agricultural land-use zoning and land cover mapping by fast-tracking the finalization and implementation of the Draft Law on Agricultural Land Use and Management</td>
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<td></td>
<td>• Support Commune Councils to apply agro-ecosystem analysis and other tools to Commune Development Plans</td>
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### Table 2.4 continued

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Implications for Productivity in Agriculture Value Chains</th>
<th>Specific Policy Responses</th>
</tr>
</thead>
</table>
| 10. Lack of private sector investment in agro-processing enterprises | • Enhanced linkages to the value chain would encourage farmers to make investments to improve productivity  
• Need for agro-processing industries to provide access to productivity-enhancing farm technology as part of the contractual arrangement with farmers (embedded services) | • Establish the private-sector–based Agribusiness Development Service Program, to service emerging micro and small agro-processing enterprises (lead firms) contracted with farmer cooperatives and provide employment in rural communities, especially for women  
• Provide loan guarantees to emerging enterprises in export-oriented diversified agriculture  
• Simplify and coordinate regulatory processes for agricultural value-chain participants |
| 11. Lack of appropriate standards for food safety and product quality | • Products that do not comply with quality standards cannot access export markets and therefore have lower prices and low margins | • Develop Cambodia GAP, SPS, and organic standards consistent with ASEAN GAP and ASEAN Regional Organic Standard  
• Support value chain participants in compliance |
| 12. Limited export promotion programs and lack of national branding | • National export promotion is needed to increase the productivity of the marketing component of agricultural value chains | • Increase resources of the Ministry of Commerce Trade Promotion Department, to develop wider ASEAN and global market opportunities for Cambodia-branded agricultural products |
| 13. Unsustainable agricultural and natural resource management practices and climate change | • Reduced soil fertility, siltation of reservoirs, and loss of natural enemies of crop pests are reducing productivity | • Enforce existing legal requirements for environmental and social impact assessments on all agricultural investment projects  
• Promote sustainable and climate-resilient (green) agricultural systems and practices |

ASEAN = Association of Southeast Asian Nations, GAP = Good Agricultural Practice, R&D = research and development, SPS = sanitary and phytosanitary standards.  
Source: Authors.
Conclusions

Framework for the Way Forward

Special support for agro-industry. Development of Cambodian agro-industry is a key issue, linked to diversification, rural employment, development of export markets, and other dimensions of the agriculture sector. Focused support is required along the lines of the Rice Policy, including trade facilitation, tax incentives, cheaper access to credit for operating capital, and sustained political endorsement.

Diversification. Diversification of production requires feasibility reports and assessment of location-specific capability and market potential, as well as development of input regimes and management practices designed to be environmentally friendly. Although many crops with value-adding potential are already known in Cambodia, areas are small, cultivation and management history is short, and agronomic and economic information is largely absent. Access to markets will depend on the design of specialized branding and product development, consistent with the demand of urban consumers. A Cambodian national “clean and green” branding framework could be created.

Possibilities in the rice subsector include high-value varieties (aromatic, glutinous, and organic varieties). Non-rice crops with potential include fruit and vegetables, flowers, bamboo, pulses, tree crops in upland areas, and specialty livestock and aquaculture. For example, rice-field eel (*monopterus albus*) cultivation is now being profitably undertaken by farmers in several provinces, with low-cost infrastructure and feed requirements (earthworms). Eels can be transported live to distant markets, and are a very high-value product in many parts of Asia.

Green growth and sustainable agriculture. Enhancing agriculture sector productivity primarily requires measures to make on-farm practices more efficient, based on the better use of natural resources (i.e., soils and water) and the non-exploitation of ecologically sensitive areas. A green economy is able to achieve economic objectives and increases in human welfare, with minimal detrimental effects on the environment, and management and use of natural resources. The green growth initiative in Cambodia is supported by the Republic of Korea and is centered at the Ministry of Environment. There is a need to strengthen this initiative and to coordinate more effectively with the relevant work of other agencies.

Effective mitigation of the many threats to sustained and improved productivity in Cambodian agriculture requires change to key elements
of the approach and strategy to take account of environmental services that are currently not accounted for, and which promote the health of farmers and rural communities. The changes require something of a paradigm shift from the Green Revolution approaches, which now appear to have reached their limits, to a “greening” of the Green Revolution. This approach is laid out effectively in the Food and Agriculture Organization’s (FAO) Save and Grow report (2011), which provides an overview of technical aspects and policy recommendations for such a shift to become sustainable.

The recommendations given above remain valid under a sustainable agriculture approach. For example, diversification of production and development of agribusinesses within robust value chains, and improved seeds and appropriately targeted agricultural research remain high priorities. In the case of the rice subsector and given the rice balance numbers, the Government of Cambodia’s initial targets for milled rice exports can in principle be met without any increase in paddy production, as the key point of intervention is the agribusiness sector, especially investment in infrastructure for drying and storage, to position Cambodian millers to handle the seasonal availability of paddy. An initial focus on this aspect can provide some lead time for the adaptation of more eco-friendly and sustainable approaches to increasing productivity in rice in the Cambodian context, which could mitigate the damage to inland fisheries as a result of the conventional approach to increased rice production.

**Organic agriculture.** Many nongovernment organizations and some government agencies are promoting organic agriculture approaches in Cambodia. The Cambodian Organic Agriculture Association is a civil society and private sector body that has introduced organic standards for the Cambodian market, and is working with the Ministry of Agriculture, Forests and Fisheries to enable Cambodia to adopt the new Asian Regional Organic Standard. It encourages and supports farmers to improve their livelihoods through the production of high-value organic products that are top quality, healthy, and more marketable and competitive in international markets. Cambodia now has a significant production of organic vegetables and rice. Promisingly, women comprise about 20% of the management personnel of the producers’ associations that coordinate and market this organic production.

**Existing Policy on Productivity Enhancement through Diversified and Green Agriculture**

Within the Rectangular Strategy are several references to sustainable management of natural resources to maintain agricultural productivity,
and an explicit directive for implementation of the National Strategic Plan on Green Development 2013–2030, which makes direct if general provisions for increasing and sustaining agricultural productivity through green approaches (Government of Cambodia 2013b).

The Rice Policy represents the first phase of a larger policy initiative to diversify Cambodian agricultural production and export. It views milled rice export promotion as a major first step in increasing exports of a range of other agricultural products, such as rubber. The Rice Policy states that the government intends to create similar support programs for additional commodities, e.g., rubber, cashew nuts, fruit and vegetables, flowers, and others.

**Strategic Policy Measures**

Growing numbers of urban consumers in Asia are demanding and can pay premium prices for green and safe food. This creates a win–win opportunity to use resource-conserving, safe, green, and organic approaches to diversifying agriculture, and to creating commercial demand-pull for improvements in the agricultural business environment to encourage investment and enhance productivity along agricultural value chains.

The primary recommendation is therefore that the next iteration of special policy for Cambodian agriculture should not be commodity based, but rather should address the opportunities and challenges presented by green agriculture, as a leading component of the overall agricultural strategy, as was done with the Rice Policy. Green agriculture offers a short-term quick win opportunity for using access to high-end urban niche markets to enable Cambodian agro-enterprises to compete regionally and globally. Initial successes will, as the Rectangular Strategy suggests, send a strong political message that will encourage and pave the way for increased exports of other agricultural crops. They will also contribute to the growing consensus on, and practice of green growth as a sustainable path for enhanced productivity of Cambodian agriculture.

Implemented strategically, green agriculture and agro-processing approaches offer an initial entry point for using a market opportunity to show that the challenges facing agricultural productivity in Cambodia can be overcome. Policy and program measures that support green agriculture in the context of high export demand for safe and green products provide a demand-pull opportunity to promote change in the sector as a whole.

Green agriculture approaches will not change Cambodian agricultural productivity overnight. They do offer a focused opportunity
to use a large, emerging, and high-priced market as a lever in the following ways:

- to increase diversification and commercialization of production (greater margins per unit land and labor);
- to develop rural enterprises producing high value-added products and providing farmer-to-market linkages;
- to increase employment, especially for women, and reduce poverty in rural areas; and
- to empower the use of resource-enhancing and sustainable technologies for improving sector productivity.

The following green agriculture policy and program measures for Cambodia provide a context for the specific responses to the constraints faced by the agriculture sector.

i. Develop and implement the National Policy on the Promotion of Diversified Agricultural Production and Green Products Export, similar to the Policy on the Promotion of Paddy Production and Rice Export (the Rice Policy), providing special support measures for green agriculture investments, and mandating inter-ministerial policy and program coordination mechanisms.

ii. Establish and support a green agriculture policy analysis function within the Department of Planning and Statistics at the Ministry of Agriculture, Forests and Fisheries, linked to the existing policy and planning mechanism in the ministry. The agenda should include opportunities and constraints for diversification; market research for green products; design of programs to support green agriculture and baskets of technology for its implementation and analysis of the roles, constraints, and opportunities for green agriculture in the Cambodian rural development context (FAO 2011; Montpellier Panel 2013).

iii. Reinforce the research program of the Cambodian Agriculture Research Institute (CARDI) to include a major focus on diversification, farming systems, and technology packages for green agriculture.

iv. Establish green agriculture programs in Cambodia’s three leading agricultural education institutions, and provide merit-based scholarships for students and research funds for relevant studies.

The development of a national green agriculture policy will create the specific framework required to take early advantage of market-driven opportunities for sustainable rural economic growth in Cambodia, and
to expedite appropriate responses to the many challenges to Cambodian agricultural productivity. The apparent possibility of starting this in cooperation with subregional partners and within the ASEAN framework is particularly attractive.

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3. Agricultural Productivity in the Lao People’s Democratic Republic

Linkham Douangsavanh, Phouang Parisak Pravongviengkham, and Souklaty Sysaneth

Introduction

Most developing countries depend on raw material production. The Lao People’s Democratic Republic (Lao PDR) considers the agriculture sector to be one of the most important sectors for economic development and poverty reduction. Agriculture plays an important role since both the quantity and productivity of important agricultural products, such as crop products (rice, coffee, maize, sugarcane, and other vegetable crops), livestock products (buffalo, cattle, swine, goats, and poultry), and agro-processing products (tobacco, polished rice, processed meat, cassava flour, sugar, noodles, baked goods, and coffee), have been gradually increasing.

Domestic market demand for such agricultural products, as well as international market demand for selected agricultural products, such as organic products, has also been dramatically increasing. Regional integration and globalization through the reduction of trade barriers have enhanced agricultural development in the country for both domestic and export markets. The country has also been developing and improving favorable institutional frameworks to facilitate foreign direct investment (FDI) to speed agricultural investment and promote
The agriculture sector, however, still faces many problems and challenges that need to be addressed by the government. Low agricultural production quality and efficiency are still major hurdles that are preventing the country from being competitive with neighboring countries. The problems have emerged because of many factors, including degradation and limitations of natural resources (land), limitation of access to inputs, production, processing, markets, and technical knowledge, and areas of inefficient infrastructure and support.

In order to overcome the challenges, the Government of the Lao PDR should consider an agenda to improve institutional frameworks such as policies, rules, and regulations related to agriculture and agro-processing products; enhance agricultural productivity and facilities; initiate agricultural and environmental risk and vulnerability management; connect to markets; and ensure social and environmental sustainability.

The International Monetary Fund’s (2012) *World Economic Outlook* indicates that the Lao PDR is one of the 20 fastest growing economies in the world. The country has been significantly changing over the last decade. This is represented by high economic growth rates, low inflation rates, a reduced proportion of people living in poverty, increased growth in the agricultural and forestry sectors, rapid growth in the non-agriculture sectors (i.e., manufacturing, tourism, energy, and mining), expansion of services, governance reforms, and pro-poor development programs (Ministry of Planning and Investment 2010). There has been steady progress in the areas of poverty, child and infant mortality, HIV prevalence, malaria, tuberculosis, and key education indicators (Ministry of Planning and Investment 2010).

The government considers commercial production to be one of the factors for enabling the country to achieve its targets for the 5-year 7th National Socio-Economic Development Plan and address the seriously off-track Millennium Development Goal (MDG) on hunger reduction. It recognizes that the promotion of commercial production is integral for hunger and poverty reduction efforts, and that improved household food security can be achieved through better economic conditions. Since more than 80% of the total population is still living in rural areas and engaging in agricultural production, the government has strongly promoted commercial agricultural production throughout the country by issuing different policies to enhance both public and private investment in agriculture and forestry.

The National Growth and Poverty Eradication Strategy (NGPES) has identified national programs, which are to be intensified over time.
in the 72 poorest districts and put into practice through community-driven development planning. Enhancing local development through active people participation at the grassroots level is a major component of the government’s national development goal of hunger and poverty eradication. A major objective of the government is to reduce systematically the number of poor districts through priority investments in the identified poor districts over the 5-year period of the sectoral socio-economic development plan.

Agriculture is fundamental for the country’s economy and increasing agricultural production will lead to poverty reduction. However, recently, globalization has affected agricultural production in the country and there are other emerging challenges for agricultural development in the Lao PDR.

**Importance of Agriculture for the Lao PDR Economy**

Generally, developing countries depend heavily on the agriculture sector for country development, while most developed countries depend mainly on the manufacturing and industry sectors. The Lao PDR is classified as a developing country and the agriculture sector contributes significantly to the economy. Agriculture contributes to the country’s gross domestic product (GDP) growth rate, which is a fundamental tool for fighting poverty in order to achieve the National Socio-Economic Development Plan (NSEDP) as well as the MDGs. Therefore, the Government of the Lao PDR has promoted investment in this sector from both domestic and international investors. The economy has showed strong growth in recent years, with real GDP growth increasing from 7.5% in 2008 to 8.2% in 2012, and there have been growth opportunities in non-resource sectors, including manufacturing, agricultural production, industrial forestry plantation, and agro and non-food processing industries, among others (International Monetary Fund 2012).

The NSEDP aims to move out of the least developed country status by 2020, and concentrates on the agriculture and forestry sector to contribute to the declining poverty trend. The agenda of the NSEDP has been also adapted to the MDGs. The specific agenda in the agriculture and forestry sector contributes directly to MDG 1 of eradicating extreme poverty and hunger. The impact of the agenda, such as the availability of high-quality and sufficient quantities of food and environmentally-friendly agricultural production systems also supports MDGs 4, 5, and 7 to reduce child mortality, achieve environmental sustainability, and improve maternal health.
In order to achieve the NGPEs, NSEDP, and MDGs, the Lao PDR has been gradually promoting investment in the agriculture sector. Investment in the sector has been progressing significantly since 2009 after recovering from the Asian financial crisis. The total value of public investment in agriculture increased from KN220.1 billion in 2009 to KN546.3 billion in 2012, with international investment significantly contributing to the increase (Figure 3.1).

**Figure 3.1: Public Investment in the Agriculture Sector in the Lao PDR, 2005–2012**

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic</th>
<th>International</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005/06</td>
<td>100</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>2006/07</td>
<td>90</td>
<td>450</td>
<td>540</td>
</tr>
<tr>
<td>2007/08</td>
<td>80</td>
<td>480</td>
<td>560</td>
</tr>
<tr>
<td>2008/09</td>
<td>70</td>
<td>500</td>
<td>570</td>
</tr>
<tr>
<td>2009/10</td>
<td>60</td>
<td>550</td>
<td>610</td>
</tr>
<tr>
<td>2010/11</td>
<td>50</td>
<td>600</td>
<td>650</td>
</tr>
<tr>
<td>2011/12</td>
<td>40</td>
<td>700</td>
<td>740</td>
</tr>
</tbody>
</table>

Lao PDR = Lao People’s Democratic Republic.
Source: Lao PDR Statistics Bureau (2012).

The production system is in transition to a commercial production system. Rice is the main staple food of the people in the Lao PDR. It is currently sufficient in domestic production, so imports of rice from neighboring countries have been decreasing. Other potential commercial agricultural products are also increasing in both production area and productivity such as coffee, cassava, maize, sugarcane, tea, and rubber. In order to increase value added to these products, manufacturing and processing industries, which mainly produce for the export market, are also being established. The processing and manufacturing industries recruit a number of employees in local areas, which contributes to employment opportunities and development in rural areas in terms of infrastructure and facilities such as roads and market access.
Some agricultural products produced in the Lao PDR are well known and recognized worldwide. The most famous product is the country’s coffee, which benefits from a special environmental and organic production system. In 2012, the production of coffee equaled around 25,000 t, of which, 18,000 t were exported at a value of approximately $60 million. Over the past 10 years, coffee production capacity and facilities for export have been strengthening with the support of donor agencies, such as the Asian Development Bank and Oxfam (Oxfam 2010), through the provision of technical assistance, capital, and tools to process coffee cherries to smallholder farmers. The main importers of Lao PDR coffee are Taipei, China; Italy; Japan; Spain; Poland; Germany; the United States; France; Belgium; Thailand; and Viet Nam. Stakeholders are keen to take advantage of the growing market for organic products and there are now several initiatives to attain fair trade certification and create partnerships with international buyers. The government is also working to increase competitiveness in international markets by meeting international standards and phytosanitary measures, such as the requirements stipulated by the World Trade Organization.

Other major exports include maize, which brought in income of $55 million in 2012, cassava, tea, bananas, soybeans, sugar, and sesame. Import revenue from these products is working to increase socio-economic development and living standards in rural areas.

Agricultural Productivity and Trade: Patterns and Performance

Crop Production Patterns and Performance

Agriculture in the Lao PDR is largely subsistence based. Producers are mostly rice-producing smallholders, and farmer organizations and groups are still uncommon. Market access in rural areas is also severely limited and this has placed constraints on agricultural production.

At the national level, however, positive trends can be seen in the production volumes and yields of many crops. Nevertheless, the production areas of most crops are remaining constant or declining. Rice is the staple food crop and production is currently sufficient for domestic consumption. During the last 5 years, annual average rice production was 2.9 million tons (t), which accounted for 450–470 kilograms (kg) per person per year. Less than 10% of rice produced is marketed, with the rest being consumed by the producers themselves. The rice cultivation area is gradually declining, and decreased from 872,896 hectares (ha) to
817,250 ha during 2009–2011, caused by urbanization and development. However, the decline in cultivated area had no major impact on total rice production, which remained at approximately 3.0 million t per year, since new and modern production techniques had raised productivity per unit area from 3.60 t/ha in 2008 to 3.75 t/ha in 2011.

Coffee production, which is the most important agricultural export commodity, is in a similar situation as rice production. Coffee plantation area has also declined, from 57,545 ha in 2008 to 38,545 ha in 2011. There are several possible causes, such as low-incentive coffee prices and land-use changes to other alternative forms of agricultural production, such as rubber plantation. Production, however, gradually increased from 31,065 t in 2008 to 52,010 t in 2011, while productivity increased from 0.54 t/ha to 1.35 t/ha in the same period.

At the national level, maize production grew most rapidly during 2005–2008. The production area increased during the period from 86,000 ha to 229,220 ha, while total production also increased from 372,560 t to 1,107,775 t. After 2008, however, both production area and total production remained at around 212,105 ha and 1.1 million t.

One of the fastest growing agricultural commodities has been sugarcane. The general trend has been significantly positive since 2005. The production area increased from 5,500 ha in 2005 to 24,765 ha in 2011, and total production rose from 196,100 t to 1,222,000 t during the period. Production efficiency also improved from 35.65 t/ha to 50.00 t/ha.

Vegetable crops are also important for domestic consumption. Production area has slightly increased since 2009 and productivity has also significantly improved. The production area for vegetable crops increased from 81,305 ha in 2008 to 130,640 in 2011 ha and total production rose from 521,495 t to 1,225,370 t during the same period. Productivity also dramatically improved from 6.42 t/ha to 9.38 t/ha.

**Livestock and Fish Production Trend**

Livestock production in the Lao PDR is also prospering. Total livestock products have been increasing, from 24.19 million heads in 2005 to 32.67 million heads in 2011, a 47.7% increase (Lao PDR Statistics Bureau 2012). The highest increasing rate has been for goat production, by almost 1.3 times, while swine and poultry production rank the second and third highest rates at 45.05% and 35.60%, respectively. Cattle and buffalo production has also increased by 20.91% and 9.12%, respectively. The largest livestock production is poultry, which was more than 26.85 million heads in 2011, while goat production is the lowest (433,000 heads in 2011). During 2009–2011, swine production in the country fell by 10%. The details are illustrated in Table 3.1.
Fish production in the Lao PDR has also gradually been increasing. During 2009–2011, fish production in the country increased from 74,200 t to 95,600 t, an increase of almost 29% (Figure 3.2).

Table 3.1: Livestock Production Trend in the Lao PDR ('000)

<table>
<thead>
<tr>
<th>Livestock</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalo</td>
<td>1,097</td>
<td>1,108</td>
<td>1,123</td>
<td>1,155</td>
<td>1,178</td>
<td>1,183</td>
<td>1,197</td>
</tr>
<tr>
<td>Cattle</td>
<td>1,272</td>
<td>1,321</td>
<td>1,353</td>
<td>1,499</td>
<td>1,426</td>
<td>1,474</td>
<td>1,538</td>
</tr>
<tr>
<td>Swine</td>
<td>1,827</td>
<td>2,033</td>
<td>2,186</td>
<td>2,548</td>
<td>2,947</td>
<td>2,753</td>
<td>2,650</td>
</tr>
<tr>
<td>Goat</td>
<td>190</td>
<td>210</td>
<td>268</td>
<td>289</td>
<td>339</td>
<td>366</td>
<td>433</td>
</tr>
<tr>
<td>Poultry</td>
<td>19,802</td>
<td>20,803</td>
<td>20,453</td>
<td>21,983</td>
<td>22,521</td>
<td>24,079</td>
<td>26,852</td>
</tr>
<tr>
<td>Total</td>
<td>24,188</td>
<td>25,475</td>
<td>25,383</td>
<td>27,474</td>
<td>28,411</td>
<td>29,855</td>
<td>32,670</td>
</tr>
</tbody>
</table>

Lao PDR = Lao People’s Democratic Republic.
Source: Lao PDR Statistics Bureau (2012).

Figure 3.2: Fish Production Trend in the Lao PDR (tons)

Lao PDR = Lao People’s Democratic Republic.
Wood Processing Trend

Domestic wood processing is one of the major promotion policies of the government in reducing timber imports. There are several wood processing products in the country, including lumber, plywood, floor lumber, wood furniture, and rattan furniture. All of them have been gradually increasing, as shown in Table 3.2.

<table>
<thead>
<tr>
<th>Wood Product</th>
<th>Unit</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumber</td>
<td>'000 cubic meters</td>
<td>125</td>
<td>158</td>
<td>148</td>
<td>150</td>
<td>151</td>
<td>170</td>
<td>183</td>
</tr>
<tr>
<td>Plywood</td>
<td>'000 sheets</td>
<td>1,320</td>
<td>765</td>
<td>952</td>
<td>996</td>
<td>1,009</td>
<td>3,645</td>
<td>3,801</td>
</tr>
<tr>
<td>Floor lumber</td>
<td>'000 square meters</td>
<td>210</td>
<td>925</td>
<td>915</td>
<td>966</td>
<td>1,034</td>
<td>2,599</td>
<td>2,677</td>
</tr>
<tr>
<td>Wood furniture</td>
<td>KN million</td>
<td>…</td>
<td>…</td>
<td>…</td>
<td>…</td>
<td>20,195</td>
<td>35,450</td>
<td>38,286</td>
</tr>
<tr>
<td>Rattan</td>
<td>KN million</td>
<td>500</td>
<td>…</td>
<td>18,791</td>
<td>20,150</td>
<td>2,013</td>
<td>5,435</td>
<td>5,815</td>
</tr>
</tbody>
</table>

... = not available, Lao PDR = Lao People’s Democratic Republic.
Source: Lao PDR Statistics Bureau (2012).

Patterns of Consumption and Agro-Processing

In general, domestic agricultural consumption has been gradually increasing since 2005 (Lao PDR Statistics Bureau 2012). However, the price of agricultural products has been fluctuating. For example, the price of rice changed from 4,000 KN/kg during the early 2000s to 8,000 KN/kg during the late 2000s (Eliste, Santos, and Pravongviengkham 2012).

Beside the positive improvement trends in agricultural production, the processing and manufacturing industries using agricultural products have also significantly increased. These processing industries have increased value added to the input agricultural products and provided job opportunities in the country.

The most important agro-processing industry is tobacco, which has doubled in production volume from 3.1 million t in 2005 to 6.4 million t in 2011. Polished rice has taken second place in the production volume
and increased from 579,070 t in 2007 to 880,640 t in 2011, an increase of 52%. There are also other growing agro-processing industries such as cassava flour, sugar, noodles, baked goods, and coffee. However, it is interesting that animal-feed production has significantly declined since 2008 when it was 77,500 t to 13,800 t in 2011, because of the increasing export of raw materials with competitive prices, e.g., maize (Table 3.3).

### Table 3.3: Agro-Processing Trend in the Lao PDR

<table>
<thead>
<tr>
<th>Product</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobacco</td>
<td>3,080.00</td>
<td>3,836.30</td>
<td>3,991.00</td>
<td>4,737.50</td>
<td>5,063.00</td>
<td>5,908.30</td>
<td>6,381.00</td>
</tr>
<tr>
<td>Polished rice</td>
<td>…</td>
<td>…</td>
<td>579.07</td>
<td>616.00</td>
<td>638.75</td>
<td>815.40</td>
<td>880.64</td>
</tr>
<tr>
<td>Processed meat</td>
<td>6.20</td>
<td>10.43</td>
<td>11.24</td>
<td>12.63</td>
<td>12.91</td>
<td>39.92</td>
<td>43.11</td>
</tr>
<tr>
<td>Cassava flour</td>
<td>…</td>
<td>…</td>
<td>…</td>
<td>7.68</td>
<td>10.28</td>
<td>27.18</td>
<td>28.54</td>
</tr>
<tr>
<td>Animal feed</td>
<td>12.00</td>
<td>13.50</td>
<td>58.50</td>
<td>77.50</td>
<td>75.00</td>
<td>12.80</td>
<td>13.80</td>
</tr>
<tr>
<td>Sugar</td>
<td>…</td>
<td>…</td>
<td>1.20</td>
<td>1.61</td>
<td>3.03</td>
<td>8.47</td>
<td>9.11</td>
</tr>
<tr>
<td>Noodles</td>
<td>0.80</td>
<td>2.40</td>
<td>2.45</td>
<td>2.63</td>
<td>2.91</td>
<td>6.67</td>
<td>7.20</td>
</tr>
<tr>
<td>Baked goods</td>
<td>1.50</td>
<td>2.52</td>
<td>2.72</td>
<td>3.01</td>
<td>3.41</td>
<td>5.21</td>
<td>5.61</td>
</tr>
<tr>
<td>Coffee</td>
<td>0.25</td>
<td>0.52</td>
<td>0.47</td>
<td>0.52</td>
<td>0.54</td>
<td>0.61</td>
<td>0.66</td>
</tr>
</tbody>
</table>

… = not available, Lao PDR = Lao People's Democratic Republic.
Source: Lao PDR Statistics Bureau (2012).

### Agricultural Trade Patterns and Performance

The common import and export agriculture-related products are different crop products, agro-processing products, live animal and animal products, and oil (including animal and vegetable oil) and waxes. The total import values of these products fluctuated in different periods. After the global financial crisis, the country dramatically increased imports of agricultural and agro-processing products, from $58.4 million in 2007 to $253.3 million in 2008. After the country recovered, the import value of these products dropped to $195.6 million. The highest import products were agro-processing products, followed by crop and animal products, respectively. On the other hand, the Lao PDR also exported these agricultural and agro-processing products. Export values increased significantly, from $50.5 million in 2007 to $468.4 million in 2010. The most important export products are different crop products followed by agro-processing products and animal products, respectively (Table 3.4).
Agricultural Productivity in the Lao People’s Democratic Republic

Table 3.4: Import and Export Value of Agricultural and Agro-Processing Products in the Lao PDR ($’000)

<table>
<thead>
<tr>
<th>Product</th>
<th>Imports</th>
<th></th>
<th></th>
<th>Exports</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop products</td>
<td>16,903</td>
<td>45,091</td>
<td>38,828</td>
<td>47,235</td>
<td>66,085</td>
<td>416,568</td>
</tr>
<tr>
<td>Agro-processing products</td>
<td>30,253</td>
<td>183,355</td>
<td>130,140</td>
<td>3,118</td>
<td>4,542</td>
<td>50,291</td>
</tr>
<tr>
<td>Animals and animal products</td>
<td>9,456</td>
<td>20,862</td>
<td>23,005</td>
<td>162</td>
<td>2,166</td>
<td>1,479</td>
</tr>
<tr>
<td>Oil and waxes</td>
<td>1,792</td>
<td>3,958</td>
<td>3,589</td>
<td>10</td>
<td>5</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td>58,404</td>
<td>253,266</td>
<td>195,562</td>
<td>50,525</td>
<td>72,798</td>
<td>468,393</td>
</tr>
</tbody>
</table>

Lao PDR = Lao People’s Democratic Republic.
Source: Lao PDR Statistics Bureau (2012).

Economic Reform Pattern

Agriculture and natural resources sectors have undergone significant reforms over the past 2 decades. The reform started with the introduction of the New Economic Mechanism in 1986. The period 1990–1994 saw progress in economic management and stabilization with the adoption of a new constitution in 1991. The exchange rate was relatively stable and there were increases in inflows of FDI.

By the late 1990s, political will for reform weakened and the Asian financial crisis caused foreign exchange losses and financing problems in the country. In the early 2000s, however, the 5-year recovery plan was put into place, which led to increased regional integration, and improvements in economic growth and poverty reduction.

Emerging Challenges for Agricultural Productivity in the Lao PDR

SWOT Analysis

The Lao PDR’s agriculture sector has been progressively improving. However, it still faces many challenges that are influenced by different internal and external factors. These factors generate strengths, weaknesses, opportunities, and threats to the Lao PDR agriculture sector as shown in Table 3.5.
Table 3.5: Strengths, Weaknesses, Opportunities, and Threats in the Lao PDR’s Agriculture Sector

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Large share of the population (about 80%) engaged in agricultural activities</td>
<td>• Small-scale production, mainly for home consumption</td>
</tr>
<tr>
<td>• Large and productive arable land with low population density</td>
<td>• Land limitations and degradation, both physical and chemical</td>
</tr>
<tr>
<td>• Low cost of intensive labor</td>
<td>• Some important production inputs such as seed varieties, animal breeds, and organic fertilizers not available or insufficient for domestic demand</td>
</tr>
<tr>
<td>• Low pollution levels and traditional farming practices that are mainly natural and close to organic farming with minimal use of agrochemicals</td>
<td>• Animal feed production in the country still insufficient for commercial requirements</td>
</tr>
<tr>
<td>• Emerging crop diversity</td>
<td>• Information concerning input use in agriculture still not accessible by some rural villagers</td>
</tr>
<tr>
<td>• Increasing production efficiency due to progressive automation</td>
<td>• Some farmers have limited access to relevant information to improve their knowledge and skills, making them slow to adapt to new innovations in productivity</td>
</tr>
<tr>
<td>• Emerging domestic markets (e.g., trade fairs and weekend markets)</td>
<td>• Production and marketing plans in many cases not available at the local village level</td>
</tr>
<tr>
<td>• Cost competitive compared to other countries</td>
<td>• Use of modern agriculture such as mechanization and technology not widespread</td>
</tr>
<tr>
<td>• Increased market prices of most agricultural products, which provide incentives for farmers</td>
<td>• High cost of inputs, such as machinery and production equipment, prevents small-scale farms from increasing their efficiency in production</td>
</tr>
<tr>
<td>• Initiation of farmers’ organizations such as farmer groups and associations</td>
<td>• Inadequate application of post-harvest technology, facilities, and logistics</td>
</tr>
<tr>
<td>• Various agricultural research stations in provinces</td>
<td>• Inadequate working capital and access to credit and other financial services for smallholders and farmer associations</td>
</tr>
<tr>
<td>• Agricultural production facilities such as irrigation systems and access roads being developed</td>
<td>• Low trade facilitation and inadequate export promotion of high-quality and high-value agricultural and agro-processing products (e.g., organic products)</td>
</tr>
<tr>
<td>• Continuous support, both financial and technical, from international organizations, development organizations, and nongovernment organizations as development partners</td>
<td>• Agricultural production safeguards, such as agriculture and climate insurance services not available</td>
</tr>
<tr>
<td>• Rules, regulations, decrees, and laws related to agriculture gradually being developed</td>
<td>• Public extension system in general still weak and insufficient</td>
</tr>
<tr>
<td>• Clear government policies for supporting investment in agricultural and environmentally friendly products</td>
<td>• Weak farmers’ organizations</td>
</tr>
<tr>
<td>• Minimum R&amp;D system to generate suitable technical production knowledge appropriate to local conditions</td>
<td>• Minimum R&amp;D system to generate suitable technical production knowledge appropriate to local conditions</td>
</tr>
<tr>
<td>• Limited number of input suppliers</td>
<td>• Limited number of input suppliers</td>
</tr>
</tbody>
</table>

continued on next page
Table 3.5  continued

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Low use of chemicals and pesticides, which is a good opportunity for</td>
<td>• Increased production of industrial crops and urbanization will</td>
</tr>
<tr>
<td>producing organic products for niche markets</td>
<td>reduce land as well as labor for other farming activities</td>
</tr>
<tr>
<td>• Regional integration can increase cooperation in exchanging knowledge and</td>
<td>• Weather conditions and adverse effects of climate change like drought</td>
</tr>
<tr>
<td>products</td>
<td>or flooding are threats to agricultural production</td>
</tr>
<tr>
<td>• Changing the country from a “land-lock” to “land-link” policy through</td>
<td>• Low competitiveness</td>
</tr>
<tr>
<td>development of regional linkages such as road and bridges to provide</td>
<td>• Limited proper quarantine checks for agricultural production across</td>
</tr>
<tr>
<td>more opportunities for agricultural exports</td>
<td>borders (illegal border trade), which can lead to outbreaks of</td>
</tr>
<tr>
<td>• Increased public–private partnerships for increasing value added of</td>
<td>pests and diseases</td>
</tr>
<tr>
<td>agricultural production for export</td>
<td>• Weak regulatory mechanism and certification of agricultural products</td>
</tr>
<tr>
<td>• Develop agro- and eco-tourism</td>
<td>for export</td>
</tr>
<tr>
<td>• Foreign direct investment policy to attract more foreign investment</td>
<td>• High competition in international markets</td>
</tr>
<tr>
<td>• Increasing demand of agricultural products, especially for organic</td>
<td></td>
</tr>
<tr>
<td>agricultural products in eurozone countries, the United States, Japan,</td>
<td></td>
</tr>
<tr>
<td>ASEAN, and PRC markets</td>
<td></td>
</tr>
<tr>
<td>• Membership of WTO and the ASEAN Economic Community increases the</td>
<td></td>
</tr>
<tr>
<td>country’s recognition and brands in the region and worldwide</td>
<td></td>
</tr>
</tbody>
</table>

ASEAN = Association of Southeast Asian Nations, PRC = People’s Republic of China, R&D = research and development, WTO = World Trade Organization.
Source: Authors.

Overcoming the Challenges: Options for Enhancing Agricultural Productivity

In order to overcome the challenges facing the agriculture sector, the Government of the Lao PDR should work to improve and publicize institutional frameworks, such as the policies, rules, and regulations related to agriculture and agro-processing products. It must also work to enhance agricultural productivity, initiate agricultural and environmental risk assessment and vulnerability management, connect to markets, and ensure social and environmental sustainability.

Policy, Bureaucracy, and Legal Framework

The vision of the agriculture sector is to ensure food security and achieve sustainable agricultural development and the production of
potential agricultural products to contribute to the national economic foundation in the direction of industrialization and modernization. Therefore, the government has set as the main target focus areas: food production and commercial agricultural production in both the short term and long term.

In order to achieve the target areas, two fundamental measures should be applied. The technical measures will include different specific implementation measures for each technical sector. Other general measures will also be considered to facilitate the implementation of the specific technical measures, for example, policy development, legislation, administrative coordination, human resource development, and bureaucratic and organizational development. Accordingly, perhaps as many as 15 programs and over 100 projects could be scheduled for implementation in the agriculture sector.

**Increasing Productivity**

Increasing agricultural productivity is important because it will allow those engaged in agricultural activities to achieve food security and increase their incomes and livelihoods. This needs to be done in a holistic manner, beyond simply increasing the yields. As part of the long-term plan, the National Agriculture and Forestry Extension Service (NAFES) needs to introduce enhanced varieties, quality seeds, and improved techniques, and accelerate the shift to mechanization, conservation, and competitiveness.

In order to achieve this, the role of NAFES needs to encompass the following objectives:

- Allowing farmers’ organizations to proliferate and evolve to be able to provide support to the wider agricultural community and facilitate links with markets and the private sector
- Supporting the education of farmers so they are best able to benefit from extension packages, by improving literacy and training
- Engaging with the private sector to find new and potential outlets for the country’s agricultural produce, and new forms of dissemination of new techniques and skills should also be explored
- Realizing the value from foreign direct investment and enabling positive spillovers from larger farms to smallholder producers, with the potential to further increase investment, practices, framework, and facilities
- Enhancing agricultural land inventory and land-use plan to avoid problems in land management
• Enhancing human resource development in agriculture and related fields to work in rural areas supporting agricultural value chains
• Enhancing research and development, and extensions of successful research

Addressing Risks and Vulnerabilities

Despite declining poverty, many farmers are still vulnerable in various ways. A key vulnerability is climate change, which poses a direct threat to the livelihoods of those who depend on the agriculture sector. Some of the threats farmers face include natural hazards (storms, drought, flooding, etc.), fluctuations in agricultural commodity prices, limited access to finance, and lack of land ownership.

Risk management is under the responsibility of the Ministry of Agriculture and Forestry, with the mandate of preventing damage from climate change and carrying out risk assessment to determine the scope for government intervention by region. Similarly, the ministry also works to ensure land rights for farmers and addresses issues relating to food security. It will also work to establish insurance programs and provides training for vulnerable farmers and support and assistance for farmer groups and associations. The ministry has the invaluable role of supporting the transition to commercialization, while ensuring diversity in farming systems with successful integration into value chains and technological advancement.

Connecting to Markets

In connecting the agriculture sector of the Lao PDR with regional and global markets, the Ministry of Agriculture and Forestry should concentrate on two areas: improving trade and business, and improving the ability of farmers to connect to markets.

Improving trade and business requires the implementation of an appropriate legal framework, successful integration into regional and global agreements to facilitate trade, and effective introduction of the World Trade Organization’s sanitary and phytosanitary agreements. Investment should be promoted and channeled into technological innovation and increasing levels of specialist knowledge.

Improving the ability of farmers to connect to markets is important as currently rural and smallholder farmers are not able to engage in commercialization due to constraints related to technical skills, finance, and bargaining power. This objective can be reached through the facilitation of independent farmers’ organizations, associations, and
groups. Such initiatives will be able to help farmers prepare for market connectivity by educating them on quality control and food and safety standards, helping them to work together with the private sector, and assisting them in commodity management and processing, among others. They will also assist agricultural producers in adding value to their products through “branding” as Lao PDR products, and also raise quality standards, thereby boosting the competitiveness of produce.

Ensuring Social, Economic, and Environmental Sustainability

The move to increasing commercialization does pose challenges to the environment and sustainability. Rapid mechanization and the use of fertilizers and pesticides, for example, can deplete natural resources, cause environmental imbalances, and be detrimental to health. Programs to boost agricultural productivity must ensure a long-term and sustainable path for development and not simply push for the short-term benefits. If this is to happen, cooperation must be achieved by all stakeholders along the value chain.

Forests are particularly at risk as many agricultural producers rely on forestry for significant shares of their livelihoods. The Ministry of Agriculture and Forestry must work to supervise and educate about sustainable management as part of its Forestry Strategy 2020. Similarly, other commodities must also be closely monitored and it is vital that new varieties, better seeds, technologies, and breeds are able to integrate successfully and with minimal disruption to the existing environment and communities.

Conclusions and Recommendations

The Lao PDR is classified as one of the fastest-growing economies in the world. The agriculture sector has an important role in the economy and contributes significantly to GDP and poverty reduction. Growth in the sector has been fueled by improvements in the supply and productivity of important agricultural products, such as crop products, livestock products, and agro-processing products. Domestic market demand for these products as well as international market demand for selected agricultural products, such as organic products, has also been increasing dramatically. Regional integration and globalization facilitated through reductions in trade barriers has enhanced agricultural development in both domestic and export markets. The Government of the Lao PDR has
also been developing and improving favorable institutional frameworks to facilitate FDI to speed agricultural value investment and promote agricultural production, processing, and marketing.

There are, however, significant challenges facing continued agricultural development. Low production quality and efficiency is still a major problem and one that threatens to become worse with increasing degradation and limitation of natural resources (primarily land); limitation of access to inputs, production, processing, markets, and technical knowledge; and poor and inefficient infrastructure and government and organizational support.

In order to overcome these and other challenges, the government should adopt a sector agenda for improving and publicizing institutional frameworks, such as policies, rules, and regulations related to agriculture and agro-processing products; enhancing agricultural productivity and facilities; initiating agricultural and environmental risks and vulnerability management; connecting to markets; and, at the same time, ensuring social and environmental sustainability.

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4. Agricultural Productivity in Myanmar

*Tin Maung Shwe and Richard Vokes*

**Introduction**

The agriculture sector in Myanmar has a key role to play in the improvement of rural livelihoods through increased farm incomes and employment generation. Opportunities for enhancing agricultural productivity in Myanmar lie in analyzing and identifying the major constraints and issues affecting the agriculture sector and instituting a development strategy for agriculture geared to enhancing productivity. Myanmar’s agriculture sector faces significant challenges due to the legacy of earlier state-led policies, but the development of effective policy support and measures are central for the achievement of inclusive growth.

The current government, which has been in power since 30 March 2011, has embarked on broad economic reforms that are expected to have far-reaching impacts on the agriculture sector. While it is too soon to judge the long-term success of the reform program, Myanmar has the benefit of being a “late starter” in terms of economic reform and will be able to draw on the lessons, both positive and negative, from the experience of other countries in Southeast Asia.

The following are the key policy elements and issues that need to be addressed:

- A development strategy with smallholder farms at its core
- Environmental sustainability and scope for a “green growth” strategy in Myanmar
- Developing Myanmar’s competitiveness
- Rebuilding research and extension systems
- Expanding rural finance
- Addressing farm land issues and ensuring security of tenure
- Expanding access to mechanization
- Fostering the growth of farmers’ organizations
- Strengthening value chains
- Building rural connectivity

Addressing these priorities will require a policy environment that enables the private sector to play a full part in complementing public sector investment and support. At the same time, the public sector will need to ensure effective regulation of the private sector as it comes to play a leading role in getting agriculture moving.

**Importance of Agriculture for Myanmar’s Economy**

**Economic Structure and Contribution of the Agriculture Sector**

Agriculture, including fisheries and forestry, easily accounts for the largest sector share of Myanmar’s gross domestic product (GDP), amounting to 36.4% of GDP in 2011 (Table 4.1). The share of agriculture in GDP has been declining in recent years, having accounted for an estimated 57% in 2000. Under the national 5-year plan between 2011 and 2016, the new government is seeking to move Myanmar toward becoming a more developed, industrialized economy. Under the plan, while the share of agriculture (agriculture, livestock, fishery and forestry) in GDP is targeted to fall from 36.4% to 29.2%, that of the industrial sector is targeted to increase from 26% to 32.1%, and that of the services and trade sector 37.8% to 38.7%. Even if these targets are achieved, agriculture will still retain a key position in the country’s economy. This is especially so since, as in Thailand, much of the potential growth in the industrial and manufacturing sectors is agro-based, while agricultural exports are expected to play an important role in the growth of trade.

Despite the decline in GDP share in recent years, the agriculture sector still accounts for by far the largest share of employment, equaling around 52% in 2010. With 69% of the total population living in rural areas, the majority of the population still depend directly and indirectly on agriculture for their primary livelihood and income. Agriculture thus has a vital role in promoting inclusive growth and poverty reduction and also clearly plays a key part in the country’s food security.
Table 4.1: Composition of Gross Domestic Product in Myanmar, 2011

<table>
<thead>
<tr>
<th>Sector</th>
<th>Share in GDP (MK million)</th>
<th>Share in GDP (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>11,159.50</td>
<td>27.55</td>
</tr>
<tr>
<td>Livestock and fishery</td>
<td>3,411.10</td>
<td>8.42</td>
</tr>
<tr>
<td>Forestry</td>
<td>158.40</td>
<td>0.39</td>
</tr>
<tr>
<td>Energy</td>
<td>65.80</td>
<td>0.16</td>
</tr>
<tr>
<td>Mines</td>
<td>301.20</td>
<td>0.74</td>
</tr>
<tr>
<td>Industry</td>
<td>7,905.20</td>
<td>19.41</td>
</tr>
<tr>
<td>Electricity</td>
<td>418.50</td>
<td>1.03</td>
</tr>
<tr>
<td>Construction</td>
<td>1,839.30</td>
<td>4.54</td>
</tr>
<tr>
<td>Services</td>
<td>7,211.00</td>
<td>17.90</td>
</tr>
<tr>
<td>Trade</td>
<td>8,037.80</td>
<td>19.86</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40,507.80</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
</table>

GDP = gross domestic product.
Source: Authors’ calculations.

Myanmar’s Development Agenda: The Role of Agricultural Development

Poverty alleviation and rural development are major priorities for the Government of Myanmar. In November 2011, the government announced the National Strategy on Poverty Alleviation and Rural Development. The strategy identified eight priority areas: agricultural production, livestock and fisheries, rural productivity and cottage industries, micro saving and credit enterprises, rural cooperative tasks, the rural socio-economy, rural renewable energy, and environmental conservation (Livelihoods and Food Security Trust Fund 2011).

In December 2012, the government further announced the Framework for Economic and Social Reforms (MNPED 2010). It highlighted 10 priority areas, including finance and revenue; relaxation of restrictions on trade and foreign investment; development of the private sector; the education and health sectors; food security; development of the agriculture sector; transparency in government; mobile phone and internet systems; and development of basic infrastructure.
Targets for the agriculture sector under its National Comprehensive Development Plan (NCDP) 2011–2031 (MOAI 2013) are laid down as follows:

i. Building an agriculture sector that can compete with other economies in the region

ii. Increasing technical and rural knowledge to meet the levels of neighboring economies

iii. Developing industrial productivity and social infrastructure in rural regions in line with other economies

In order to achieve these targets, the following short-term goals have been identified:

i. Boosting primary productivity in the agriculture sector

ii. Increasing productivity of rural, small and medium-sized agribusiness firms

iii. Encouraging foreign direct investment (FDI) in the agriculture sector for advancing levels of employment, marketing, technology, and investment

iv. Increasing access to domestic and export markets and facilitating market information infrastructure

v. Supporting pure research and applied research activities in the agriculture sector

To formulate the sectoral priorities, the Ministry of Agriculture and Irrigation (MOAI), Ministry of Livestock and Fisheries, and Ministry of Environment Conservation and Forestry have held meetings and workshops on the development of agriculture with the state and regional governments and stakeholders including farmers, traders, and millers. The resulting strategy for the crop sector formulated by the MOAI has the following key elements:

• Greater use of high-yielding and good-quality seeds
• A shift from conventional to mechanized agriculture
• Expansion in research and extension with a focus on sustainable development
• Renovation and maintenance of irrigation works
• Emphasis on high-quality production and improved marketing
• Protection of farmers’ rights and ensuring farmers get a fair price on their produce
• Freedom of choice for farmers in crop cultivation
• Support for rural development and poverty reduction activities through development of the agriculture sector
• Promotion of local and international investment in agriculture
• Amendment of existing agricultural laws and regulations in light of more recent economic reforms
A number of different actions and activities have been identified to implement each of the areas so as to achieve the objectives of the sector development program. While all of the elements are important, giving the farmers the freedom to choose which crop to grow and encouraging FDI are probably the most striking in light of the country’s earlier policies.

The plan is certainly comprehensive in its coverage. However, its focus on the use of advanced technology and improved seeds and inputs to boost productivity suggests a conventional “Green Revolution” approach, which may undermine other issues such as environmental protection and sustainability and farmer independence. Other more climate-friendly approaches, such as ecological intensification, including the System of Rice Intensification, which has already been introduced in some delta areas, also need to be considered. The strategy also neglects a number of important areas. These include rural credit, disaster mitigation and climate change adaptation needs, and biosafety and food safety.

Equally importantly, while the strategy does mention the need to support rural development and poverty reduction, there is as yet no explicit statement by the government that it plans to prioritize smallholder development for taking agricultural development forward. Myanmar’s agrarian structure is still dominated by small farmers. If growth is to be pro-poor and inclusive, then a strategy based on the small farmer is key.

An inclusive, pro-poor development strategy would also emphasize the promotion of small and medium-sized enterprises (SMEs). It is encouraging that the agriculture sector strategy under the NCDP does include an explicit objective to increase the productivity of rural agro-based SMEs. According to a study by the Ministry of Commerce, of an estimated 43,000 enterprises, some 70% are classed as small enterprises and a further 17% as medium-sized enterprises. The vast majority of agro and rural based enterprises fall into these categories. A Small and Medium Industrial Development Bank has been set up, although as yet its impact has been limited and most SMEs still face financial difficulties.

In February 2013, the Food and Agriculture Organization of the United Nations (FAO) and the Government of Myanmar jointly developed the Country Programming Framework (CPF) in consultation with all stakeholders. The CPF again highlights the importance of agriculture development for Myanmar. Under the CPF, seven priority outcomes have been considered for FAO assistance in Myanmar during 2012–2016: (i) increased agricultural production to enhance food security, (ii) improved food safety and quality, (iii) sustainable management of natural resources and the environment, (iv) land use and land
management, (v) human resource development and institutional capacity building, (vi) improvement of rural livelihoods, and (vii) preparedness for and mitigation of disasters and climate change. The CPF gives more direct emphasis on environmental and green growth issues than the earlier policy statements of the government. However, it does not explicitly identify support for smallholders as a priority.

Given the pace of Myanmar’s economic and political reforms and a desire to catch up with its more developed neighbors, it is not surprising that there has been a plethora of new policies and initiatives. However, there is a need now to bring a degree of coherence to the government’s development strategy and to identify priorities. It is hoped that the current work on a new NCDP will go a long way toward doing this.

**Potential for Investment in Agriculture**

Giving priority to smallholder development does not imply that there is no role for larger-scale commercial farming. Agribusiness plantation companies play an important role in crops such as rubber, palm oil, sugar, and tea in Southeast Asia. However, in all of these subsectors, smallholder production systems also exist, sometimes in competition with the larger companies or linked through out-grower schemes. Contract farming also provides a way of achieving economies of scale, while encouraging smallholder development in partnership with large-scale agribusinesses. Successful examples can be found in the region in poultry raising and horticulture, and more recently even in paddy. However, the prospects for agribusiness are greatest in the post-production and post-harvest areas: processing, marketing and branding, as well as the wider supply chain, providing farmers with access to the inputs they need, such as seeds, fertilizers, agro-chemicals, and also research and extension services. These are all areas where there is potential for increased private investment, both from domestic and foreign sources, that will contribute to increased production and productivity. The Myanmar Investment Summit in Yangon in July 2012 attracted a large number of foreign agribusiness companies interested in examining investment potential, particularly in post-production and supply chain activities.

Post-harvest losses, in terms of both quantity and quality, are high in Myanmar. Physical losses in harvest, such as threshing and drying, range from 5% to 10%, while a similar loss is recorded in storage, milling, and drying, bringing total post-harvest to as much as 20%. This level of loss reflects poor practices and old equipment, while quality losses further add to these physical losses. The lack of cold storage facilities is a particular problem for farmers producing fruit and vegetables and other
perishable items. Currently, Myanmar has only one specialized storage and packing company with cold room facilities. Some cool storage facilities have been set up by members of the Myanmar Fruit, Flower and Vegetable Producer and Exporter Association. However, these facilities meet only a very small part of the need, resulting in high losses for farmers. Hence, establishment of cold storage facilities is an important potential area for new investment. Since most agricultural exports are still exported in their unprocessed forms, there is also significant scope for investment in value-addition processes and manufacturing.

Agricultural Productivity and Trade: Patterns and Performance

Major Crop Patterns and Performance in the Past

Myanmar is a relatively large country with a considerable land frontier and relatively abundant water resources. The country has a number of different agro-ecological zones allowing for the production of a wide range of crops. Cropping systems and patterns vary according to agroclimatic conditions. In the delta region, paddy is the dominant crop, while in irrigated areas a paddy–paddy or paddy–pulses–paddy pattern dominates. In the dry zone areas and other upland rain-fed areas, mixed cropping or intercropping of pigeon pea with sesame, peanuts, or other pulses is the norm. In the mountainous and hilly regions, upland paddy, corn, millet, oilseeds, and pulses are grown. Shifting cultivation is still common in these areas. Fruit and vegetables are grown throughout Myanmar all year round with the varied climate allowing for the production of both tropical and temperate fruit and vegetables in the country’s different agro-ecological zones.

Both historically and at present, paddy has been the dominant crop in Myanmar. During the colonial period, increasing rice exports was a primary objective of the colonial government. By the end of the interwar years, the area planted for paddy had reached 12.52 million acres (5.06 million hectares) with a yield of 29–32 baskets/acre (1.64 t/ha) (Ohn Kyaw 2002). During that period, the increase in production was achieved mainly through an expansion in the cultivated area. With a population of just 16 million at that time, the country produced a large surplus. Rice exports reached 3 million tons (t), and the country was the world’s largest rice exporter, with Yangon one of the busiest ports in the region.

The Second World War caused significant damage to the country’s agricultural infrastructure and resulted in the loss of significant numbers
of cattle. For the 2 years immediately after independence in 1948, civil war also disrupted production (Tin Soe and Fisher 1990). By 1951–1952, the area under paddy was still only 9.45 million acres (3.6 million ha) with production and exports at 5.6 million t and 1.6 million t, respectively. Under the Pyi Daw Thar Development Plan of 1952–1953 and 1959–1960, the government hoped to regain the country’s place as the world’s largest rice exporter. However, by the end of the plan’s period, paddy area amounted to only 11.35 million acres (4.59 million ha), still lower than in the pre-war period. The paddy yield was also stagnant at around 1.6 t/ha, while exports amounted to 1.6 million t in 1961–1962.

The military coup of 1962 led to a dramatic shift in policies and economic structures. In 1964, the Revolutionary Council nationalized all lands within the sovereign territory of Myanmar. Farmers became tenants of the state with only tilling rights. Farmers from “planned areas” grew “planned crops” (primarily paddy) and were obliged to sell a compulsory quota to the state. Myanmar Agricultural Produce Trading (MAPT) was the sole state procurement agency and was also responsible for rice exports as well as distributing rice to government staff at subsidized prices. Even under such severely restricted conditions, farming, especially paddy growing, was still profitable because the cost of cultivation remained low. However, the area under paddy at 12.5 million acres (5 million ha) in 1988 remained similar to its immediate pre-war level, while the paddy yield was also only slightly higher at not more than 35 baskets/acre (1.8 t/ha) in 1962–1963 and 1974–1975 (Kyaw Myint 2002).

Subsequently, there was a marked improvement in agricultural growth, particularly in the paddy sector. This coincided with the period of the country’s second, third, and fourth four-year plans. At least in the case of paddy, this period of growth also reflected the impact of both favorable weather and the introduction of the Whole Township Rice Production Program in the second half of the Second Four Year Plan, which was gradually expanded to 82 townships (Mya Than 1990). After years of more or less stagnant production and yield, both began to increase during 1973–1974. Both paddy production and yield per hectare reached post-war peaks in 1973–1974 of 5.68 million t and 1.1 million t, respectively. They subsequently continued to grow, and by 1985–1986 stood at 9.45 million t and 1.82 t.

Economic reforms from 1988 removed many of the earlier restrictions imposed on farmers. While the state retained ownership of the land and a monopoly on rice exports, farmers in theory had free choice of what to grow. In practice, the government still effectively controlled the cropping pattern for key crops, namely rice, cotton, and sugar cane. Paddy was the crop subject to most controls as a designated
national crop, with economic, political, and social importance. However, while a compulsory quota accounting for 10%–12% of total produce was imposed on paddy farmers, the farmers were allowed to sell any remaining balance or surplus to the free market.

Even these partial reforms had a notable impact on production and rice yield and production increased during the 1990–2002 period. Much of the production increase came from the large increase in area of summer paddy from 1992 to 1993. Prior to this, all of the paddy area had been under only monsoon (rain-fed) paddy. However, average rice yields in 2001–2002 also reached 3.3 t/ha. While a substantial increase compared to the period before 1988, this was still low compared with the average rice yield of 4.0 t/ha in Indonesia and Viet Nam during the same period. The main constraints in rice production were noted to include (i) low official procurement price, (ii) low irrigation intensity, (iii) low fertilizer application to rice, and (iv) inadequate credit to farmers.

There was a further liberalization of rice policies in 2003. The compulsory quota for paddy was ended, although the government still controlled the cropping pattern for key crops. However, in another significant move, the government ended its monopoly on rice exports allowing private exports for the first time since 1963 (Htin Aung Shien 2013). Paddy production has grown significantly since, again due to the increase in area of summer paddy and yields (Table 4.2). By 2010/11, average paddy yield had reached 4.07 t/ha, although there was a small decline to 3.83 t/ha in 2011/12.

The liberalization of polices from 1988 had an even greater impact on non-paddy crops, particularly pulses and oilseeds. The sown area of exported pulses (black gram, green gram, and pigeon pea) grew rapidly by about 10% per annum over 1990–2000, from 1 million ha to 2.27 million ha, while production increased nearly fourfold, from 596,000 t to 2.26 million t during the same period. The area and yield of pulses has continued to grow steadily since then, helped also by price incentives for farmers. Despite their growth, yields have remained low at less than 1 t/ha as these crops are grown mostly under rain-fed conditions with generally poor seedling establishment and limited application of fertilizers and pesticides. Pulses and beans have become important to the rural economy of Myanmar, not only for their income-earning potential, but also because of their dietary contribution. The three pulse crops, green gram, black gram, and pigeon pea, also accounted for over 80% of the total export value for crops.

Edible oil is the second most important food item in the traditional diet of Myanmar, and palm oil is still imported to meet domestic demand. Oilseed crops were planted on nearly 3.5 million ha in 2011–2012, largely in the dry zone of central Myanmar. Sesame accounts for roughly 46%
of the area sown to oil crops, with a further 25% taken by groundnut and 16% by sunflower. Table 4.2 shows that the sown area of oil crops increased until 2009–2010, before declining slightly in subsequent years. While yields have increased since 2000–2001, the increase has been much less than in the case of pulses.

Table 4.2: Sown Area of Major Crops in Myanmar ('000 hectares)

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Paddy</td>
<td>3.08</td>
<td>3.38</td>
<td>3.75</td>
<td>4.03</td>
<td>4.06</td>
<td>4.07</td>
<td>3.83</td>
</tr>
<tr>
<td>Maize</td>
<td>1.70</td>
<td>1.73</td>
<td>2.87</td>
<td>3.39</td>
<td>3.43</td>
<td>3.54</td>
<td>3.61</td>
</tr>
<tr>
<td>Black gram</td>
<td>0.78</td>
<td>0.87</td>
<td>1.25</td>
<td>1.46</td>
<td>1.48</td>
<td>1.52</td>
<td>1.26</td>
</tr>
<tr>
<td>Green gram</td>
<td>0.74</td>
<td>0.74</td>
<td>1.00</td>
<td>1.19</td>
<td>1.24</td>
<td>1.26</td>
<td>1.22</td>
</tr>
<tr>
<td>Pigeon pea</td>
<td>0.60</td>
<td>0.90</td>
<td>1.14</td>
<td>1.27</td>
<td>1.25</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>Groundnut</td>
<td>1.15</td>
<td>1.25</td>
<td>1.42</td>
<td>1.55</td>
<td>1.57</td>
<td>1.59</td>
<td>1.58</td>
</tr>
<tr>
<td>Sesame</td>
<td>0.34</td>
<td>0.33</td>
<td>0.40</td>
<td>0.54</td>
<td>0.53</td>
<td>0.54</td>
<td>0.57</td>
</tr>
<tr>
<td>Sunflower</td>
<td>0.76</td>
<td>0.54</td>
<td>0.81</td>
<td>0.88</td>
<td>0.89</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td>Cotton</td>
<td>0.51</td>
<td>0.51</td>
<td>0.71</td>
<td>1.23</td>
<td>1.46</td>
<td>1.57</td>
<td>1.64</td>
</tr>
<tr>
<td>Sugarcane</td>
<td>51.17</td>
<td>44.38</td>
<td>55.72</td>
<td>61.20</td>
<td>61.61</td>
<td>62.64</td>
<td>63.22</td>
</tr>
<tr>
<td>Rubber</td>
<td>0.53</td>
<td>0.58</td>
<td>0.59</td>
<td>0.65</td>
<td>0.67</td>
<td>0.69</td>
<td>0.75</td>
</tr>
</tbody>
</table>

Sources: Government of the Union of Myanmar, Ministry of Agriculture and Irrigation (2012) and ADB (2014).

Among industrial crops, cotton, rubber, and sugarcane are the most significant with important links to agro-based industries. While the sown area of rubber has expanded significantly since the mid-1990s, that of cotton and sugarcane have remained largely stable, at least since 2000–2001. Only yields of cotton have increased noticeably since 2000–2001.

The import and distribution of agricultural inputs such as fertilizer was also liberalized to some extent. Under the earlier socialist regime, the import and local distribution of chemical fertilizers and pesticides, among others, had been monopolized by the Myanmar Agriculture Service (MAS) under the MOAI with the inputs, especially chemical fertilizers, sold to the cultivators below cost, with the government covering all the overhead costs. The subsidies were reduced and finally removed in 1993, and the private sector’s role in the distribution of fertilizer has been encouraged by removing various restrictions. While this helped to improve supply, it also resulted in growing
concerns among farmers over fertilizer quality due to the lack of enforcement of quality standards under the Fertilizer Law. At the same time, the lack of adequate credit and appropriate extension services remained a major constraint on farmers’ ability to use optimum levels of fertilizers.

**Current Reforms and Changing Institutional Structures**

Even before the most recent phase of economic and political reform began in 2011, further reforms in agriculture policy had been initiated. These affected the rice sector in particular. In 2009, the Myanmar Rice Industry Association (MRIA) was established with 44 rice specialization companies (RSCs) as members. The MRIA acts as a networking and coordinating mechanism between rice marketing entities and the government. The members of the MRIA share market information and can receive loans from the association. The RSCs were also granted export licenses, but had to agree to undertake contract farming as a condition (Htin Aung Shien 2013).

Until recently, the Myanmar Paddy Producers Association, Myanmar Rice Millers Association, Myanmar Rice and Paddy Traders Association, and the RSCs worked together under the supervision of the MRIA to ensure effective paddy and rice marketing for both the local and export markets. To further improve coordination among the different stakeholders, all of these associations have been integrated into the MRIA, which was subsequently renamed the Myanmar Rice Federation (MRF).

Under their contract farming arrangements, the MRIA and the RSCs are providing farm credit, inputs, and other services to farmers, an arrangement that is expected to increase productivity. Under these arrangements, a range of services and support, including loans at 2% per month to selected individuals, seasonal in-kind credit such as fertilizers and seeds, farm mechanization services, and support for rice market promotion, are offered to selected farmers. Paddy is procured by RSCs at the prevailing market price. Farmers who pay back their loans after selling their produce are entitled to receive loans in the following year. However, the area covered by these arrangements is only a very small proportion of the total rice growing areas.

From the 2012–2013 cropping season, the private sector, through the MRF and through its newly formed business arm, the Myanmar Agribusiness Public Corporation (MAPCO), is now responsible for managing the country’s rice stockpile with financial support from the government. This initiative was encouraged by the President of Myanmar. Under this arrangement, MAPCO’s stockpiling operations
are overseen by the National Rice Reserves Supervisory Committee under the Ministry of Commerce. The committee has 10 members, including the MRF, the Central Cooperative Association, and Myanmar Agricultural Produce Trading (a department under the Ministry of Commerce). The objectives of the stockpile policy include domestic price stabilization while maintaining a fair farm-gate price at harvest time and an emergency reserve. Initially, the stockpile is expected to be less than 100,000 t, although this will be adjusted as necessary. Although balancing the interests of consumers and producers can be difficult, thus far the system has worked well. While the export volume of rice in 2012–2013 significantly increased to 1.3 million t, the farm-gate price and domestic rice price have been reasonably stable throughout the season.

Under the guidance of the MRIA, paddy processing and rice marketing are undergoing significant change. This includes the upgrading of processing technologies (milling, drying, and storage) as well as the creation of a higher value-added supply chain link serving both the domestic and export market. Historically, Myanmar’s rice exports have been of a low quality. However, in part this is due to the poor quality of seeds used and the mixing of different varieties during processing. Improving the supply of good quality certified seed is expected to also have a significant impact on yields and has already been identified by the government as a priority area for policy and investment. To the extent that efficiency improvements and higher value-added are passed on to farmers in the form of higher prices, this would also impact productivity and production.

Production of paddy and other crops is also adversely affected by the quality of fertilizers, although the low rate of utilization of fertilizers is generally regarded as a more serious problem. However, this raises the question as to how far a rapid expansion in reliance on inorganic fertilizers is desirable. While food safety issues are particularly an issue with chemical pesticides and weedicides, excessive use of artificial fertilizers can also lead to problems. Alternative cultivation practices and/or the greater use of organic fertilizers are possible ways to address these issues.

Lack of seasonal credit is an important factor limiting input use, including farmers’ access to quality seeds and mechanization services. Overcoming the credit constraint is thus clearly another priority in seeking to enhance productivity. Although the provision of credit through the Myanmar Agricultural Development Bank (MADB) has increased significantly in the last year, supply is still well below demand, while contract farming programs providing credit are also limited. Hence, the majority of farmers still rely on high-cost informal sources of credit.
Key Factors Contributing to Productivity Growth

Quantitative analysis of the factors driving productivity growth in Myanmar is made difficult by the lack of reliable data and the fact that since 1962 there have been quite radical shifts in the macro and policy environment, some of which have had negative consequences for farmers. An example of this was the demonetization of MK25 currency notes in September 1987 along with the payment of agriculture tax in kind, which followed a radical move to liberalize the marketing of paddy, maize, and beans and pulses (Mya Than 1990). However, one early attempt at quantitative analysis was carried out by Mya Than in the late 1980s looking at the period from 1974/75 to 1985/86, which as noted above was one of the few periods of relatively strong growth in agriculture, particularly of paddy, linked to the introduction of high yielding varieties (HYVs) developed by the International Rice Research Institute under the WTSRPP. This was a period that Mya Than (1990) referred to as the “second agricultural revolution.”

The study set out to analyze the changes in factor productivity and identify the most important causal factors. Importantly, paddy procurement prices and the official (government) rice price were significantly raised in 1973–1974 and clearly contributed to the initial supply response under the Second Four-Year Plan. However, the benefits of these price rises were soon eroded by inflation. In addition, from 1974, government paddy procurement and rice prices were left unchanged until around 1986. Although free market prices were higher than government prices, there was little change in the real prices through this period. Indeed, the terms of trade moved against the peasantry, especially paddy farmers. Hence, price was not a causal factor in the increases in production and yield at the time.

In seeking to analyze the factors behind the growth in production and yield, Mya Than (1990) analyzed the changes in factor productivity, namely labor, land, fixed capital and current (variable) capital, and the relationship between these. From this, it emerged that land-saving, labor-saving, and cost-saving technologies had all contributed to growth in this period, implying that the general level of technology was increasing throughout the decade. However, the highest contribution to growth came from land-saving technology. Using a Cobb-Douglas production function, the study also analyzed the contributions of inputs, specifically total fixed capital and total current capital to both land productivity and overall agricultural growth. In both cases, total fixed capital (state capital expenditure on agriculture + tractors + draught cattle) emerged as the key explanatory variables. Interestingly, since the irrigation ratio was more or less constant in this period, expenditure on irrigation was not
a significant component of capital expenditure during this period. Total current capital (state current expenditure + fertilizers + chemicals) was a relatively insignificant factor. While the total quantity of fertilizer use did increase more than fourfold in this period, the returns to scale of fertilizers and other components of current capital declined, suggesting that fertilizer consumption was approaching diminishing returns. This in turn indicated that the impact of the WTSRPP was beginning to waver by the end of the study period.

In his final conclusion, Mya Than (1990: 40) opined that “unless other ... components of the ... package such as motive power (in the form of tractors and draught cattle), water management, and infrastructure (in the form of government expenditure) are expanded, the stagnant situation will linger on.” At the same time, he also noted the need to change the incentive structure, particularly through price reform.

### Agricultural Trade

The composition of exports has changed significantly in past years as non-agriculture sectors, particularly the manufacturing sector and minerals, gems, ready-made garments, and gas have contributed to a greater proportion of the country’s export earnings (Table 4.3). Even so, agricultural exports still accounted for 21.1% of export earnings in 2009–2010.¹ The value of agriculture exports also increased during the

<table>
<thead>
<tr>
<th>Year</th>
<th>Agriculture</th>
<th>Livestock and Fisheries</th>
<th>Base Metals</th>
<th>Gems and Precious Stones</th>
<th>Gas</th>
<th>Garment</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000/01</td>
<td>18.15</td>
<td>7.62</td>
<td>2.54</td>
<td>2.85</td>
<td>8.72</td>
<td>29.72</td>
<td>24.09</td>
</tr>
<tr>
<td>2004/05</td>
<td>10.95</td>
<td>6.31</td>
<td>3.28</td>
<td>3.69</td>
<td>34.81</td>
<td>7.41</td>
<td>20.13</td>
</tr>
<tr>
<td>2005/06</td>
<td>12.28</td>
<td>5.66</td>
<td>3.13</td>
<td>6.58</td>
<td>30.29</td>
<td>7.68</td>
<td>21.15</td>
</tr>
<tr>
<td>2006/07</td>
<td>13.31</td>
<td>4.58</td>
<td>2.13</td>
<td>7.43</td>
<td>38.89</td>
<td>5.34</td>
<td>18.55</td>
</tr>
<tr>
<td>2007/08</td>
<td>13.26</td>
<td>4.74</td>
<td>1.35</td>
<td>10.08</td>
<td>39.49</td>
<td>4.41</td>
<td>18.28</td>
</tr>
<tr>
<td>2008/09</td>
<td>15.53</td>
<td>4.13</td>
<td>0.48</td>
<td>9.72</td>
<td>35.10</td>
<td>4.30</td>
<td>24.77</td>
</tr>
<tr>
<td>2009/10</td>
<td>14.11</td>
<td>3.73</td>
<td>0.44</td>
<td>12.52</td>
<td>38.40</td>
<td>3.74</td>
<td>17.24</td>
</tr>
</tbody>
</table>


¹ While there was a significant growth in the value of gas exports from 2003 to 2004, this was in part offset by a sharp decline in garment exports.
past decade as a result of liberalization in the production and marketing of agricultural products. A further liberalization occurred in 2011 with the removal of the 8% commercial tax on export commodities, leaving just a 2% income tax to be paid by exporters.

Rice export volumes have fluctuated widely over the last decade, due to both policy issues and weather conditions. Prior to 2012, rice exports were allowed only through normal trade channels. Starting from 2012, rice was allowed to be exported to the People’s Republic of China (PRC) across the border. This trade facilitation measure resulted in a doubling of rice exports from 0.63 million t in 2011/12 to 1.25 million t in 2012/13 (Table 4.4). Half of the 1.25 million t of rice exports is accounted for export to the PRC through border trade.

Table 4.4: Rice Exports in Myanmar (’000 tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Rice Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001/02</td>
<td>839.70</td>
</tr>
<tr>
<td>2002/03</td>
<td>678.01</td>
</tr>
<tr>
<td>2003/04</td>
<td>106.31</td>
</tr>
<tr>
<td>2004/05</td>
<td>183.58</td>
</tr>
<tr>
<td>2005/06</td>
<td>175.12</td>
</tr>
<tr>
<td>2006/07</td>
<td>14.51</td>
</tr>
<tr>
<td>2007/08</td>
<td>365.60</td>
</tr>
<tr>
<td>2008/09</td>
<td>711.75</td>
</tr>
<tr>
<td>2009/10</td>
<td>818.46</td>
</tr>
<tr>
<td>2010/11</td>
<td>791.09</td>
</tr>
<tr>
<td>2011/12</td>
<td>643.20</td>
</tr>
<tr>
<td>2012/13</td>
<td>1,249.53</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations.

In addition to rice, exports of other major crops, pulses particularly, have been growing rapidly in recent years (Table 4.5).

Until recently, informal cross-border trade had been a significant feature of Myanmar’s economy and trade, largely because of the huge differential between the official exchange rate and the black market rate. The currency reform in 2012, which saw the official rate adjusted to more or less the market rate, removed that incentive for cross-border trade. However, given that these cross-border channels have become well established over many years, allowing cross-border official exports,
as in the case of rice trade to the PRC, represents a pragmatic approach to trade policy. At the same time, major investment in Myanmar’s port sector will be needed to boost the country’s trade.

### Emerging Challenges for Agricultural Development in Myanmar

#### Opportunities and Obstacles for Agricultural Development

This section seeks to identify the key emerging challenges and issues facing agriculture in Myanmar, through a SWOT analysis that will also examine the extent to which the government’s current development strategy for agriculture is likely to address these challenges.

As Table 4.6 indicates, Myanmar possesses many advantages with respect to agriculture and primary sector development and thus also very considerable development potential. The past weak performance of agriculture, which in turn reflects, amongst others, a lack of investment, poor support services, and inappropriate incentives and policies, also means that there are real opportunities to realize this potential. At the same time, the SWOT analysis also reveals the serious weaknesses and threats that Myanmar faces as a result of the past neglect of agriculture and the general stagnation of the economy in recent decades. While Myanmar is now on a new development path that is likely to produce much more rapid and sustained growth, it will take some years to fully make up for the past neglect and stagnation.

**Table 4.5: Pulses Exports in Myanmar**

(‘000 tons)

<table>
<thead>
<tr>
<th>Year</th>
<th>Black Gram</th>
<th>Green Gram</th>
<th>Other Pulses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995/96</td>
<td>185.0</td>
<td>185.9</td>
<td>238.7</td>
</tr>
<tr>
<td>2000/01</td>
<td>274.6</td>
<td>186.0</td>
<td>370.7</td>
</tr>
<tr>
<td>2005/06</td>
<td>379.6</td>
<td>174.1</td>
<td>323.8</td>
</tr>
<tr>
<td>2008/09</td>
<td>529.7</td>
<td>264.8</td>
<td>656.8</td>
</tr>
<tr>
<td>2009/10</td>
<td>615.8</td>
<td>303.6</td>
<td>312.5</td>
</tr>
<tr>
<td>2010/11</td>
<td>456.5</td>
<td>166.3</td>
<td>206.6</td>
</tr>
<tr>
<td>2011/12</td>
<td>598.1</td>
<td>229.0</td>
<td>469.3</td>
</tr>
</tbody>
</table>

Sources: Government of the Union of Myanmar, Ministry of Agriculture and Irrigation (2012); ADB (2014).
Table 4.6: Strengths, Weaknesses, Opportunities, and Threats in Myanmar’s Agriculture Sector

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Diverse agro-ecological zones allow for a wide range of crops</td>
<td>• Lack of clear strategy and policy direction; weak capacity in policy formulation and planning</td>
</tr>
<tr>
<td>• Abundant fertile land</td>
<td>• Weak implementation capacity</td>
</tr>
<tr>
<td>• Plentiful water resources</td>
<td>• Unreliable data sources</td>
</tr>
<tr>
<td>• Farmers responsive to policy reforms and incentives</td>
<td>• Lack of analysis of comparative advantage and competitiveness</td>
</tr>
<tr>
<td>• Strategic location for exports to the PRC, India, and ASEAN</td>
<td>• Low capacity of research and extension</td>
</tr>
<tr>
<td></td>
<td>• Rural indebtedness and limited farm credit</td>
</tr>
<tr>
<td></td>
<td>• Land policy still evolving; problem of land grabbing</td>
</tr>
<tr>
<td></td>
<td>• High level of landlessness</td>
</tr>
<tr>
<td></td>
<td>• Limited irrigation and low efficiency of water use</td>
</tr>
<tr>
<td></td>
<td>• Lack of effective farmers’ organizations</td>
</tr>
<tr>
<td></td>
<td>• Weakness and inefficiency within the value chain</td>
</tr>
<tr>
<td></td>
<td>• Legal framework not conducive to agribusiness investment (e.g., taxes, land laws, banking regulations)</td>
</tr>
<tr>
<td></td>
<td>• Poor connectivity of major roads, agricultural roads, internet, and telephone networks</td>
</tr>
<tr>
<td></td>
<td>• Power (electricity) scarcity</td>
</tr>
<tr>
<td></td>
<td>• Lack of food balance sheet</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Huge productivity gaps to fill with readily available technologies</td>
<td>• Land grabbing might result in extreme social fragmentation</td>
</tr>
<tr>
<td>• Large areas for increasing irrigated agriculture</td>
<td>• Lack of clarity and transparency in land laws may undermine investment</td>
</tr>
<tr>
<td>• Potential as a major exporter of rice, including high-quality produce through integrated rice operations</td>
<td>• Neglect of smallholder farming might result in persistence of poverty and aggravate social tensions</td>
</tr>
<tr>
<td>• Significant potential for export of fruit, vegetables, pulses, etc. to the PRC, India, and ASEAN</td>
<td>• High input agriculture might lead to environmental damage and unsustainable use of natural resources</td>
</tr>
<tr>
<td>• High potential in rubber, sugarcane, pulses, and timber</td>
<td>• Land degradation in dry and hilly areas and lack of action plan to address slash and burn agriculture</td>
</tr>
<tr>
<td>• Potential for fertilizer production linked to domestic natural gas supplies</td>
<td>• Natural disasters and climate change</td>
</tr>
<tr>
<td>• Potential to focus on green growth, including organic production and food safety</td>
<td>• Prospect of substantial aid flows</td>
</tr>
<tr>
<td>• Prospect of substantial aid flows</td>
<td>• Lack of food balance sheet</td>
</tr>
</tbody>
</table>

ASEAN = Association of Southeast Asian Nations, PRC = People’s Republic of China.  
Source: Authors.
What then are the main challenges going forward and how far does the government’s present strategy address the policy and other tasks necessary to meet the emerging challenges and realize its potential?

As noted earlier, given the speed of recent reforms and the number of different initiatives and programs under way, there is something of a lack of clarity in the government’s agricultural development strategy. Work is ongoing on the completion of the NCDP and it is expected that this should provide a clearer statement of both strategy and policies. We highlight what we believe to be the key emerging issues that will need to be addressed by the NCDP.

**Challenges Affecting Agricultural Production and Productivity**

**Challenge 1: Strengthening Agriculture Policy and Planning**

Agriculture and rural development requires actions across a wide front and involves a wide range of stakeholders in both the government and private sectors. The limited capacity, in policy analysis, planning, and implementation, particularly within the government, represents a significant challenge. While efforts are already under way to build this capacity and substantial assistance is beginning to flow from development partners, this process will inevitably take time. Related to the need to build capacity is the need for a reliable database on the agriculture sector. While considerable data, both historic and current, already exist, much is extremely unreliable, making sound policymaking and planning extremely difficult.

**Challenge 2: Poverty and the Need for Inclusive Growth**

Although data remain unreliable, in 2004 it was estimated that almost a third of the rural population was living below the poverty line (Dapice et al. 2010). The incidence of poverty is unlikely to have gone down much after this, and may well have increased, given the appreciation of the exchange rate from the mid-2000s, something that made it harder for Myanmar’s farmers to compete in export markets. At the same time, it is too early for recent reforms to have yet had any significant positive impact on farm incomes and livelihoods—hence the priority the government is giving to agriculture and rural development. However, if growth and development is to be inclusive, then it will be vital for the government to place smallholder agriculture at the center of its strategy for agricultural development. There are signs that the desire for rapid growth and technological modernization could lead to a bias in policy and planning toward larger-scale commercial farming. In the case of rice intensification, which as noted is one of the cornerstones of the
government’s objectives for the agriculture sector, the success stories in Asia have come from smallholder agriculture rather than large-scale farms or plantations. Indeed, studies have consistently shown the lack of any significant economies of scale in wet rice cultivation (Vokes and Goletti 2013). In Myanmar’s case, the rapid growth in the production and export of pulses since the 1990s, is also largely a smallholder success story. Given the proven efficiency of smallholder agriculture, such a strategy does not imply a trade-off between growth and equity. That said, the emphasis being given to contract farming through organizations like MAPCO highlights the potential scope for complementarities between smallholders and agribusiness.

**Challenge 3: Environment and Climate Change**

In contrast to the 1960s and 1970s, the period that saw the main thrust of the Green Revolution in Asia, concerns over the environment and sustainability, as well the issue of climate change, are now receiving much greater attention. In this regard, simply adopting a traditional high-input, fossil-fuel based Green Revolution strategy would raise many questions. It is true that with the continued development of new HYVs that also breed in greater disease resistance, the level of inputs required, particularly pesticides, is now less than before. In addition, techniques such as integrated pest management have also helped reduce the amount of chemical pesticides and herbicides used by farmers. This has had multiple benefits, helping to protect the environment, protect farmers, and reduce the costs of production.

Water is another area of concern, given the yield advantages of modern HYVs only come with the availability of irrigation and effective water control. Growing urbanization brings with it increased competition for water resources, growing scarcity, and the risk of depletion. This is of less immediate concern in Myanmar given that the country has relatively abundant water resources. However, the cost of developing large-scale irrigation schemes remains, while water management within such schemes is often poor, leading to high levels of wastage and salinity. Promotion of smaller farmer-managed schemes and more individual farm-level irrigation, such as shallow tube wells where possible, is likely to offer a more efficient option. At the same time, improving water management within existing irrigation schemes remains a priority.

More fundamentally, there are other more radical approaches to “greening the Green Revolution,” notably the adoption of an ecosystem approach, as detailed in the FAO’s Save and Grow program,² and also the

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² For more details on the Save and Grow program, see FAO (2011).
System of Rice Intensification (SRI), which as noted earlier, has already been introduced in a number of townships in Myanmar.

While genetically modified seeds may offer some environmental benefits, their use remains controversial. Restrictions on the import of genetically modified foods into the European Union and consumer resistance more generally also make the use of genetically modified seeds unattractive for an exporting country like Myanmar.

Cyclone Nargis in 2008, which devastated large areas of the Ayeyarwady Delta, exposed the vulnerability of much of Myanmar to climate change. The government will need to carefully consider mitigation and adaptation measures as well as other policies designed to reduce climate change risks. The conservation of the country’s remaining forest resources will be an important element of any such program.

Challenge 4: Determining Myanmar’s Comparative Advantage
With its diverse agro-ecological zones, abundant fertile land and water resources, and scope for the application of improved technology, Myanmar clearly has a huge potential to increase crop production and productivity to serve both the domestic and export market. However, in formulating specific policies and interventions, there is a need to determine where Myanmar’s comparative and competitive advantage lies.

Currently, boosting rice production and exports is a major focus of government policy. Given the historical importance of the paddy sector and rice exports, this is understandable. However, while undoubtedly there is significant potential for boosting domestic productivity and improve quality through investment in modern processing and marketing systems, the world rice market is currently extremely competitive. Thailand remains a leading player in terms of the export of high-quality rice, while Viet Nam and India are now major exporters, and along with Pakistan are able to export (medium) quality rice at low prices, often on government-to-government contracts. New market entrants are Brazil and Cambodia (Vokes and Goletti 2013). When the export rice volume of India dramatically increased after the Indian government released its national stock, the rice export price dropped. Further, the price for agricultural inputs in India is also cheaper than in other countries. The appreciation of the kyat in recent years has also undermined Myanmar’s competitiveness. Myanmar exporters have made less profit in recent years and are finding it hard to compete. While the appreciation of the kyat has also affected other agricultural commodities, exports of pulses and oilseeds go mainly to neighboring countries, making it easier for Myanmar to compete. Similarly, fruit and vegetable exports have been expanding rapidly, particularly to the PRC. Cash crops, such as rubber
and sugar, may also offer profitable opportunities to Myanmar. Given the large imports of palm oil, there is also considerable interest in oil palm production, although from an environmental viewpoint oil palm remains a controversial crop.3

However, it clearly is desirable to identify those activities where Myanmar has either the existing capacity to compete or the potential to compete given achievable progress in terms of raising yields, reducing production, and raising quality.

**Challenge 5: Research and Extension**
A productive and dynamic agriculture sector will also depend on the introduction of new or improved seeds and improved farming practices. Myanmar’s system of research and extension has to date been commodity and productivity focused, with little coordination between the large number of different institutions involved. It has also suffered from a lack of funding. With a focus on maximizing yields, to the neglect of cost and other issues of critical importance to farmers, as well as a neglect of differences in agro-ecological zones, the uptake of improved technologies has been limited (UNDP 2011). A major reorientation of both research and extension to a farming systems approach will be required.

**Challenge 6: Insufficient Farm Credit**
Although the amount of seasonal credit available through the MADB was raised to MK100,000 per acre (MK247,000 per ha) for paddy and MK20,000 per acre (MK494,000 per ha) for oil crops and pulses starting from 2013, this is still insufficient to cover production costs. Hence, farmers continue to have to borrow from informal money lenders at high interest rates, ranging from 5% to 20% per month. This aggravates the already widespread problem of indebtedness and makes it almost impossible for farmers to escape poverty by improving their livelihood. Boosting crop productivity will therefore require a considerable increase in farm-level investment. This will include investment in seasonal inputs such as new seeds, fertilizer, mechanization services, as well as in fixed costs such as improved farm machinery and on-farm water control. Given the very limited amount of credit currently available, an expansion in agriculture credit would still be required even if a less capital- and input-intensive model were to be adopted.

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3 The environmental issues surrounding oil palm concern the clearing of forest land for oil palm plantations, the loss of biodiversity associated with the monoculture of oil palm, and also pollution from the processing of oil palm fruit into palm oil.
Challenge 7: New Land Laws and Land Issues

The new government has clearly recognized the importance of secure land rights to investment, whether in agriculture or the economy in general. In March 2012, parliament passed two new land laws, namely the Farmland Bill and the Vacant, Fallow, and Virgin Land Management Bill. While land ownership remains vested in the state as before unlike under the earlier system, under the new laws, land can now be used as collateral and land-use rights sold and transferred. Although it is clearly desirable to encourage new investment, there is concern that the new laws are undermining the security of tenure of small farmers. The issue of “land grabbing,” especially for large-scale agribusiness projects, has also been an issue leading to growing land disputes.

While land-use rights are largely determined at the village tract level, smallholder farmers are losing out to groups close to the local authorities who offer to bring vacant farmland into production, since the farmers have insufficient funds or access to credit to take on this task. Since in the past local farmers had the right to make use of this land, which was vacant due to problems such as regular flooding or poor drainage, these moves have caused social tension. According to Chapter III, paragraph 9 (b) of the new Farmland Bill, people who have the right to use land shall have the right to sell, mortgage, lease, exchange, and gift in whole or part, the right to use such land. These privileges open up grabbing rights on the land, resulting in disputes between social groups. In response to the growing concerns over land grabbing and land disputes, a Farmland Investigation Commission was appointed to oversee the issue. Land fragmentation is another serious and widespread problem in Myanmar, and has continued to increase under growing population pressures. A high degree of fragmentation can have an adverse impact on productivity since it makes mechanization more difficult. These land issues need to be addressed urgently, a process that is likely to require some amendments to the new land laws.

Challenge 8: Migration, Landlessness, and Mechanization

Landlessness has been a chronic problem in Myanmar. In 2010, the landlessness rate reached 38%, up from 34% in 2005. Even in the rice bowl areas, the incidence of landlessness is high at 41% in Bago and 39% in Yangon (UNDP 2011). While increased landlessness can have an adverse impact on rural living standards, landless labor is increasingly mobile, seeking out non-farm jobs in both rural and urban areas or even abroad. For landless labor this may well be a positive move in terms of their incomes. However, this has resulted in an increasing scarcity of farm labor. The lack of labor hinders the correct timing of planting,
weeding, and harvesting resulting in decreased crop yields and increased post-harvest losses.

Experience from other countries in the region, especially Thailand and Malaysia, suggests that the process of outmigration from agricultural and rural areas is inevitable and not necessarily adverse for rural communities. Jobs in the non-farm sector are often better paid and remittances can help to sustain rural households and communities. However, as labor becomes scarcer and more expensive, there has to be growth in mechanization and mechanization services to substitute for labor.

**Challenge 9: Agribusiness and the Value Chain**

Boosting agricultural productivity depends not only on improvements at the production level but also on the efficiency and responsiveness of the whole value chain between producer and consumer. Staple food value chains in particular have undergone a “quiet revolution” in recent years as they have adapted to changing consumer preferences, new technology, and the need for greater efficiency.

The main actors engaged in the rice value chain are farmers, input suppliers, millers (traders), exporters, wholesalers, retailers, and consumers. Effective coordination among these actors in response to market demand for both the domestic and international market is necessary to improve efficiency. Currently, there are a range of weaknesses in the rice value chain, including use of poor quality seed, the low quality of fertilizers, insufficient fertilizer application, mixing of different varieties at harvest, improper drying, and poor storage.

Somewhat similar weaknesses can be found in the value chain of pulses: poor quality seed and low use of fertilizers. Farmers also suffer from a lack of mechanization for land preparation. Unlike in the case of MIRA and rice, the Myanmar Pulses, Beans and Sesame Seeds Merchants Association (MPBSA) has not embarked on any contract farmer programs. Another serious weakness is the lack of value addition in part due to the lack of processing and storage facilities. Finally, the pulses sector is heavily dependent on just one market, India.

Improvements to the supply chain will also depend on an effective legal framework. Most of the laws required have already been implemented. These include the Pesticide Law in 1990, the Plant Pest Quarantine Law in 1993, the Fertilizer Law in 2002, the Procedures Relating to Fertilizer Law in 2007, the Procedures Relating to the Pesticide Law in 2007, and the Seed Law in 2011. What is now required

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Although the Pesticide Law was originally enacted in 1990, it was not until 2007 that the implementing procedures were passed.
is the effective implementation of these laws, along with the effective education of farmers and value chain participants.

Myanmar is participating in sanitary and phytosanitary (SPS) standards and the harmonization of maximum residue limits of pesticides practiced in the Association of Southeast Asian Nations (ASEAN). In the case of fertilizer, inferior quality fertilizers imported both through formal and informal channels are selling in the local market but the Department of Agriculture has insufficient staff to check all but a sample of the fertilizer sold.

**Challenge 10: Infrastructure Development and Connectivity**

One of the most immediate constraints to Myanmar’s economic prospects is its poor infrastructure and this is particularly true of the rural areas. Investment in irrigation and improved water control will likely be one of the important factors in boosting farm productivity. However, the most important area for infrastructure improvement is connectivity in all its forms. Better farm-to-market roads, as well as improved links between rural markets and urban centers, will be critical to reducing production and marketing costs and reducing losses and improving incentives at the farm level. In February 2015, the Government of the Union of Myanmar and the Asian Development Bank agreed on a loan of $80 million to improve road connectivity in the Ayeyarwady Delta. The objective of the agreement is to improve access to markets for agricultural producers in the “agriculturally rich but underdeveloped” region (ADB 2015).

Digital connectivity and access to mobile phones will also be important in enabling farmers to gain quick and easy access to market information, while also providing a cost-effective means of improving extension. The government has the target of 80% mobile phone coverage within 5 years. Improved digital communications, in both mobile and internet technology, can help Myanmar offset some of its infrastructure deficit and even leapfrog quickly to a higher growth path (MGI 2013). However, this also points to the importance of increased access to electricity and connectivity to the national grid. Apart from being essential to digital communications and connectivity, it can support the introduction of other innovations, such as tube well irrigation and the growth of agro-processing and manufacturing. Connectivity in all its forms is thus important to the growth of the non-farm sector.
Overcoming the Challenges: Options to Enhance Agricultural Productivity

Policy Options

Development Strategy
With regard to the broad strategy for agricultural development, we have already argued that a strategy that has smallholder farming as a central element is the correct one for Myanmar at least over the medium term of the next 10 years. Given widespread rural poverty and a farming structure dominated by small farms, such an approach will be essential to achieving more equitable and inclusive growth. Smallholders have been the driving force in agricultural and rural transformation throughout Southeast Asia over the last 4 decades. Small farmers have been willing adopters of new technology and have shown themselves to be responsive to price and other incentives. Given the lack of scale economies in wet-rice farming, such a strategy does not imply a trade-off between growth and equity. As noted earlier, putting smallholders at the center of the agricultural development strategy does not imply that there is no role for larger commercialized farming. In the case of crops like rubber and sugar, as well as in fruit production, larger-scale commercial farming by plantation companies has been an important component of development in Southeast Asia. But even in these crops, smallholder models have been successfully implemented, as in the case of rubber in Malaysia, Thailand, and Indonesia, while in others, like sugar, out-grower schemes linked to a larger nucleus estate and processing plant allow for complementarities between smallholders and commercialized farms. As the food value chain develops in response to rising incomes and changing consumption patterns, new opportunities to link smallholders with agribusiness companies and retail marketing chains emerge in areas like poultry, fish farming, and horticulture.

In seeking to raise agricultural productivity and farm incomes, Myanmar also needs to consider how far this can be done by adopting a “green growth” strategy. While Green Revolution technology has brought significant benefits to the Asian countryside, there have also been serious problems associated with the excessive use of artificial fertilizers and with the use of pesticides and herbicides. This has included health problems for farmers. Coupled with the high cost of such inputs, there has been a move toward lower input and less intensive agriculture. The production of organic crops, initially at least largely for export, could be an extension of such a strategy. While the adoption of such an approach would probably put more strain on limited public
sector capacity than a more conventional approach where agribusiness companies and suppliers take a more active role, there are many donor agencies keen to support a “green growth” sustainable strategy.

**Analyzing and Building Myanmar’s Competitiveness**

Given the dominant role of paddy in Myanmar’s agricultural economy and its past history as a major rice export, it is both natural and appropriate that considerable attention is being given to boosting productivity in the paddy and rice sector. However, as noted earlier, the world rice market at the current time is highly competitive. Other crops, particularly oilseeds and pulses, may offer better returns to farmers, and better growth and export prospects than rice. As the basic staple food, there are always pressures on governments to keep rice prices low, something that impacts adversely on farmers in the absence of costly paddy price support schemes. At the same time, rice has low or negative income elasticity as populations tend to increase meat consumption as their incomes rise.

To a considerable extent, the issue of comparative advantage and thus the crop pattern can and should be left to market forces to determine. Clearly there are dangers in trying to be too prescriptive in “backing winners” in agriculture just as in the industry sector. However, the need to prioritize public sector investment and support services, such as extension, also makes it important to identity the more attractive opportunities in order to avoid an excess of investment in infrastructure or services geared to crops that do not necessarily offer the best return either to the nation as a whole (e.g., through foreign exchange earnings) or to farmers. For example, the quantum of investment required for irrigation and also the type of irrigation infrastructure required will vary depending on whether one is promoting a paddy–paddy double cropping (or triple cropping) system or whether the focus is on non-paddy crops in the dry season.

**Research and Extension**

By improving and developing its research and extension systems, Myanmar will be able to draw on the knowledge and experience of a number of organizations and lessons from neighboring countries. On the research side, and particularly over the short to medium term, Myanmar should focus more on adaptive research by drawing on the existing knowledge base within the Consultative Group for International Agricultural Research (CGIAR) system and affiliated national research programs in Southeast and South Asia. Tailoring this knowledge to the country’s various agro-ecological zones will be a key priority of this adaptive research. On the extension side, appropriate retraining of government extension agents
will be required to enable them to effectively support farmers operating within a more market-based system where they have more freedom of choice over what farming activities to pursue. As in research, greater decentralization of the extension system will be necessary to ensure that extension advice is relevant to farmers in different localities.

Some newer approaches have already been undertaken with external support under the multi-donor funded Livelihoods and Food Security Trust Fund program and these can now be scaled up. There is also significant potential for private sector involvement in both research and extension, including in the production and distribution of new, improved, certified seed. These are also areas where public–private partnerships are possible. Myanmar’s new institutional structure with entities like MAPCO operating should be well suited to the public–private partnership model. That said, proper regulation of the private sector will be needed (Vokes and Goletti 2013).

**Rural Finance**

Even with the recent increases in the level of credit available to farmers, formal sector lending through the MADB still meets only a small part of total demand. A significant expansion in rural credit, both short-term seasonal credits, as well as more medium to long term credit will be needed if agriculture is to take off rapidly. Given an extensive branch network that covers over 60% of the county’s townships, MADB needs to be developed as a properly functioning rural finance institution. It has already embarked on a restructuring process. However, even with an influx of capital, it will take time to retrain staff to fit their new roles as credit officers, supervisors, and financial analysts. MADB can, however, draw both positive and negative lessons from the experience of public sector agricultural development banks in neighboring countries, notably Bank Pertanian Malaysia and the Bank for Agriculture and Agricultural Cooperatives in Thailand, which are among the more successful public sector rural banks.

Allowing other banks, including private banks, to expand into the rural sector is likely to be necessary to meet rising credit needs. However, this will only be possible once a proper land registration system is in place. It will also only be possible if financial sector reforms, including the removal of interest rate caps, allow such lending to be profitable. One advantage Myanmar has as a “late starter” is that the use of modern technology, along with mobile banking units and the use of mobile phones for banking, can help to reduce the costs of serving a clientele that consists of a large number of relatively small farmers. At the same time, private banks can help the sector more generally by providing credit to agribusiness companies and suppliers.
Microfinance will also need to be developed. Since the late 1990s, there have been a number of successful externally funded microcredit and microfinance projects in Myanmar, based on the Grameen model. There are also a number of government and non-government organizations (NGOs) involved in microcredit. Microfinance has a particularly important role to play in meeting the needs of poorer, more vulnerable groups, including women, and in supporting non-farm economic activities.

Although still an evolving area in the development field, the introduction of hometown trusts, and crop and livestock insurance could also be an important element of Myanmar’s rural finance sector. As the cyclones in 2008 and 2010 have shown, disaster risk is high, while the country is also vulnerable to increased risks from climate change. Having a well-functioning system of insurance should ultimately lead to a lower cost of credit while also protecting livelihoods.

**Land**

Given the critical role of access to land as a basis for agricultural livelihoods, the potential for land disputes to develop in a rapidly liberalized environment is high. If unchecked, this will not only undermine the prospects for agricultural growth, especially in the smallholder sector, but could also lead to social unrest and polarization that might have the potential to threaten the whole reform process. In this regard, the outcome and recommendations of the Farmland Investigation Commission, that has just submitted its report to the president, is being eagerly awaited.

The problem of land grabbing is clearly not confined to Myanmar. Whatever the arguments in favor of smallholder agriculture, the potential returns from larger-scale commercial agriculture, a weak legal framework, and “rent seeking” activities of those who control access to land, mean that such land grabbing is often a serious problem in the early stages of liberalization. Significant problems in this regard have occurred also in Cambodia and the Lao People’s Democratic Republic.

While appropriate legislation that gives farmers secure rights of use, transfer, inheritance, exchange, and collateralization is essential, effective implementation of the law is also important. This requires an appropriate institutional structure at both the national and local levels that also encompasses land surveys, cadastral surveys (which nowadays, thanks to innovations in GIS and GPS are both very accurate and relatively low cost), land titling, and the distribution of titles. Appropriate land-use planning regulations/laws are another important way of minimizing misuse and abuse and are thus an important component of the legal framework for land. The legal framework for land also needs to take
account of the special needs of the ethnic minority areas where land ownership is often communal.

**Mechanization**

Shortages of labor have already emerged as a problem in Myanmar due to the outmigration from rural areas, much of it overseas to neighboring countries. The high rate of outmigration has been due to the negative impact of past government policies on the rural sector as well as the appreciation of the kyat since 2006. While agriculture now faces a more positive policy environment and new opportunities, it is hard to attract labor back to farming work once it has migrated to other sectors. While the shortage should push up wage rates and thus have a positive effect on the livelihoods of landless and casual laborers, it hinders the scheduling of critical steps in the cultivation cycle and undermines farm profitability.

As long as mechanization is coming in as a response to such developments—that is, it is demand rather than supply driven—then it needs to be supported. While two-wheel tractors have proven popular in most paddy farming areas in Southeast Asia, the provision of ploughing and land preparation services using four-wheel tractors has also been common. Similarly, because of the high cost of labor, combine harvesters are now widely used in a number of ASEAN countries, having first come into use in Malaysia in the 1970s. Such mechanization services are probably most effectively provided by the private sector. However, some public sector provision of such services, through agricultural service centers or cooperatives may be needed to ensure a degree of competition at the farm level. Equally, as in other areas, the private provision of services has to be effectively regulated.

**Farmers’ Organizations**

In an agrarian structure characterized by smallholders, farmers’ organizations can play an important role in facilitating farmer access to affordable inputs and support services. This includes in extension and credit and in strengthening the bargaining power of farmers in both input and output markets, and in ensuring the effective integration of smallholders into value chains. Given the active encouragement that the Government of Myanmar is giving to contract farming between agribusiness companies and smallholders, this is clearly important in Myanmar. Government-promoted farmers associations played a key role in the agrarian transformations in Taipei, China and in the Republic of Korea. Elsewhere, attempts to develop top–down associations or cooperatives have generally been less successful. Hence, a “bottom–up” approach encouraging the growth of more informal grassroots
community-based organizations, cooperatives, user groups, self-help groups, and federations, is likely to offer the best route to the development of more viable and sustainable farmers’ organizations. NGO support in building capacity of such organizations is likely to be important. Since Cyclone Nargis, there has been a rapid growth of nongovernment organizations in Myanmar. This is also an area where international NGOs can play an effective role.

**Strengthening the Value Chain**

As noted in previous sections, Myanmar has clearly made some important steps in improving the value chain. Apart from measures to strengthen production and boost productivity at the farm level, a new institutional structure has emerged over the last few years in which the private sector is taking the lead, but in close partnership with the public sector. Organizations like the MRF and MAPCO are now playing a key role, not only in the rice sector, but encouraging investment and modernization throughout the value chain. There is also considerable foreign interest in investment in the agro-processing sector, both in setting up plants or in supplying equipment. For domestic enterprises, particularly SMEs, loans to help facilitate investment in improved drying, storage, and milling facilities may need to be considered.

Where smallholder agriculture is the core of the production strategy, small farmers have to be effectively linked to the supply chain. However, apart from physical connectivity by road, river, or even mobile phone and internet, it is also important that smallholders have a voice in the supply chain and benefit from the value addition that occurs. A key factor in ensuring inclusive value chain development is a governance structure within the value chain that assures a fair distribution of benefits among all parties. Here again, farmers’ organizations have a role to play. Having federations of such organizations as investors in supply chain companies is one way of ensuring that benefits are shared through the supply chain. At the same time, an appropriate regulatory framework is needed to help balance the power and interests of larger companies and small farmers.

**Connectivity**

The issue of connectivity clearly goes well beyond the agriculture sector and beyond the mandate of the various ministries responsible for agriculture and rural development policy and planning. However, the importance of connectivity in all its forms, to the development of agriculture, as well as the wider rural economy cannot be overemphasized. Myanmar faces a serious connectivity deficit. In the case of hard infrastructure such as roads, substantial external assistance is likely. By adopting more labor-intensive approaches to the building of rural, farm-to-market roads, investment in connectivity can also contribute to
inclusive growth. At the same time, the availability of digital technology gives Myanmar the opportunity to make rapid progress at least in some areas of connectivity. Mobile phone and internet services are also areas where the scope for and interest of private investment is high and will need to be harnessed.

**Options for Regional Integration in the Agriculture Sector**

As a member of ASEAN, Myanmar has much it can learn from the experience of neighboring countries that have already been through, or are well-advanced, in their agrarian transition. However, in terms of immediate lessons, the experience of other less developed members of ASEAN, namely Cambodia, the Lao People’s Democratic Republic, and Viet Nam, which together with Myanmar form what are termed the CLMV countries, may be most relevant to Myanmar. Efforts are also under way to address the particular needs of the CLMV countries through more integrated development activities among them, examining areas of common interest under regional development programs and potential support from development partners within the framework of the Greater Mekong Subregion (GMS) program.

Under the GMS Core Agriculture Support Program Phase II (CASP Phase II), the overarching strategy is to develop a system that can connect to regional and global markets and achieve competitiveness and attract investment. This broad strategy supports three pillars.

**Pillar 1**
The first pillar centers on building global competitiveness by promoting food safety and modernizing agricultural trade through
- harmonized food safety standards and system,
- paper free trade and information technology (IT) traceability systems,
- critical mass quality of food and products, and
- a community-based participatory guarantee approach.

**Pillar 2**
The next pillar aims to promote climate-friendly agriculture via a market-based strategy to ensure food security while rewarding farmers for their ecosystem services through
- carbon financing for agriculture,
- climate-resilient farming systems,
- weather-based insurance systems, and
- management of transboundary invasive species and animal disease controls.
Pillar 3
The final pillar is promoting agriculture as a leader in providing clean, rural renewable energy and cross-border eco-friendly supply chains through

- regional bioenergy regulatory framework and harmonized standards,
- efficient utilization of biomass for bioenergy while fostering food security, and
- eco-label systems for market access.

Regional initiatives for Pillar 1 aim to promote GMS corridors as regional hubs for safe agri-food trade development. To achieve this, the GMS members, including Myanmar have proposed a project on Enhancing Regional Competitiveness on Food Safety, Quality and Market Access for Smallholders. This includes key investments in (i) developing infrastructure for enhancing cross-border agri-trade logistics, including agro-processing and cold storage; (ii) strengthening regional IT-based traceability and certification systems to improve food safety and food quality; (iii) developing capacity; and (iv) strengthening relevant policies, regulations, and standards.

Regional initiatives for Pillars 2 and 3 work to encourage GMS producers to adopt climate-friendly and resilient agricultural practices, including improved crop land management (e.g., improved agronomic practices, nutrient use, tillage, and residue management) that will support enhancing agricultural productivity and provide clean rural renewable energy along the corridor. The project, Facilitating Green Pro-poor Value Chains in the GMS, promotes activities under Pillars 2 and 3 of CASP Phase II on climate-friendly agriculture and bioenergy. The project will invest in climate-friendly, pro-poor, agri-business value chain development in the GMS. The project includes key infrastructure investments as follows: (i) efficient roads that provide access to markets; (ii) renewable and bioenergy systems that can meet the growing energy needs of rural communities and agribusiness centers; and (iii) efficient storage, processing, aggregation, grading, marketing, and logistics infrastructure to ensure delivery of safe and quality food products. Myanmar will participate in these project activities in cooperation with other GMS countries.

Within the GMS framework, CASP Phase II will promote regional cooperation through subregional dialogue to analyze and integrate ongoing climate change initiatives being launched by regional organizations. Technology development and product safety projects are also being proposed for support from other development partners. These regional initiatives will help Myanmar to improve crop productivity,
reduce risks from climate change, and ensure the safety of agricultural products.

**Summary and Conclusions**

Myanmar’s ongoing economic reforms offer the prospect of a greatly reinvigorated and dynamic agriculture sector. With its abundant land and water resources and varied agro-ecological conditions, and scope to boost agricultural productivity, the sector has the potential to play a vital role in the country’s development. As a net exporter of food, Myanmar also has the potential to be a food source for the ASEAN region and thereby contribute to regional food security.

At the same time, the agriculture sector faces major challenges, primarily due to the country’s long period of slow growth and economic isolation during the period of military rule. As we have argued above, action is needed across a range of issues, and while some prioritization will be essential, some progress across all these areas will be necessary to move agriculture forward. While the government certainly has a key role to play in determining agriculture policy and strategy, it will need to ensure a policy environment that enables the private sector, whether in the form of individual farmers or agribusiness companies, to play a full part in complementing the public sector.

While the sector faces major challenges, Myanmar can benefit from the lessons and experience, both positive and negative, of its neighbors in ASEAN and South Asia, including with the impact of technological change. One of the key lessons is that smallholder farmers have been the driving force in agricultural and rural transformations in Asia and in doing so have played a key role in reducing poverty and contributing to more inclusive growth. We have therefore argued that smallholders should be at the core of Myanmar’s strategy, complemented where appropriate by larger-scale commercial farms. However, it is higher up the value chain that we see the main scope for larger-scale private sector investment, through the activities of agribusiness companies. The fostering of links between agribusiness and small farmers, through mechanisms such as contract farming, is almost certainly an appropriate one for Myanmar at this time. However, even though farmers’ representatives are part of the existing institutional structure, careful monitoring and effective regulation of these arrangements is needed to protect the interests of small farmers.

Another important lesson that Myanmar can learn from its neighbors is the need to give greater emphasis to the environmental impact of technological change and the issue of sustainability. Coupled
with the growing concern globally and regionally with climate change, there is a growing awareness that a strategy based on high carbon-based inputs mechanization, fertilizers, and pesticides may no longer be the most appropriate strategy to follow. Rather, there is a need to follow a “green growth” strategy.

Certainly, Myanmar’s new government has identified environmental conservation and sustainability as the priorities of its development program. It therefore needs to consider carefully the alternative options available to boost agricultural growth and productivity. While these may include more labor-intensive approaches such as the SRI in rice, we have also noted that labor is already a scarce resource in many of Myanmar’s rural areas. It also needs to be recognized that due to advances in breeding, the newer HYVs are less input-intensive than before. Hybrid seeds and genetically modified crops may also be less input intensive; however, they bring with them their own concerns, the loss of traditional biodiversity, and the locking-in of farmers into long-term contractual arrangements with large seed companies.

Given how far Myanmar is lagging behind regional neighbors in agriculture, even a “green growth” strategy will require technological change, improvements in irrigation and water management, and a major expansion in non-farm investment. This in turn will require improvements in research and extension, mechanization, and rural finance.

The nature and quantum of investment in these areas will also depend on the cropping pattern that farmers will ultimately choose now that they have the freedom to determine what crops to grow. While paddy will remain a key crop, Myanmar needs to determine where its comparative advantage lies, particularly with respect to export crops. This will also depend on its ability to build efficient value chains.

Two other institutional issues of importance are land and farmers’ organizations. Security of tenure is a prerequisite for increased agriculture investment. The problem of land grabbing clearly undermines this and points to the need for a proper land registration system and a transparent and fair means of addressing land disputes. Farmers’ organizations can provide an efficient way of channeling services to farmers as well as protecting farmers’ interests.

In addition to policies and programs directly targeted at agriculture, we have also stressed that investment in economic infrastructure, and especially in connectivity, whether in the form of roads, power, or digital communications, will be essential to efforts to increase agricultural productivity and growth.

Finally, a sound macroeconomic policy environment will be important for agriculture to grow. In this regard, it is widely recognized
that the appreciation in Myanmar’s exchange rate since 2006 has undermined the competitiveness of much of the country’s agriculture. With appropriate agriculture policies and investment, there should be considerable scope to improve efficiency and reduce costs. Even so, the impact of the exchange rate on the agriculture sector will need to continue to be monitored.

Bibliography


5. Agricultural Productivity in Viet Nam

Nguyen Trung Kien,
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Introduction

After 25 years of reforms, Viet Nam’s agriculture sector has made remarkable progress and played an important role in the socio-economic development process of the country. Agricultural production has developed despite market fluctuations, natural disasters, and diseases. Along with the continuous growth of agriculture at 3.8% per year, food availability has vastly improved from 445 kilograms (kg) per person per year to 513 kg per person per year during the period 2000–2010. Thus, the country has been largely successful in overcoming its acute hunger problem faced during the post-war period and has achieved food self-sufficiency at the national level.

As the major source of income and employment for 70% of Viet Nam’s population, agriculture has played an important role in the successful reduction of poverty through improvement in agricultural growth and food security. The poverty rate has decreased sharply from 58.1% in 1992 to 12.6% in 2010, at a remarkable average reduction of more than 2% per year.

Compared to neighboring countries, agricultural prices in Viet Nam, especially food prices, have remained low. This has helped to keep labor costs low and has enabled the country to attract foreign investment and in turn make important contributions to economic growth and social stability. Agricultural exports have also accelerated continuously, giving Viet Nam important roles in international and regional markets of commodities, such as rice, rubber, coffee, pepper, cashew nuts, wood products, and fishery products. In 2011, agricultural exports reached
a record level of $25 billion, and in the time of economic stagnation, agriculture was the only sector with a steadily growing net export surplus. This surplus, in fact, contributed significantly to balancing the national trade deficit.

Following the period of rapid growth, the sector has started to slow down significantly. The growth of agricultural GDP has fallen from 4.5% in 1996–2000 to 3.8% in 2001–2005, 3.4% in 2006–2011, and only 2.7% in 2012. The growth can mainly be attributed to increases in sown land (including both cultivated areas and crop intensities) and higher use of inputs and natural resources. However, the sector is facing increasing domestic competition for water, labor, and land. Natural resources are being overused and the sector is losing competitiveness in international markets as costs rise. Issues regarding the quality of produce, food safety standards, lack of innovation, and low value added have arisen from unsustainable and “low-quality” growth.

Reforms to enhance agricultural productivity are needed not only for farmer livelihoods but also for sustainable national development. Improvements in labor productivity, land productivity, and other inputs of agricultural production and investment are essential. Importantly, policy changes are needed in the sector. Agriculture needs to become more market-oriented, and the management of investment in agribusiness and regulatory services needs to be enhanced and developed.

In this context, the main objective of this chapter is to draw policy lessons to enhance agricultural productivity by analyzing the patterns of agricultural growth and productivity change in Viet Nam. It aims to describe the role of agriculture in the socio-economic development process in Viet Nam since the economic reform of the late 1980s, introduce the concepts of agricultural productivity, methods of measurement and data collection, and analysis on patterns and driving factors of Viet Nam’s agricultural growth and productivity.

**Agriculture in Viet Nam’s Development Process**

Agricultural growth has been regarded as the foundation of the Doi Moi (economic reform) process in Viet Nam. Agricultural growth has laid a solid foundation for the smooth transition from a centrally planned economy to a market economy—a critical change that many of the countries from the former Soviet Union are struggling to achieve. From having a food deficit with food aid of around 0.5 million–1 million tons (t) of food per year before 1988, Viet Nam began to export 1 million t of rice in 1989, then continued to become one of the largest exporters of rice in the world.
Despite the share of agriculture in total GDP declining sharply from 35% in 1986 to 16% in 2011, the sector has helped to shelter the economy against three economic crises since the start of the economic reform in 1986: the economic crisis in the first stage of the Doi Moi process in 1986–1990, the Asian financial crisis in 1997–1999, and the global economic recession in 2008. During these times of economic crisis, when both industrial and service performance dropped, agriculture remained an essential factor for steady growth. The stable and relatively high agricultural growth generated an abundant food supply, relatively low food prices, and employment and income for the labor force, and helped support the economy.

The fast pace of production growth over a long period has also created a prerequisite for agriculture to support the industrialization process. Particularly, the food surplus has helped to sustain the low cost of living and the correspondingly low real wages for labor transferred from the agriculture sector to non-agriculture sectors.

Agriculture also plays an important role in employment creation. Though the share of agricultural employment in total national employment has declined considerably, it is still much higher than the share of employment in other economic sectors in Viet Nam. In 2011, about 50% of the labor force and around 70% of rural labor was engaged in agricultural activities.

Agriculture makes significant contributions to hunger elimination and poverty reduction. Growth of food production has increased food availability and food security for the nation. Increasing agricultural productivity and income, together with improved access to rural infrastructure and social services has led to a significant reduction in poverty, and according to the Living Standards Survey produced by the General Statistics Office of Viet Nam, during 1992–2011, Viet Nam’s rural poverty rate fell dramatically from 58.1% to 15.9%.

In addition, Viet Nam’s agricultural products have become increasingly export oriented. Viet Nam is currently a leading world market player for several commodities, particularly rice, coffee, rubber, pepper, cashew nuts, aquaculture, wood, and wooden furniture products. During 2000–2010, the value of agricultural exports increased tenfold, reaching over $25 billion in 2010. Imports of agro-food products also increased over the period, but Viet Nam remains a net exporter of agro-food products. For the last decade, the agriculture sector has been the only economic sector to record a continuous net export surplus through which to generate important foreign exchange earnings to import necessary materials for industrialization and modernization.

Ensuring national food availability has been critical in maintaining stable prices and low real wages, and has contributed to poverty
reduction, improved social stability, and established competitive advantages for Viet Nam in attracting foreign investment and domestic private investment—the most active components contributing to economic growth in Viet Nam in recent times. It is worth noting that Viet Nam is only ranked 104th out of 178 countries in terms of national competitiveness (as reported by the World Bank) and 91st of 118 countries in terms of national business environment (as reported by the World Economic Forum), but has ranked 6th in the world in terms of foreign direct investment inflows (FDI) in recent years.

**Agricultural Growth and Productivity: Patterns and Performances**

**Patterns of Agricultural Growth in Viet Nam**

**Agricultural Growth during 1986–2011**

The growth rate of value added in Viet Nam’s agriculture sector has been relatively high and stable compared with other countries in the region. During the period 1986–2011, Viet Nam’s agriculture value added grew by an average of 3.8% per year. This figure was higher than those of all other Association of Southeast Asian Nations (ASEAN) countries, and only slightly lower than the miraculous performance of the People’s Republic of China’s (PRC) agriculture sector in the same period.

Changes in the composition of agricultural output toward products with higher values have contributed positively to agricultural growth and productivity. Along with the rapid agricultural growth, Viet Nam has been able to shift from being a subsistence-based economy to becoming one of sound food security, diversification, commercialization, and also a large exporter of agricultural products. Within the agriculture sector, the share of the crop sector declined from 63.2% to 54.7% during 1986–2011, while the share of industrial crops, and the livestock and fishery sectors increased from 13.1% to 15.9% and from 12.6% to 24.7%, respectively, in the same period.

Structural change has occurred within each sector. In the crop sector, the share of food production in total output declined significantly from 67.5 to 56.8% during 1986–2011. Other crops, especially industrial crops such as coffee, tea, rubber, pepper, and cashew nuts, grew quickly in terms of both sown area and output. The share of industrial crops in total crop output almost doubled from 14.3% to 26.1% in the period. There has also been a rapid increase in area for fruit crops from 261,200 hectares (ha) in 1986 to 832,700 ha in 2011. Meanwhile, net cultivated
paddy area decreased by more than 200,000 ha during 1986–2011. Maize production increased 1.8 times in sown area and 2.8 times in output terms in the same period.

Livestock production has been increasing in scale and become more modernized. Farm-based and concentrated industrial forms of animal husbandry are gradually replacing scattered household-level practices— as of 2001, there were only 1,761 livestock farms across the country, while in 2011 there were as many as 23,558, indicating a sharp growth rate of more than 150% annually. In response to increasing consumer demand, livestock production has been growing relatively fast at an average of 6% per year. In the fisheries sector, there have been positive improvements in both off-shore fishing and aquaculture cultivation. The overall fisheries output increased by 7.5 times, of which aquaculture cultivation increased by 14.5 times during 1986–2011.

The forestry sector has been slower in its pace of development, yet has still achieved increased output. Better attention to forest protection and development has helped alleviate forest degradation nationwide. Total forest coverage has been expanded, from 11.31 million ha in 2000 to 13.4 million ha in 2010, and there has been an expansion in newly planted forests. The wood processing industry has also been booming in recent years and mainly relies on imported materials. This high value-added industry is seen as a sound prospect for development of the forestry sector.

Growth started mainly with the production of rice until the end of the 1990s. From the mid-1990s, agricultural growth was spurred by the development of commercial crops, such as coffee, pepper, and cashew nuts, with the opened access to and increasing prices of international markets. From 2000, growth was mostly led by the fishery and livestock sectors as the crop sector faced resource constraints for further growth and declining market demand.

However, despite these positive structural changes, major shortcomings still exist and there is a need for further attention to increasing agricultural growth and productivity by moving to commodities with higher values and value additions. Crops, especially food crops, still account for a very large share of agricultural production, while consumer preference is moving toward higher nutritional and higher-value products, such as fruits and vegetables, livestock, and aquacultural products. In addition, most of Viet Nam’s agricultural exports are primary products without much processing or value-added creation.

There are three reasons for this slow change in the structure of agricultural production. First, focus on food self-sufficiency still places importance on land for paddy cultivation, though some areas
are not suitable for paddy production that by nature generates little value. Second, research has concentrated mainly on the technological development of food and particularly paddy production. Little attention has been paid to technology development for other crops, livestock, or the fishery or forestry sectors. Third, growth of industrial crops and fishery sectors has been contingent on the export market, which is very unstable. Meanwhile, processing technology is poor as the research system has been biased toward the development of production technologies. In addition, trade infrastructure, credit, and insurance facilities are not sufficient to reduce the risks of investment for modernizing these commercialized sectors.

**Agricultural Growth and Factor Productivity**

**Land Productivity**
Land supply is limited in Viet Nam, and land productivity growth has played the most important role in the growth of total agricultural output. During 1986–2011, land productivity growth contributed to 62% of the growth of total agricultural output; land expansion (sown area), including increasing crop intensity, only accounted for 38% of the growth of total agricultural output (Figure 5.1).

![Figure 5.1: Growth in Agricultural Output and Land Productivity in Viet Nam](image)
Economic reform significantly motivated efforts of farmers to increase land productivity during 1986–1990 and 1991–1995. Together with the previous investment in irrigation during the central planning period, agricultural growth was enhanced further by land expansion. That led to the high levels of agricultural growth during the 1990s of more than 6% per year on average. In the 2000s, possibilities for land expansion became more limited, and hence agricultural growth mostly came from land productivity improvement. The application of intensive farming technologies such as new seeds, fertilizers, and pesticides rapidly improved land productivity in Viet Nam. Land productivity of major commodities increased between 2 and 5 times in Viet Nam during 1986–2011, and figures of land productivity in Viet Nam are relatively high in comparison with other countries in the world.

**Labor Productivity**

Growth of agricultural labor productivity has been dependent on land yield and land availability. Agricultural labor productivity started to rise from the 1990s (Figure 5.2), when land productivity increased significantly without much improvement in land availability. Growth of agricultural labor productivity in Viet Nam achieved the highest levels during 1996–2005 when significant amounts of labor were transferred

![Figure 5.2: Growth of Agricultural Labor Productivity and Yield in Viet Nam](chart.png)
out of agriculture, and land availability per labor increased significantly. Recently, growth of agricultural labor productivity has slowed down as growth of land per labor was limited while growth of land productivity remained constant. This has introduced obstacles for the improvement of income of farm households, and threatened the previous success of rural poverty reduction in Viet Nam.

As a result, agricultural labor productivity of Viet Nam is relatively low compared to other countries in the region. Without significant labor transfer out of agriculture and land productivity improvement, Viet Nam’s labor productivity growth has slowed since the mid-2000s in comparison with other countries. Similarly, agricultural labor productivity was only one-third of national labor productivity in 2011. The labor productivity gap has been increasing since the economic reform, especially between those working in agriculture and industry. As labor costs have been increasing, both in urban and rural areas, relatively low agricultural productivity has discouraged farmers from investing and adopting new technologies in agricultural production, hence threatening the competitiveness of Viet Nam’s agriculture.

The major constraints on Viet Nam’s agricultural labor productivity are small farm sizes and the limited transfer of labor out of agriculture. Egalitarian distribution along with de-collectivization led to equal but very small and fragmented landholdings in Viet Nam. A survey carried out in 2010 shows that 70% of farm households occupy less than 0.5 ha, while only 1% of farm households occupy more than 3 ha. In addition, intra-farm land fragmentation is also a serious problem as an average farm household has 4–5 plots of land with an average total area of 0.6 ha. The small scale and fragmentation prevents farmers from applying new technologies and improving production efficiency. Various studies in Viet Nam show that agricultural commercialization along with the economic reform have changed technical coefficients of agricultural production that favor large-scale farms using more capital-intensive inputs. More importantly, the fragmented landholdings also harm quality consistency, disease management, and application of food safety and sustainable standards. This works to lower the prices and reputation of Viet Nam’s agricultural products, particularly agricultural exports.

Meanwhile, transfer of agricultural labor surplus to non-agriculture has been limited. The high concentration of industrial development around Ha Noi and Ho Chi Minh City has generated only very small spillover effects of income and employment on other provinces and the countryside. In addition, most rural–urban migration has gone to the informal sector, often to the service sector. Informal urban work often does not include labor contracts with sufficient housing, schooling,
healthcare, or social insurance conditions. Rural migrants often do not feel secure in their new urban lives, and hence many choose to keep their small pieces of land in the rural villages as a hedging mechanism. Consequently, land transactions have occurred very rarely in rural areas, and this has further prevented land accumulation and consolidation.

Driving Factors of Agricultural Growth and Productivity in Viet Nam

1986–1990
The 1986–1990 period saw significant growth for total factor productivity due to increased incentives from economic reforms. The reforms led to the development of the peasant household economy in rural areas. Furthermore, the state also accepted private sector food marketing, meaning that farmers were allowed to sell their surplus product to the free market.

In the initial years of Doi Moi, when the old cooperatives started to be dissolved, many of the key contributors to their production processes also disappeared. The cooperative’s machinery and tractors were replaced by the manual labor of households. The shift from the cooperative-planned distribution network to a household system also caused disruption in the supply of agricultural inputs for some time. The reform policy provided a strong stimulus for farmers to work harder, and labor became a factor that helped offset part of the diminished role of machinery.

Market incentives were further improved by market liberalization. In the late 1980s, prices became liberalized and the ration system was ended. As controls diminished, trade began to flourish, and in 1989, the exchange rate was devalued bringing it almost in line with the free market rate.

The 1991–2000 Period
Growth of agricultural value added achieved the highest level of 4.7% during 1991–1995. Yet, the contribution of total factor productivity (TFP) was negative, showing symptoms of the one-off effects of institutional reform of de-collectivization and land allocation to farm households. The one-off effects of institutional reform were further evidenced during 1996–2000, when contribution of labor to agricultural growth was slowed down. Evidence from Coellie and Rao (2003) bolsters the above arguments by showing that TFP growth of Viet Nam’s agriculture was wholly contributed by efficiency change rather than technical change (recorded as negative) during 1980–2000. This reflects the nature of TFP growth in Viet Nam’s agriculture, in which
farmers have been utilizing resources more efficiently within their own production boundary, rather than taking new technologies to move up the production ladder.

In fact, the very high agricultural growth during 1991–2000 can be attributed largely to fertilizer and land expansion and the related growth of pumps. Land expansion in this period was closely related to government investment in irrigation and land reclamation for industrial crops such as coffee. Government budget for irrigation between 1991 and 1995 was 7.4 times higher than between 1986 and 1990. This investment continued to increase by 3.4 times in 1996–2000 from the level of the 1991–1995 period. The government also managed to obtain foreign loans and issue bonds to mobilize additional investment for irrigation. The government allocated major investments in irrigation projects in the Mekong Delta and land clearance work to rapidly increase the acreage of industrial and fruit crops. The successful implementation of the 1996 decision of the prime minister on irrigation work in the Mekong Delta allowed for the transformation of hundreds of thousands of hectares from single-crop land to high-yield double-crop land, making important steps forward in the country’s food production.

The growth of input use, such as of fertilizers, was enhanced by further market liberalization during 1991–2000. This period witnessed a series of efforts toward greater integration with the world economy. Trade agreements were made with ASEAN and the United States, and the economy became more open to export expansion and attractive for FDI. Trade protection measures were greatly reduced as import quotas fell and export quotas dropped. With opened access to input and output markets, while output prices were increasing, farmers had incentives to buy and apply land-saving inputs such as fertilizers and pesticides as much as possible. This led to high growth of in-kind land productivity in the period, but also showed signs of the overuse of chemical inputs that can lead to environmental and food safety costs.

2001–2011 and Beyond
The period 2001–2011 witnessed declining agricultural growth but higher contributions to TFP. During 2001–2011, TFP contributed to nearly 60% of agricultural growth. TFP growth came from three main sources: government investment in agricultural science and technology, agricultural diversification toward higher-value products, and step-by-step improvement in the quality of agricultural products. Between 2001 and 2011, government expenditure in agricultural science and technology increased fivefold. Agricultural research institutes were strengthened in terms of both infrastructure and human resources. This was accompanied by calls to restructure agricultural research institutes
to become more compact and efficient. Mechanisms for management of scientific research activities were also reformed, and the national agricultural extension system was developed and further consolidated.

There were extension workers in all communes, districts, and provinces. Village and hamlet-level extension work was organized in the form of agricultural extension clubs, with 3,918 such clubs and 176,399 members. In addition, there were a great number of voluntary extension workers and collaborators. The active services of this entire extension system reached out to 60%–80% of farm households.

Investment in agricultural science and technology has brought promising results. During 2001–2011, the proportion of land growing high-yield rice varieties went up to 90%, maize increased to 80%, and other annual crops and fruits rose to 60%. Around 90% of imported new varieties were adapted, and that accounted for 35% of varieties applied in agricultural production. Use of hybrid and exotic breeds in 70%–80% of the pig population helped to increase productivity by 17 kg/head in 2001–2005 and 34 kg/head in 2006–2010. New cultivation methods were introduced to help protect the environment and promote food safety standards.

The 2001–2011 period also witnessed strong agricultural diversification toward higher-value crops. Contribution of food crops to agricultural growth reduced significantly to only 40%, from its share of 65% during 1991–2000. Industrial crops continued to grow faster than food crops. Meanwhile, contribution of livestock to agricultural growth increased from 13% in 1996–2000 to 20% in 2001–2011. The performance of the fishery sector was even more impressive with an increase in contribution to agricultural growth from 20% in 1996–2000 to 40% in 2001–2010. The forestry sector also started to grow significantly at an average annual rate of 4% as international prices for wooden products increased.

The diversification toward higher-value products, in part, was a result of further international integration and market liberalization policies, including the removal of rice export quotas and fertilizer import quotas, opening mechanisms for private participation in foreign trade in 2001, and World Trade Organization (WTO) membership in 2007. Agricultural diversification and rural structural transformation were further supported by a series of policies that included support for private investment in the rural sector, contract farming, application of modern technologies, development of rural non-farm activities, and upgrade of rural physical and social infrastructure focusing on education and healthcare. Such policies not only helped the diversification of agricultural production, but also contributed to value chain integration and improvement in the quality of agricultural products.
However, the contribution of science and technology to agricultural growth has still been quite limited. In general terms, the role of investment in production modernization (indicated by the increase in machinery) and science and technology development (indicated by the increase in TFP) has not been very significant in contributing to agricultural growth over the last 20 years (9.5% from tractors, 11.7% from pumps, and 9.2% from TFP). This shows that the contribution of mechanization, labor productivity, and product quality to agricultural growth remains surprisingly limited.

More recently, the level of contribution of inputs has declined markedly. Much of the young and strong labor force has withdrawn from rural areas; agricultural land has shrunk; the use of fertilizers has reached a limit while fertilizer costs have also gone up; and there has been little progress in addressing constraints such as piecemeal land allocation and capital shortage, which discourage farmers from investing in mechanical farming equipment. This leaves science and technology as the only major contributor to continued growth in agricultural production. Increases in TFP have accounted for as much as 55% of the sector’s overall growth rate. In recent years, the Ministry of Agriculture and Rural Development has been shifting focus to the development of science and technology. However, such a move is only happening in terms of organizational and capital structures, and is expected to be challenging with regard to policy framework and operational mechanisms. Investment in science and technology is considered a long-term investment whose effects would only be seen after 5–10 years, meaning a slower pace of agricultural growth in the short term would be expected.

In short, the initial reform of de-collectivization, land allocation to farm households, and domestic market liberalization in the late 1980s created incentives to speed up agricultural growth and labor productivity, mainly in the food sector to fulfill basic needs for the whole population. Yet, these institutional reforms are likely to have had one-off effects, as growth of total factor productivity became negative later on during 1991–1995. Agricultural growth and productivity was attributed more to land expansion with increasing investment in irrigation and to opening access to international markets for agricultural exports. The 1991–2000 period saw the highest level of agricultural growth and the start of agricultural diversification toward industrial crops, which helped the industry to catch up with the high prices in international markets and gave farmers incentives to buy and use land-saving inputs. As a result, land productivity increased considerable during the period, but there were also negative externalities due to the overuse of chemical inputs, with detrimental effects on the environment and on food safety.
During 2001–2011, agricultural growth declined as effects of institutional reform were further limited together with a declining contribution of factors of production to growth. Most agricultural growth in this period was attributed to total factor productivity with increasing government investment in agricultural science and technologies. In addition, strong international integration and an expanding domestic market for higher-value products also helped further speed up agricultural diversification toward the livestock and fishery sectors. It may be argued that this pathway of agricultural growth and productivity was a unique choice, and not the best solution, for Viet Nam to overcome the difficult and uncertain economic reform process by achieving the objectives of food security, poverty reduction, and socio-political stability. However, under the unfavorable conditions of limited natural resources, high agricultural labor surplus, limited capital accumulation, poor agricultural infrastructure, and the threats of food insecurity and poverty, this pathway has created high growth of food, income, and employment for 50%–70% of the labor force. In addition, food availability and agricultural exports have established a solid foundation for industrialization by providing relatively cheap food, cheap labor to attract private investment (both domestic and foreign enterprises), and foreign exchange earnings to import necessary materials for industrialization in Viet Nam.

**Constraints to Further Agricultural Productivity Growth**

Agricultural growth and productivity needs to be enhanced further to fulfill the objectives of socio-economic development. Further agricultural growth needs continuing agricultural transformation with new institutions, resources, and technological innovation. Agricultural labor productivity is very low in comparison to that of non-agriculture sectors in the country and in other neighboring countries. This has created low income and incentives for farming activities, and hence has reduced the competitiveness of Viet Nam’s agriculture in the long term.

Land accumulation and consolidation has been limited as land transactions are rare in rural areas. Smallholding farms of less than 0.5 ha of land are prevalent, and commercial farms of more than 3 ha account for less than 1% of the total number of farm households in the country. Small and fragmented landholdings are obstacles to the application of mechanization, technological innovation, and management improvement. Fragmentation and dispersion of land reduce the efficiency of resource use and do not take advantage of the economies of scale in agricultural production and marketing. Overall,
the level of mechanization and technology applied on farms has been weak, and this has limited markets and damaged competitiveness.

Farm income is low also due to relatively weak farm-gate prices, which lower profits received by farmers. The agricultural value chains are very fragmented with many layers of transactions from farms to final consumers. As a result, farm-gate prices are often less than 30% of retail market prices. It is estimated that only paddy farm households with more than 3 ha of land can earn enough income from paddy production to exceed the national poverty line. Meanwhile, direct contract farming is very limited and accounts for less than 2% of total agricultural sales as enterprises are not ready to establish linkages with huge numbers of smallholding and dispersed farmers. In the context of the smallholding system, agricultural cooperatives develop very slowly and do not fulfill the expected role in supporting productive marketing activities for smallholder farms. The cooperative activities are poor, mainly focusing on the provision of services such as electricity and irrigation. Few agricultural cooperatives work to provide services in terms of inputs for agricultural production (such as of seeds, fertilizers, and machinery), finance, insurance, and marketing.

Agricultural labor productivity is restrained further by the stagnation of land productivity, given limited land availability in Viet Nam. Land productivity, in turn, is limited by the slow changes of crop structure, high costs of production, low value addition along the agricultural value chain, and low quality and low food safety management. The current structure of agricultural production does not reflect the comparative advantages of Viet Nam, and has not been able to capture and meet the potential demand for the future. Cultivation, especially rice, still accounts for a large share of total agricultural output, though demand for rice has been declining and rice prices are relatively low. Government policy for food self-sufficiency still tries to secure 3.8 million ha of paddy land, despite its low economic efficiency.

Livestock has grown rapidly but is unstable and unsustainable under small-scale livestock practices. The growth of livestock production has largely been the result of an increase in the quantity of animals rather than from an increase in productivity. Long periods of disease outbreaks and typically small-sized, low-technology slaughter facilities are additional contributors to the high cost and low competitiveness of livestock products. Fishery and aquaculture lack stability and linkages between producers, traders, and processing enterprises. The production and processing methods sometimes violate international safety standards and pollute the environment. Inland fishery outpaces seafood reproduction capacity while offshore fishery is inefficient. The contribution of forestry to economic growth remains low despite
its high potential, with forestry land covering half of the total natural area of the country. Institutional and policy reforms are occurring at a slow speed in the forestry sector. Forestry characteristically has a very long production cycle. There are high risks of fire and vandalism, a lack of social and environmental functions properly reflected in market relationships, a vast and complex geographical coverage, and foresters are typically poor with low levels of income and education. Vast areas of forest land are still kept as state-owned plantations, but suffer from low efficiency.

Costs of agricultural production, including environmental costs, have been increasing. Agricultural growth in Viet Nam has been based mainly on the use of natural resources and high levels of fertilizers, pesticides, and veterinary drugs. This pathway has achieved economic objectives but generated negative impacts on the environment. This misuse of national resources threatens biodiversity, coastal mangrove systems, and fisheries, among others. It has also generated pollution and increased emissions of greenhouse gases.

Agricultural growth requires strong support through government investment in the sector, but the government budget for agriculture is limited. The budget for agriculture decreased from 13.8% in 2000 to only 6.3% in 2010. Many irrigation systems remain incomplete or unmaintained due to low investment and there is much need for support for improving management systems, market access, and research and development (R&D).

Meanwhile, investment research remains thinly spread and limited. Infrastructure facilities and equipment for research institutions are often outdated or obsolete. Appropriate research on policies, markets, environment, rural areas, and farmers is lacking and the quality broadly inadequate. Applied research on ecological regions (particularly the central coastal and mountainous regions) and basic research work have not received much investment. Bio-technology (except for certain new seed/animal varieties) has not been widely applied and does not contribute significantly to agricultural development. There still remain large gaps in the way scientific research is managed, and research activities have yet to respond practically to training and extension needs. The percentage of research results that have been applied is low. Remuneration packages offered to researchers are not attractive, which has resulted in a departure of qualified, experienced researchers. Those who stay on have to take on non-research jobs in order to make a living.

With regard to extension work, investment is limited and scattered. Extension services are often focused on agricultural techniques rather than knowledge of markets, trade, management, and business
development. Farmers are not treated as clients and services do not necessarily respond to farmers’ needs. The level of socialization of extension work is still low. Due to investment constraints and the top–down system of management, the job of grassroots extension workers is difficult and their power is weak—generally, they do not have the motivation or incentives to wholeheartedly commit to their work.

Furthermore, agriculture has received little support from industry and the service sector. Key industrial products such as automobiles, motorcycles, and electronic appliances are strongly favored by foreign investors and protected by the government. However, the production of agricultural machinery and inputs is neglected. Less than 20% of enterprises are located in rural areas, and only 4% of enterprises are engaged in agricultural production. Domestic enterprises are able to meet only 25% of the domestic demand for agricultural machinery, and the rest is mostly imported from the PRC and/or are second-hand Japanese products. Viet Nam has to import 50% of its fertilizer from the PRC, and much of its supplies of pesticides, veterinary drugs, and seedlings are still imported.

The underdeveloped post-harvest agro-processing industries are another constraint on agricultural growth and productivity. Recently, Viet Nam’s agricultural products have been moving up the ladder of the agricultural value chain. Yet, Viet Nam’s agro-processing industry is still in its infancy and does not provide active supports to match the increasing volume of raw materials produced by agriculture. Agro-processing industries and related services account for just 16% of Viet Nam’s GDP, a figure that is much lower than the typical 25% share of other countries at the equivalent level of GDP per capita of $1,200 per year. Without strong participation of private investors in agro-processing industries, it will be difficult to add more value to agricultural products, and hence improve agricultural productivity and farmer incomes.

Emerging Opportunities and Challenges for Agricultural Development in Viet Nam

Opportunities

Further International Integration
Since its WTO accession, Viet Nam has largely integrated with the regional and global economy, established and consolidated international trade relationships, and invested and cooperated via trade agreements and bilateral negotiations. The opening of the market and rising prices
of agricultural commodities strongly support a country with good comparative advantages in agriculture like Viet Nam.

Growth in population and income of neighboring countries, especially the PRC, has strongly boosted the demand for food. In combination with regional integration, this offers a valuable opportunity for commodity exports and increases in foreign investment in Viet Nam’s agriculture. The threat of food insecurity will continue to press countries to cooperate more closely in coordinating regional supply and demand for food. Furthermore, South–South cooperation will be encouraged by international sponsors for global food security in the context of climate change.

**Increasing Opportunities for Attracting Foreign Direct Investment in Agriculture**

Although FDI investment in agriculture is limited, there is great potential for investment from international companies and organizations. If the government develops appropriate policies, Viet Nam has the potential to become a destination for foreign agricultural investors, as happened with FDI in industry and the service sector in the last 15 years.

**Support of International Donors, Especially on Climate Change Response**

International organizations are paying increasing attention to climate change. South–South cooperation to respond to climate change together with regional food security has become an important subject for finance by international donors in the coming decades. Few developing countries in the world get this chance, and Viet Nam will have to do its best to seize this opportunity.

**Challenges**

**Competition from Neighboring Countries**

Strong regional and international integration also raises the risk of a deterioration in the competitiveness of Viet Nam’s agriculture, as the capacities of available natural resources are reaching their limits and labor prices increasing. Economic reforms in Myanmar and other countries in the region will push up the competition facing Viet Nam’s economy and agriculture. With a low starting point, advantageous natural conditions and cheap labor, Myanmar has the potential to produce agricultural commodities at regional prices and compete with agricultural exporters like Viet Nam, especially on rice. Cambodia has been transforming its economy toward opening the market and improving its competitiveness in order to attract foreign capital.
Competition of Industrialization and Urbanization on Agricultural Resources

Viet Nam’s agriculture has to cope not only with competition from the industry and service sectors, but also with national resource competition from neighboring countries. Upstream countries have been planning many irrigation, dam, and thermal electricity works on the Mekong River. The natural ecological system around the Mekong River could be seriously damaged as water levels may vary unexpectedly, flow directions could change, aqua resources could disappear, and overall hydrologic conditions might be adversely affected. A similar situation could also occur in the upstream Red River.

Increasing Natural Disasters and Epidemic Risks

Environmental pollution is another serious problem, especially in suburban areas, industrial zones, and handicraft villages. In some areas, intensive production and overuse of fertilizers, chemicals, pesticides, and growth-stimulating factors have resulted in toxic residues in agricultural products and increased the resistance and mutation capacity of diseases. The overuse of intensive inputs in the livestock and aquaculture sectors has led to increases in pollution, outbreaks of diseases, and resulted in a decrease in production. The overexploitation of natural resources has led to biodiversity deterioration, ecological imbalance, and natural resource depletion. Forests, wild animals, groundwater, aquaculture resources in inland and coastal areas, and some mining resources appear to be suffering from overexploitation. Recent years have witnessed a cycle of natural disasters and disease occurrences affecting crops and animals, which has made the growth of agricultural production unsustainable.

Adverse Impacts of Climate Change

Viet Nam is particularly exposed to natural disasters and at risk from the effects of climate change and highly vulnerable to rising sea levels. In the long run, the current production structure will be seriously affected by climate change, and rising water levels in the Mekong Delta and the coastal middle region. In the medium term, climate change is likely to have adverse effects on the agriculture sector in the coming decades due to increasing salt penetration and extreme changes in precipitation and temperature. In the short run, the risks related to pests and diseases will increase. For these reasons, climate change needs to be considered in all scenarios of agricultural and rural area development, and strategies need to be devised to best mitigate the ill effects.
Characteristics of the Agriculture Sector in Viet Nam

Table 5.1 summarizes the attributes of Viet Nam’s agriculture sector.

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<th>Strengths</th>
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<td>• Appropriate natural resources for agricultural production&lt;br&gt;• Extensive system of irrigation infrastructure&lt;br&gt;• Farmers with good skills in agricultural production&lt;br&gt;• Low cost and high volume of agricultural production&lt;br&gt;• Strategic location in the region</td>
<td>• Limited quantity of resource endowment&lt;br&gt;• Low uniformity of products and low food safety&lt;br&gt;• Slow structural change and low efficiency&lt;br&gt;• Dependence on imports of agricultural inputs&lt;br&gt;• Underdeveloped agricultural products processing</td>
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Opportunities

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<th>Opportunities</th>
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<tr>
<td>• Growing demand for agricultural products&lt;br&gt;• Further international integration&lt;br&gt;• Increasing opportunities to attract foreign direct investment&lt;br&gt;• Support of international donors, especially on climate change response&lt;br&gt;• Development with technology&lt;br&gt;• Government commitments to economic restructuring and support for agricultural and rural development</td>
<td>• Increasing competition from neighboring countries&lt;br&gt;• Evolving demand for standards compliance&lt;br&gt;• Competition of industrialization and urbanization on agricultural resources&lt;br&gt;• Increasing natural disasters and epidemic risks&lt;br&gt;• Adverse impacts of climate change</td>
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On the demand side, increasing demand and international integration will provide significant opportunities for Viet Nam’s export-oriented agriculture. Meanwhile, shifting diet patterns, both in the domestic and international markets, toward high nutrition products are pushing Viet Nam’s agricultural structure to move faster toward animal feed, industrial crops, livestock, and fishery products. The evolving demand for better-quality, standards-compliant agricultural products will challenge Viet Nam to form reliable trading links and assert its brand presence in international markets.

For low-value agricultural products like rice, regional integration provides a favorable environment for export of agricultural commodities and consequently enhances the importance of Viet Nam in Asia and the Pacific. It is worth noting that the increasing competitiveness
of neighboring countries like Myanmar and Cambodia will require Viet Nam to make strong efforts in technology innovation to maintain its competitiveness in low-end agricultural markets as labor costs rise in Viet Nam.

On the supply side, Viet Nam’s agriculture has significant opportunities for capital inflows from private investment, international donors, and the government. As natural resource endowments are limited and declining, appropriate policies and institutions are needed to drive capital flows into factors that can create further momentum for agricultural growth and productivity. These may include policies focused on production and trade infrastructure for agriculture, agricultural technology innovation, development of industries producing agricultural chemical inputs and machinery, and development of agro-processing industries. Furthermore, given the increasing outbreaks of diseases and food poisoning, improvement is also needed in agricultural services such as plant protection, veterinary services and animal husbandry, food safety, and quality management. Last but not least, Viet Nam’s agriculture must develop toward greater flexibility and improved resistance against weather and climate change through enhancing the effectiveness of production measures and technology to diminish the risks and consequences of natural disasters.

Overcoming the Challenges: Options to Enhance Agricultural Productivity

The above analysis provides a basis to develop prioritized options and solutions to enhance agriculture and labor productivity in Viet Nam in the medium and long terms. The major objective of the reform agenda for the coming years is to develop a modernized, commercialized, and export-oriented agriculture sector with better quality, and increased competitiveness and sustainability to serve the increasing and diversifying demand of domestic and international consumers. With this objective, the following priorities should be set:

- Moving away from low-value, uncompetitive agricultural commodities toward high-value, competitive ones
- Moving toward further value addition to the agricultural value chain
- Moving to quality and food safety control
- Moving from resource-intensive to technology-intensive agricultural growth
- Moving from fragmented to consolidated landholdings
The most promising policy options to address these priorities include the following:

**Land Policy**
- Remove constraints on the 3.8 million ha of paddy land. Protect agricultural land instead of paddy land by allowing flexible change of land use between paddy and other crops. Allow the change of paddy land with inefficient production to land for high-value production activities.
- Facilitate land use transfer and the renting of land. Ensure conditions that protect the land and the rights of farmers.
- Encourage land consolidation and accumulation by supporting cadastral surveys, land certificate issuance, and infrastructure investments.
- Discourage further fragmentation of landholdings through progressive inheritance taxes.
- Encourage flexibility in land use to adapt to market opportunities rather than using administrative measures.

**Land-Use Planning**
- Develop land-use planning and stabilize areas of specialized production zones of crops (coffee, rubber, tea, pepper, and cashew nut) with high competitiveness and market potentials in appropriate regions.
- Develop specialized production zones of fruit and vegetables with sufficient conditions to monitor food hygiene and safety standards.
- Move livestock production from areas with low population density to specialized areas far away from cities and residential areas. Develop livestock according to the specific advantages of each ecological region in two ways: (i) promoting large-scale and intensive production in specialized and industrialized areas with high-tech applications, and (ii) maintaining household livestock production with incentives to apply technologies and protect biosecurity. Encourage linkages among value chain stakeholders to reduce costs and increase efficiency and value added. Enhance disease control and prevention along with improved veterinary services and biosecurity protection. Promote hygienic production models with high technology and effective management of polluting wastes.
- Increase value of forestry production, improve capacity and the effectiveness of environment and biodiversity protection, respond effectively to impacts of climate change, and contribute
positively to the livelihood improvement of the inhabitants of mountainous areas. Develop intensive forestry products with good comparative advantages in appropriate regions, establish specialized material production areas of medium and large scales, meeting the criterion of sustainability and supplying material wood for industrial production.

**Public Investment Policy**

- Increase investment in infrastructure and provide support for agribusiness development.
- Develop special or favorable policies to support private investment in the production of agricultural inputs and agro-processing industries.
- Increase investment in market information and forecasting systems.
- Establish research systems and information networks to ensure market-oriented forecasting and regular supply of essential price, supply, and demand information for producers and investors.
- Prioritize private–public partnership investment in agricultural marketing storage, trade facilities, specialized railways, and seaports for agricultural export.
- Prioritize programs and projects on pest and disease surveillance, prevention and control, and food safety assurance.

**Private Investment Promotion**

- De-concentrate industrial and urban development to the rural areas. Develop satellite urban clusters around major cities. Move industrial zones, entertainment facilities (golf courses, botanical gardens, protected parks, and resorts) and public facilities (airports, universities, and research institutions) to rural areas and at the same time build associated infrastructure items (e.g., roads, air routes, railway, and seaway systems) to connect to the major cities and markets with high-quality services (e.g., schools, hospitals, and supermarkets).
- Develop rural entrepreneurship by providing support in terms of land allocation, infrastructure, credit, technology, and trade promotion.

**Trade Policy**

- Reduce tariff and non-tariff barriers and engage in building connectivity with regional trade partners.
Meet all WTO obligations, and pass Codex Alimentarius, World Organisation for Animal Health (OIE), and International Plant Protection Convention (IPPC) standards.

Develop value chain integration and ensure equal benefit sharing among stakeholders in the value chains.

**Science and Technology Policy**

- Increase investment in agricultural science and technology.
- Prioritize investments for research institutes and collaborating entities.
- Prioritize government investment in technology innovation of post-harvest and processing segments.
- Establish clusters of high technology research, training, and production centers for different ecological regions in the country.
- Focus R&D in the direction of autonomy and self-responsibility for universities and research institutes, and attract investment from all economic sectors, especially foreign organizations engaging in R&D activities.
- Strongly decentralize extension activities for farmers’ organizations and enterprises. Focus on increasing the roles of farmers’ organizations and industry in articulating research priorities. Improve the system of research monitoring and evaluation.
- Strengthen the linkages between research, training, and extension activities. Also, strengthen the linkages between medium- and short-term weather forecasting and crop advisory services to ensure better farmer crop and varietal choice decision-making, and more efficient utilization of irrigation water.
- Promote and facilitate the application of sustainable and intensive farming practices.

**Vocational Training Policy**

- Formalize rural, non-farm employment and provide support in terms of vocational training, employment registration, labor market information, insurance, and decent housing conditions.
- Support vocational training for farmers in a systematic manner, with degree-granting for trainees. Support funding to farmers’ associations and production associations for vocational training, acquire science and technology, and secure access to information.
• Strengthen the national target program on vocational training and human resource development and ensure annual training of a target of around 1 million rural laborers.
• Develop unions for rural workers to facilitate career change. Support unions in organizing vocational training and certification to its members. Develop special policies to encourage enterprises to invest in the labor market and to absorb rural labor into non-agricultural activities.

Summary and Conclusions

Some of the major constraints on agricultural labor productivity include small and fragmented landholdings, the slow transfer of labor surplus out of agriculture, and low farm-gate prices due to the fragmented agricultural value chain.

Overall, in the authors’ opinion, focus should be placed on the following five priorities to enhance agricultural growth and productivity:
• Moving from low-value, uncompetitive agricultural commodities to high-value, competitive commodities.
• Moving from agricultural production to further value addition of the agricultural value chain.
• Ensuring implementation of quality and food safety controls.
• Moving from resource-intensive to technology-intensive agricultural growth
• Moving from fragmented to consolidated landholdings, and from agriculture to non-farm employment.

Bibliography


6. Developing Competitive Seed Industries in CLMV Countries

Min Aung

Introduction

Seed is the most crucial determinant of agricultural production potential, on which the efficiency and effectiveness of other agricultural inputs are dependent. Increased and sustained agricultural productivity is dependent mainly on the development of new and improved crop varieties and an efficient seed industry for timely supply of seeds at affordable prices to farmers, particularly smallholder farmers.

Agriculture sector contributions to gross domestic product (GDP) of 21%–35% in Cambodia, the Lao People’s Democratic Republic (Lao PDR), Myanmar, and Viet Nam (CLMV countries) strongly indicate the importance of agriculture for these countries’ economies, and the development of a sustainable and effective seed industry is one of the main priorities in agricultural development. Provision of research and development (R&D) activities is mainly carried out by government agencies at the central and regional levels, but the capacity for R&D is still very limited, mainly due to lack of funds. Less than 5%–10% of each country’s national budget is spent on agricultural research. In all the CLMV countries, the public sector is currently dominant in the formal seed production system. However, 80%–90% of seed production is still in the informal seed system, produced by farmers’ own saved seeds.

Seed distribution requires seed demand and supply to be balanced by way of a secured seed supply system in the CLMV countries. Harmonization of seed certification and seed quality standards among the CLMV countries is a major factor in quality assurance systems, and seed processing and quality control facilities need to be improved.
The common result of millions of farmers repeatedly sourcing seeds informally is inferior seed quality, dissemination, a build-up of seed-borne diseases, and crop yields that are far below their potential.

The private sector plays a major role in seed industry development, since governments alone cannot implement all seed industry activities. It is recommended to develop a seed industry with the participation of all sectors including public, private, and farmers’ associations and individual seed growers. National seed associations could be part of the coordination mechanism among the CLMV countries. National seed associations at the village level should be formed and model seed villages should be widely established.

All the CLMV countries have seed legislation. Cambodia established its seed laws in 2008, Lao PDR in 1997, Myanmar in 2011, and Viet Nam in 2004. However, in all the CLMV countries, rules and regulations are not clear and implementation is weak. Also, improvement of the basic rural infrastructure in remote areas, e.g., farm roads, electricity, irrigation network, post-harvest handling, and market information systems, are important issues for the development of efficient seed industries.

### Contribution of the Agriculture Sector in CLMV Economies

Together, Cambodia, the Lao PDR, Myanmar, and Viet Nam comprise a total of around 137 million hectares (ha) of land and an agricultural population of around 110 million people. The agriculture sector contributes significantly to gross domestic product (GDP) in all the CLMV countries. Among the CLMV countries, Myanmar and Viet Nam have the largest land areas, agricultural land, and populations. With the majority of the population engaged in agriculture in all the CLMV countries, it is clear that the agriculture sector is of great importance for economic and rural development.

Agriculture in the CLMV countries is generally in transition from a subsistence model to a more commercial model due to the combination of increased use of improved varieties of produce, modern production techniques, farm machinery, and improvements in irrigation (Table 6.1).

Asia comprises almost 90% of the world’s rice-producing area, 90% of rice production, and 70% of rice exports, while the CLMV countries account for almost 15% of the rice area and 13% of the production in Asia. Rice is the major staple food crop in all the CLMV countries, among which Myanmar has the largest area at 8 million ha of rice, followed by Viet Nam with 7.7 million ha. During 2011–2012, exports of rice from Viet Nam and Myanmar reached 7.7 million tons (t) and
710,000 t, respectively. The increase in the production of rice in Viet Nam illustrates the importance of modern improved varieties and use of good-quality seeds, which have been major factors contributing to increased rice production in the CLMV countries.

Rice production yields have been relatively low in the region, except for Viet Nam. Cambodia yields 3.0 t/ha, the Lao PDR 3.75 t/ha, Myanmar 3.83 t/ha, and Viet Nam 5.7 t/ha. The average yield of Cambodia, the Lao PDR, and Myanmar is only around 3.5 t/ha, which is 43% lower than Indonesia, 63% lower than Viet Nam, and 89% lower than the People’s Republic of China (PRC). This strongly indicates that substantial seed industry development is necessary in Cambodia, the Lao PDR, and Myanmar. Compared with the three other CLMV countries, Viet Nam has major seed industry activities, with stronger participation and involvement of the private sector and farmers.

Table 6.1: Rice Production in CLMV Countries, 2009–2010

<table>
<thead>
<tr>
<th>Country/Region</th>
<th>Rice Area (million hectares)</th>
<th>Yield (tons per hectare)</th>
<th>Production (million megatons)</th>
<th>Export (million megatons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>159</td>
<td>4.37</td>
<td>696</td>
<td>32.77</td>
</tr>
<tr>
<td>Asia</td>
<td>142</td>
<td>4.45</td>
<td>632</td>
<td>23.30</td>
</tr>
<tr>
<td>Cambodia</td>
<td>3</td>
<td>3.00</td>
<td>8</td>
<td>0.05</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>1</td>
<td>3.75</td>
<td>3</td>
<td>…</td>
</tr>
<tr>
<td>Myanmar</td>
<td>8</td>
<td>3.83</td>
<td>29</td>
<td>0.71</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>8</td>
<td>5.70</td>
<td>44</td>
<td>7.77</td>
</tr>
<tr>
<td>Thailand</td>
<td>11</td>
<td>2.87</td>
<td>32</td>
<td>8.94</td>
</tr>
<tr>
<td>India</td>
<td>43</td>
<td>3.38</td>
<td>144</td>
<td>2.22</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>12</td>
<td>4.28</td>
<td>50</td>
<td>0.01</td>
</tr>
<tr>
<td>Indonesia</td>
<td>13</td>
<td>5.02</td>
<td>66</td>
<td>…</td>
</tr>
<tr>
<td>People’s Republic of China</td>
<td>30</td>
<td>6.55</td>
<td>197</td>
<td>0.62</td>
</tr>
</tbody>
</table>

… = not available, Lao PDR = Lao People’s Democratic Republic.
Source: Government of the Union of Myanmar, Ministry of Agriculture and Irrigation (2012).

Role of Research and Development

The breeding of improved varieties of rice and other crops through R&D is the main task for maintaining and increasing crop productivity in the CLMV countries.
The Cambodian Agricultural Research and Development Institute (CARDI), the Lao PDR’s National Agriculture and Forestry Research Institute (NAFRI), Myanmar’s Department of Agricultural Research (DAR), and the Viet Nam Agricultural Research Institute are the main institutions maintaining local genetic variability, releasing new developed varieties, producing and maintaining supplies of parent seeds to supply to private seed growers, and educating farmers and seed growers about rice varieties and production techniques.

CARDI has released over 39 new rice varieties and maintains at least 2,560 samples of current seed varieties, local landraces, and wild rice relatives for breeding purposes. Since 2006, the institute has used a backcrossing program where a popular variety is hand crossed with another for the purpose of introducing a new, superior trait into that variety. After five successive generations, all plants with the new trait are selected and the new variety can be released. The backcross method of variety development is important because it uses the existing varieties that farmers are familiar with and know how to grow. It then adds a single trait that will make the new variety superior for the farmer. By using these existing varieties, it is hoped that farmers will accept these new varieties more readily because of the similarities to the presently used ones. More recently, genetic tests are being performed to identify desired plants in earlier generations in order to eliminate several years from the development process.

During the mid-1960s, research activities mainly focused on germplasm collection and the introduction of promising lines from the International Rice Research Institute (IRRI). In 1964, IR8, the first high-yielding, non-glutinous rice variety, was introduced from IRRI. A collaborative program between the Lao PDR’s Ministry of Agriculture and Forestry and IRRI was developed in 1991 and has maintained over 13,000 lines and seed varieties. From 1993 onward, the Lao PDR–IRRI program released many new rice varieties. The first main rice seed varieties used in the Lao PDR were Thadokkham1 (TDK1), Thasano1 (TSN1), and Phon Ngam (PNG), providing most of the rain-fed areas with improved varieties.

In Myanmar, under the Ministry of Agriculture and Irrigation, the DAR is solely responsible for R&D, including varietal development, collection, preservation, and maintenance of local and introduced crop varieties. The DAR has developed 223 new varieties of various crops and maintained 12,000 accessions in their gene bank. It has 24 research stations and is the main institution for the production and maintenance of breeder and foundation seeds. In addition to this, the Department of Agriculture (DOA) has 32 seed farms and produces registered seeds.
In Viet Nam, the provision of research activities is mainly carried out by government agencies. R&D comprises 18 research institutes, 6 universities, and large seed companies, among which 15 research institutes are under the direct responsibility of the Ministry of Agriculture and Rural Development (MARD). These research institutes have been organized under the Vietnam Academy of Agricultural Science (VASS) since 2005. The remaining three research institutes are under the management of the Ministry of Industry and Trade and the Ministry of Health. The six universities involved in seed research and development are under the Ministry of Education and Training.

In Viet Nam, only about 2% of the national budget is spent on science and technology, of which only 6.7% is allocated for agricultural research (around $50 million). Due to a lack of funds, institutions have generated income by engaging in profit-making activities with various enterprises, organizations, and farmers. As a result, basic and fundamental research has been neglected. Furthermore, the lack of funds has also resulted in out-of-date and incompatible research facilities in research institutes.

The development of new varieties is largely dependent on the selection from natural and IRRI sources. Newer technologies such as biotechnology and plant genome transformation need to be developed in all the CLMV countries. The use of modern biotechnology, which requires the adoption of genetically modified organism (GMO) regulations, is a major issue, and investment in this area is urgently needed.

**Seed Production and Distribution**

The concept of “good quality seed” needs to be identified among the CLMV countries. In the main field crops like rice, the most frequent solution is to produce “certified seeds.” In all the CLMV countries, the formal seed system is mainly organized and managed by the government, which monitors the entire process of seed production from breeding to production, and processing to storage, to ensure the quality of seeds. Formal seed production generally passes through the four generations system, i.e., breeder seed, foundation seed, registered seed, and certified seed. The weakness in the formal seed production system is that there is not enough capacity to produce enough certified seeds for the farmers. Poor infrastructure development, low budget, a lack of incentives, and weak coordination with the private sector are the main issues facing the formal seed production system (Figure 6.1).

In the informal system, seeds are produced and supplied by farmers, farmers’ groups, and cooperatives. In this system, farmers or farmers’
organizations themselves select, produce, disseminate, procure, and manage the seeds from their own harvest and exchange them among friends, neighbors, relatives, local markets, or traders.

The informal seed production system consists of three forms of seed production and supply:

i. Farmers produce their own seeds by preserving a portion of their production from the previous harvest for the next season.

ii. Farmers exchange their own self-produced seeds between friends, neighbors, and relatives.

iii. Seeds are produced by farmers’ groups or cooperatives and distributed to local markets or through local traders.

This system is characterized by being small scale, spontaneous, and having a low level of organization. It operates without formal quality control and certification and is not subjected to seed regulations, so the quality of the seeds produced is often lower and poorer than in formal production systems. However, the informal seed system plays an
important role in preserving local rice biodiversity in seed security in rural areas, particularly in remote and mountainous areas where formal seed supply is not accessible or affordable.

In Cambodia, the Government Department of Agriculture (GDA) is currently producing quality seeds through projects supported by the Asian Development Bank (ADB). Seed production is carried out in a total of 450 ha in GDA agricultural development centers: 200 ha produced at the Tuol Samrong Seed Farm in Battambang Province, 50 ha produced by contract farming in Trapeang Thmar in Banteay Meanchey Province, and 200 ha produced in Kampong Thom Province. Through this program, the GDA has been able to produce several thousand tons of good-quality seeds, but the funds to carry out the seed production are limited.

In the Lao PDR, the NAFRI is taking on the important role of rice seed industry development. Together with the National Agriculture and Forestry Extension Service (NAFES), it conducts seed multiplication programs, then transfers the seeds through extension agencies, nongovernment organizations (NGOs), or farmers’ groups to distribute directly to farmers. However, upgrades and improvements are needed for infrastructure facilities both in terms of production fields and building, and the Government of the Lao PDR suffers from tight budget constraints, with the yearly budget of the NAFRI research station barely enough to cover salaries, electricity, and water.

In Myanmar, development of formal seed production started in 1978 with a number of projects funded by the World Bank, the United States Agency for International Development (USAID), and the Food and Agriculture Organization of the United Nations in rice, corn, pulses, cotton, wheat, and oil crops. Through these projects, Myanmar established a system of seed multiplication, created infrastructure for seed farms, organized local and international seed training, and built seed quality laboratories and seed processing plants.

The Myanmar seed production program follows the four-generation system of seed multiplication: breeder, foundation, registered, and certified seed. The DOA is mainly responsible for the production of registered seeds. During 2011–2012, the DOA produced 2,400 t of rice registered seeds from their 32 seed farms and distributed the registered seeds through the extension system to 4,900 contracted farmers in 530 villages in the whole country for certified seed production. However, due to inefficiencies in the distribution system, not all the registered seeds reached the contracted farmers.

It is estimated that the amount of certified seeds needed for favorable high yielding variety areas in Myanmar is 100,000 t. However,
seed production reached 15,000 t in 2012–2013. Based on these data, the current certified seed system only accounts for 5%–10% of the rice area in Myanmar.

In Viet Nam, the formal seed production system consists of private seed companies, research institutes, and provincial seed centers producing certified seeds with high quality standards. In 2011, the number of businesses operating in the formal seed system was 415 units, comprising 243 seed companies, 129 provincial seed centers and companies, and 43 other units. Among the businesses operating in the official seed supply system, two national seed companies are the leading companies, National Seed JSC (Vina Seed) and Southern Seed JSC (SSC). Before 2002, these two companies were state-owned enterprises operating under the management of MARD. They were transformed into joint-stock, for-profit companies and participate in seed research, breeding and selection, and production and distribution of quality seeds, as well as other agricultural inputs in the country.

The demand for seed in Viet Nam is mainly for cereal crops like rice and maize, annual industrial crops, and vegetables. The main demand for seed includes rice seed (1.1 million–1.2 million t annually), maize (26,000–28,000 t annually), groundnuts (14,000–15,300 t), and vegetables (5,000 t). Although there is a large demand for seed, the size of the seed market in Viet Nam is relatively small. This is because a large amount of seeds (accounting for 83% of total seed demand) is self-produced by farmers by preserving a part of production from the previous harvest for the next crops (farm-saved seed). As reported by MARD (2007) and the Viet Nam Seed Trade Association (2007), current certified seed (supplied by the formal system) only accounts for 17% of seed demand for the whole country (rice, 16%; maize, 90%; soybeans, 8%; and groundnut, 3%).

While the formal system dominates quality seed production and distribution to farmers in industrialized countries, the informal sector is still the main method in all countries in the lower Mekong. It is reported that 80%–90% of the world’s smallholder farmers still obtain seeds from informal sources. The current certified seed distribution system only accounts for less than 10% of seed requirements in Myanmar, Cambodia, and the Lao PDR, and less than 15%–20% in Viet Nam.

It is well noted that all key participants in the seed production supply chain face considerable constraints. These are mainly due to capital deficits, limited irrigation, lack of equipment and facilities, and risky rice growing conditions attributable to uncertain rainfall, flood, and drought.
Seed Marketing

The development of a seed industry requires a seed market, i.e., a demand for seed by the farmers. That demand exists to some extent for some crops, particularly hybrids like maize and vegetables, but is very weak for the main autogamous crops, such as rice. The main reasons generally put forward are that farmers are not convinced of the technical benefits of improved varieties and that they cannot afford to buy expensive seeds. Those aspects, while somewhat linked, must be taken separately.

The demand for improved rice seed is determined by the following factors:

i. farmers’ capacity to adopt proper agronomic practices, and

ii. farmers’ capacity to access markets and finance.

Demand is also affected by specific agro-ecological conditions, which determine the type of varieties grown and soil types. These factors could have a significant role in farmer demand for improved varieties over traditional varieties, which have lower yields, but may be better adapted to local conditions. In order for farmers to adopt improved seed, it would be necessary to demonstrate that improved cultivars could outperform local varieties under local agro-ecological and climatic conditions or in conditions that allow farmers to overcome agro-ecological and climatic constraints.

In the CLMV countries, except for hybrid corn and vegetables, rice seed marketing is not well established, but is slowly making progress. In rice, farmers are still using their own seeds (the informal system) and the formal seed system does not provide enough certified seeds for farmers. Viet Nam is the exception, and there are many seed companies selling their seeds in the local seed market. They also have contract farming with farmers, provide credit, seeds, and inputs; give training in seed production; and buy back with guaranteed prices.

Cambodia, the Lao PDR, and Myanmar are following the same system for seed production, distribution, and marketing. Currently, the national and private seed companies mainly distribute their seeds through their private agents, some through local extension systems. Exceptionally, seed marketing is quite successful in hybrid corn and vegetables in the CLMV countries.

In the world’s seed market, the potential for seed production, not only for domestic markets but also for export, is significant. The international seed market is increasing and reached a value of $10 billion in 2011 (International Seed Federation website). The total amount is divided as follows: field crops, $6.4 billion; vegetables, $3.3 billion; and flowers, $300 million. Given the increasing demand at the international
level, continuous growth is expected. The CLMV countries could play a significant role in that development, not only for vegetable seed but also for field crops, in particular hybrids.

For vegetables, the situation is simpler as vegetable seed is sold as standard seed and does not need international certification. The seed must “only” have the seed standards required by contract. The International Seed Federation Trade Rules set the generally accepted purity and germination standards for the main vegetable species. They also provide information on how to write an international seed production contract for both vegetables and field crops.

To be involved in the international trade for field crops, a country must be member of the Organisation for Economic Co-operation and Development (OECD) Seed Schemes, except when there are regional agreements. Indeed, the CLMV countries require an OECD certificate to accept seed imports. Almost 60 countries representing the major part of the international seed market are members of the OECD schemes. This is an important issue for the CLMV countries regarding their participation in the international seed market.

CLMV farmers mainly rely on the farm-saved seed system because it is not always possible to access the right seeds supplied by the official system, at the right time, right quality, and affordable prices. Also, sometimes there are no significant differences between farm-saved seeds and certified seeds from the official system and the prices of certified seeds are higher.

Farmers also believe in farm-saved seeds because they know the seed producers (often neighbors, relatives, or friends) and it is known that the seeds provided are compatible with the local ecosystem. Most farmers are resource poor and do not have access to the necessary expertise. In some cases, farmer seed exchange does not work among poor farmers as they often do not store their own seeds—they buy or obtain the old (informal) seeds from other farmers who have surplus seeds. This practice results in a progressive degradation of seed quality and has a significant impact on rice quality and productivity.

In the CLMV countries, most farmers do not know about the latest new improved rice varieties; they simply continue growing the old, poor quality rice varieties through habit. The diversity of rice varieties is also high in the villages, with most villages growing 10–20 different varieties; single farmers even grow 2–3 varieties on average. There is a strong need for technical and financial support from the government and private sector to produce and publicize good-quality seeds.
Seed Imports and Exports

All the CLMV countries import seeds from outside, mainly from Thailand, the PRC, and India. To avoid the introduction of harmful diseases, weeds, and pests, seeds and planting materials imported into the country must be in conformity with published standards for seed quality and be correctly labeled.

Plant quarantine and phytosanitary regulations for seeds and planting materials must be based on actual risk assessments for pest and disease organisms. To facilitate the movement of materials across the land borders, information available from neighboring countries and the regional plant health organization should be used to prepare the regulations related to the seed import.

In Cambodia, the amount of crop seeds imported was reported to be around 1,130 t in 2006, 1,227 t in 2007, 2,300 t in 2008, and 1,900 t in 2011. It is assumed that the demand for improved rice seed is higher in areas of favorable agro-ecological conditions and in areas with higher agriculture potential in general. For example, based on the Ministry of Agriculture, Forests and Fisheries’ statistics in Cambodia on rice production in 2009 and the Ministry of Water Resources and Meteorology’s statistics on irrigated areas in 2009, only 0.6 million ha of the current 2.6 million ha of cultivated rice crop is under irrigation. With this assumption, a total amount of approximately 30,000 t of improved seeds would be needed when using a seeding rate of 50 kg/ha.

Viet Nam is importing mainly seeds of hybrid rice, hybrid corn, and vegetables. The annual import value of seeds is about $200 million. Annually, Viet Nam imports around 15,000 t of hybrid rice seed (70%–75% of demand), with import value amounting to $46 million. Hybrid rice seeds are mainly imported from the PRC. Viet Nam also imports around 10,000 t (60% of demand) of hybrid corn seeds, mainly from Thailand and India. The import value of vegetables seeds is about $100 million. Seed exports are insignificant compared to imports, with Viet Nam only exporting small amounts of vegetable and cashew seeds.

Exports of seeds between the CLMV countries and within the region in ASEAN are progressing well due to increasing diversity of agro-climatic conditions and rapidly improving regional connectivity and infrastructure providing new market opportunities. The CLMV countries hold significant promise for the exporters of seeds. Seed exports are improving, especially of vegetables, giving vegetable seed growers more opportunities to sell their products. As a result of these improvements, seed growers are more likely to purchase seed to ensure the quality of the crops they produce.
Quality Assurance

Purity is a major factor in seed production. All the CLMV countries have recognized the importance of quality control in seed production, distribution, and marketing. In rice seed production, all the countries follow the same quality control procedures. It is already well known among the CLMV countries that it is required to plant a nursery with vigorous seedlings, and transplant at the rate of only one plant per hill because of the high value of the seed. It is also necessary to keep fields free of off-type plants and undesirable weeds during the growing season. Seed should be harvested at proper maturity periods using improved machines or proper traditional methods, and some traditional winnowing is still necessary at the farm level. The harvested seed is tested for moisture content and usually dried down to 12%–13% moisture.

Testing the seed for germination and purity is also important. In the CLMV countries, laboratories and procedures are generally not accredited or well trained, but they can perform adequate tests that give acceptable results. All seed is labeled to a minimum of accepted levels. Germination is labeled at 80%, physical purity at 98%, and levels up to 3% of off-type plants are tolerated.

Post-harvest handling is also a major issue in seed quality assurance. After drying, the seed goes directly to the air screen grader for cleaning and the seed is bagged in clean bags at the back of the cleaner. After cleaning, each seed lot is sampled for seed analysis. Each seed bag is printed with the variety name, seed class, individual lot number, and seed analysis information. The seed is stored on pallets in warehouses and plastic sheets are used to protect bags and minimize losses due to birds and rodents. The warehouses are enclosed and ventilated so that extreme conditions are moderated, but the seed can be still exposed to the warm and humid conditions that can have a negative effect on seed viability. Hence, post-harvest facilities like combine harvesters, dryers, processing plants, moisture testers, and seed germinators are required in quality assurance.

Despite increasing progress in producing and using quality seed, presently about 20% of the total rice land area in Cambodia is cultivated with quality seed. Farmers understand the benefits of quality seed but cannot afford to buy it. Improving and increasing community access to quality seed based on their needs and preferences is one of the most essential methods for increasing productivity.

Harmonization of seed certification and seed quality standards among the CLMV countries is a major factor in the quality assurance system. The cleaning process for quality seeds is also important. Without processing facilities, minimum standards in seed regulation
have no meaning. It is recommended to use the International Seed Testing Association standard seed testing procedures in all the CLMV countries. There is a need to upgrade seed testing facilities to monitor seed quality control and to improve the capacity of seed technicians. At the regional level, a standard protocol should be developed to enable local seed producers to carry out reliable seed lab tests using simple equipment and improve the quality of their seeds at minimum cost.

Role of Public–Private Partnerships in the Seed Industry

In the CLMV countries, private seed companies are leading in official seed production and distribution systems. Among the CLMV countries, Viet Nam has the strongest private sector involvement in the seed industry. The Lao PDR is still weak in the seed business.

In Cambodia, AQIP Seed is the largest seed company. Farmers who purchase seed have learned the value of planting good seed and look to demonstration plots and seed growers’ fields to learn about new varieties. Based on sales recorded by AQIP Seed, seed purchases increased by 10% from 2004 to 2006, and over 20% from 2006 to the present.

Viet Nam’s National Seed JSC (Vina Seed) and Southern Seed JSC (SSC) are the leading companies in importing, producing, and distributing rice and maize seeds. Private companies operating in the seed industry are mainly located in cities, particularly Ha Noi and Ho Chi Minh City. Their main business activities are trading, importing, and exporting vegetables or other seed varieties. These companies dominate the vegetable seed market in Viet Nam. There are also eight multinational companies operating, including Syngenta, Bio-seed Research, CP Group, Siminis Vegetable Seed Co., Viet Nam Representative Office, Nong-Huu Plant Varieties, Dong Tay Joint Venture, Monsanto, and Bayer. These companies concentrate on producing seeds and trading hybrid rice, maize, and vegetables.

Myanmar has started the formation of private seed enterprises in the seed industry. With the encouragement of the government, the Myanmar Rice Industry Association (MRIA) was formed in 2009 and was changed to the Myanmar Rice Federation (MRF) in 2011. Under the MRF, more than 50 specialized rice companies have been formed and work in the whole rice supply chain mechanism program. Among them, about 10 rice specialized private companies, including Gold Delta, Dagon International, Eden Group, Yadanar Ayar, Myint Zeyar, Asia World, and other seed companies are producing certified seeds. They procure the
registered seeds from the government seed farms and organize the seed growers to produce certified seeds. They provide seeds, fertilizers, and other inputs and also some credit with very low interest rates. They also hire agricultural technicians to train farmers to produce seeds. The seed-producing fields are inspected and off-type plants are removed. The seed companies provide the combine harvesters for the harvest. The seeds are cleaned at processing plants and seed samples are sent to the government’s seed laboratories for seed testing. After certification by the authorized seed lab, the seeds can be sold in the market.

Many foreign seed companies are now opening their offices in Myanmar, and many local and foreign vegetable seed companies are working on seed production, distribution, and marketing in Myanmar.

**Seed Associations**

All the CLMV countries have seed associations at different levels and stages of development. The Seed Growers Association of Cambodia (SGAC) was formed in conjunction with AQIP Seed.

The Lao PDR organized the Seed Trade Association, which is open to all producers, importers, and traders, and supports the development of a strong private sector.

Myanmar has formed farmers’ associations at different levels and engages other organizations and individuals operating in seed-related activities including seed companies, research institutes, seed farms, and farmers.

Operating in Viet Nam are two strong seed associations: the Viet Nam Seed Association (VSA) and the Viet Nam Seed Trade Association (VSTA). Currently, the VSA has 800 members consisting of 42 organizations, and over 700 individuals. The main tasks of the VSA are to provide consultancy services, evaluation, and reviews of the seed projects and research projects of MARD, the Viet Nam Academy of Agricultural Sciences, and the Ministry of Science and Technology.

The VSTA was founded in 2007 and engages organizations and individuals operating in seed-related activities including seed companies, research institutes and universities, scientists, government officers, and farmers. Currently, the VSTA has 100 members including both organizations and individuals. The main task of the VSTA is trade promotion, information sharing, and training of human resources for its members.

The use of contract farming for seed production is now under way in the CLMV countries. The program is strongly encouraged as a way to promote seed production and benefit more farmers. Training for seed production is given in contracting procedures.
In Myanmar, Gold Delta and some specialized rice companies are practicing contract farming for seed production. The companies provide seeds and other inputs and also technical assistance to the farmers. They also encourage seed growers by providing guaranteed prices for seeds.

The use of pure seed and good varieties is essential for improving the quality of rice exports, and the governments of the CLMV countries are encouraging and supporting the participation of rice mills and millers’ associations in seed supply in order to promote the production of the varieties most in demand.

They also encourage initiatives by seed associations, cooperatives, NGOs, or other community-based organizations to produce seed for local use. The experience from successful local seed production groups and associations should be documented to provide guidance to new groups and to strengthen established ones. A simple code of conduct for such associations and their members should be prepared, based on best practices.¹

**Seed Legislation and Policy**

The main goal of seed law is to manage seed development to encourage seed production and distribution. Laws have been proposed and introduced in all aspects of seed production, trading, imports, exports, quality control, and breeders’ rights. They also cover plant varieties, both in the context of conventional testing and registration/listing, and in providing intellectual property rights for new varieties. Seed legislation stipulates the management and preservation rules for plant genetic resources: varietal development, breeding, selection and evaluation, and quality control.

All the CLMV countries have seed regulations. Lao PDR introduced the Seed Regulation in December 1997, Agricultural Law in 1998, and Plant Protection Law in 2008. Myanmar already enacted its Seed Law in January 2011. Myanmar’s seed law recognizes the existence of both the formal and informal seed systems, and is designed to support their development. Myanmar has also formed the National Seed Committee (NSC) and Technical Seed Committee (TSC) to organize and manage the varietal improvement, approval of new varieties, varietal registration, and formal seed production and distribution program of the country. Myanmar became a member of the WTO in 1995, but is still not a member

¹ For more information on best practices and samples of codes of conduct for NGOs, see Stillman (2006).
of the International Union for the Protection of New Varieties of Plants or the International Seed Testing Association yet.

In Viet Nam, the Seed Law was introduced in 2004, and the National Assembly passed the Law on Intellectual Property in 2005. Viet Nam officially became a member of the International Union for the Protection of New Varieties of Plants in 2006. The first regulation on plant variety protection in Viet Nam was issued on 20 April 2001. The National Assembly also adopted the Law on Intellectual Property on 29 November 2005.

The protection of new varieties of plants as a form of intellectual property is an important stimulus to private investment in plant breeding and the introduction of foreign-protected varieties to the market. To comply with the requirements of WTO membership, this protection is provided under Chapter 2 of the Law on Seed Management and Plant Breeders Rights. Breeders who wish to protect new plant varieties must submit applications to MARD.

Nevertheless, the CLMV countries have seed laws on the books, which often lack clear policy direction. Governments should define the general policy for their seed sectors first. Based on this, a seed law should be enacted in order to ensure legal certainty. Then the regulations prescribing how to implement the law should be passed, and finally guidelines for technical aspects could be issued. As the CLMV countries already have seed laws and regulations, they should be reviewed in the light of a possible new policy to avoid any inconsistencies. Figure 6.2 illustrates the ideal time frame for seed industry regulatory framework.

Figure 6.2: Seed Industry: Intervention Hierarchy

![Figure 6.2: Seed Industry: Intervention Hierarchy](image_url)

Source: Author’s illustration.
All rules and regulations should be reviewed and new seed policies should be adopted to avoid any inconsistency in the CLMV countries. The importance of plant variety protection, plant quarantine law, breeders’ rights, and farmers’ right are among the most pressing issues in seed industry development in the region.

**Infrastructure Development**

The barriers to development of community-based seed production systems include the infrastructure in rural hinterlands, which constrain the poor roads and related distribution of seed along with other farm inputs and produce. There is also a lack of the use of information systems and information sharing between state management agencies. Therefore, improved coordination and cooperation between these agencies are needed.

**SWOT Analysis**

This section summarizes the strengths, weaknesses, opportunities, and threats for the seed industry in the CLMV countries (Table 6.2).

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>• High genetic diversity and abundant plant resources</td>
<td>• Government institutions in place, but not fully effective due to insufficient budgets and human resources</td>
</tr>
<tr>
<td>• National agricultural research institutes are in place</td>
<td>• Obsolete equipment and facilities for seed research institutes and seed laboratories</td>
</tr>
<tr>
<td>• Different agro-climatic conditions, develop diversified varieties for various ecosystems</td>
<td>• Weak quality control</td>
</tr>
<tr>
<td>• Private sector involvement in the seed industry increasing</td>
<td>• Poor market information access</td>
</tr>
<tr>
<td>• Farmer seed grower associations becoming more widespread</td>
<td>• Poor quality of seed produced in the informal system</td>
</tr>
<tr>
<td>• Laws and regulations being implemented: seed legislation, plant breeder rights, plant variety protection, etc.</td>
<td>• Limited production and processing capacity and seed supply systems, especially in remote and marginal regions</td>
</tr>
<tr>
<td>• Increasing awareness of various stakeholders for improving crop productivity through seed industry development</td>
<td>• Low level of private sector participation in research and development</td>
</tr>
<tr>
<td>• Improvements in the supply chain mechanism</td>
<td>• Limited effectiveness of seed laws and regulatory framework with weak enforcement</td>
</tr>
</tbody>
</table>

*continued on next page*
Table 6.2  continued

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Public–private partnerships</td>
<td>• Negative impact of climate change</td>
</tr>
<tr>
<td>• Strategic location for seed exports</td>
<td>• Natural disasters such as flooding and drought</td>
</tr>
<tr>
<td>• Research and development networks</td>
<td>• Cultivated land area declining as a result of industrialization</td>
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<tr>
<td>• Increasing stakeholders’ awareness for improving crop outputs through using</td>
<td>• Seed industry competition with neighboring countries</td>
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<tr>
<td>quality seed</td>
<td>• Loss of regional centrality to the People’s Republic of China and India</td>
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<tr>
<td>• Increasing trend of foreign direct investment in agricultural production,</td>
<td>• High competition; high cost of domestic seed production</td>
</tr>
<tr>
<td>including seed development</td>
<td>• Effects of the global financial crisis and decrease in foreign direct investment</td>
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<tr>
<td>• Increasing private sector investment in seed production</td>
<td></td>
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<tr>
<td>• Development of contract farming and increasing demand for certified seeds</td>
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</table>

Source: Author.

Policy Recommendations

Research and Development

Capacity for R&D is very limited among the CLMV countries. The governments could provide more funding and focus on building linkages between R&D and the seed production system. High-quality human resources for R&D should also be developed.

Research institutes need to provide research findings from their research programs to the appropriate extension departments in order to transfer technical knowledge to the farmers. If the extension approach works well, the extension workers could learn about technologies to be transferred by simply reading or studying documents provided by the researchers. They could achieve this by integrating with each other’s research and extension activities.

The improvement of varieties of rice and other crops through plant breeding research is essential for maintaining and increasing productivity. This work might be conducted in close partnership with the relevant international agricultural research institutes and it could take full account of both production and market requirements. Private companies and other organizations should also be encouraged to undertake plant breeding and selection in order to increase the choice of varieties available to farmers.

Seed Production, Distribution, and Marketing

Assessment of government-run seed production farms will be required, where appropriate, to restructure them and provide financial support for
full operation so that they can better serve the farmer and cooperatives involved in seed production, and to bring those farms with potential to a level of significant production and sustainability.

Well-organized seed production and distribution systems, government financial support, infrastructure facilities in seed storage, transport and handling of the seed, and investment in the seed industry by the private sector should be encouraged. The awareness of farmers of the benefits of using high-quality seeds or possibly GMO should be strengthened.

The CLMV countries require expertise and training from national and international organizations to establish and implement their seed industries most effectively. Seed production and marketing also provide opportunities for small rural businesses to expand and diversify their activities. For these reasons, awareness of the importance of quality seed must be a key theme in agricultural campaigns and other extension activities by official and nongovernment organizations.

Establishing and managing an efficient seed supply system requires good coordination between different organizations and stakeholders. To achieve this, the establishment of a national seed committee or council to oversee and monitor the development of the seed sector has been mooted. The status, membership, and remit of these types of committees could be determined by a subdecrees of the relevant ministry (all relevant stakeholders should be included). It is essential that investments by development partners are well coordinated and are implemented in harmony with the seed development policy and other strategic plans of each CLMV government.

**Quality Assurance**

The shortage of good quality seed is frequently identified as a constraint to increasing crop production and many reports on agricultural development in the CLMV countries have emphasized this fact. To improve the quality of seed, the extension departments of the relevant ministries should make efforts to improve farmers’ management of seed that is retained on farms or exchanged within the community. These activities should be undertaken in collaboration with provincial departments of agriculture and development projects working at the community level.

The capacity for quality control and management of the industry is weak, and as a consequence the quality of seed is not ensured. A number of poor-quality seed batches have been brought to market highlighting the need for seed processing facilities.

The capacity for seed testing and certification is also weak because of the lack of highly skilled staff, and inadequate and out-of-date
equipment for seed testing. To support the quality control functions, there is an urgent need to upgrade seed testing facilities to monitor seed quality in the market. Importers also need some means of confirming the quality of seed in the case of disputes.

Governments need to seek funds to upgrade laboratories and increase staff training and operational costs. At the regional level, consultation with provincial departments of agriculture and preparation of a standard protocol should be carried out to enable local producers to organize reliable seed laboratories using simple equipment and improve the quality assurance of their seed at minimum cost.

The primary purpose of the regulatory framework is to raise the standard of seeds and varieties in the market and to protect farmers against deliberate fraud, not to restrict seed trading activities. This will reflect the availability of resources to implement specific procedures and should be introduced progressively as the seed industry develops. This applies particularly to the introduction of a seed certification scheme, which will have major resource implications.

Seed staff from departments of agriculture, in cooperation with extension staff, should monitor the quality of seed in the market by sampling and prosecute serious breaches of quality standards. Suspected cases of “fake seed” should be investigated vigorously and sufficient penalties should be applied when there is clear evidence of such practices.

**Public–Private Partnerships**

The missing link in most of the CLMV economies is public–private cooperation. The public sector should not face any barriers in access to early generation seed of public varieties. With crops where the public and private sector share involvement, there needs to be a coordination mechanism to determine the qualities and division of early generation seed. The formation and strengthening of technical capacity for the seed growers’ groups or seed associations and cooperatives is necessary in order to establish an effective seed production program in rural areas.

Future investment to create a sustainable seed industry should come mostly from the private sector, and the government should create a favorable business environment for seed development. Major efforts are still required to raise the awareness of farmers to the benefits of using high-quality seed. The barriers to development of community-based seed production systems include the infrastructure in rural hinterlands, which constrain the poor roads and related distribution of seed along with other farm inputs and produce. It is important to have good coordination and relationships with all the sectors involved to develop and implement a well-organized, successful seed industry.
Role of Government

The role of government in the CLMV countries for seed industry development is to provide foundation stock and registered seeds, and technical services, and to create an enabling policy environment, promoting the use of good-quality seeds, ensuring quality control, and strengthening seed law enforcement. Promoting the use of high-quality seed among smallholder farmers, producing a foundation seed for seed producers, and supporting the private seed producers with necessary technical assistance to enable them to produce high-quality seed are also important responsibilities of the governments of CLMV countries.

It is also the role of the public sector to create a secure and favorable climate for private investment and to use public funds in the most effective way. To promote sustainability, the private sector would be mostly responsible for production and marketing of seed but would collaborate with extension services to develop the market.

Funds from government and development partners should be provided primarily to strategic areas such as plant breeding and variety testing in national interest crops where private investment is limited or absent. Government budgets should also be provided to support essential services such as seed inspection, testing, and certification, although fees should also be charged for such services to establish the principle that users should pay.

Access to credit is recognized as a major constraint in developing the seed sector, both for capital investment and for seasonal funding of production. The financial institutions engaged in agriculture should seek solutions to this problem, for example by assisting seed growers associations and small enterprises that have demonstrated good performance and maintained regular sales. The opportunity to use seed stocks as collateral for seasonal loans could be a major benefit for seed producers and sellers. The seed grower groups and farmers are also important participants in seed production and the government needs to enhance the technical capacities of seed supply.

Conclusion

The seed industry has the potential to play an important role in enhancing agricultural productivity in the CLMV countries. However, the seed industry in the region is still in the early stages of development. The capacity of the official system is generally weak and the industry is highly dependent on the traditional informal seed production system, with all its drawbacks and inefficiencies.
Seeds are a key component in more intensive systems of crop production aimed at increasing overall productivity of the land and providing a surplus for export. All the CLMV countries appreciate this fact. As discussed, to develop a viable and efficient seed industry, various sectors need to be improved. The legal framework of seed policy and seed laws needs to be revised to implement the seed industry more effectively, and to regulate the sale, import, and export of seeds and planting materials.

It is vital that the CLMV governments make the most of their opportunities in the public and private sectors and continue to improve their bureaucracies and laboratories so as to provide support and training for farmers and all concerned groups. Finally, opportunities to cooperate and learn from neighbors with more advanced seed industries, particularly Thailand and Viet Nam, should be embraced.

**Bibliography**


7. Emerging Issues and Opportunities for Agricultural Productivity

Adam Majoe

Introduction

Cambodia, the Lao People’s Democratic Republic (Lao PDR), Myanmar, and Viet Nam all rely heavily on agriculture for economic and social development. Yet in these emerging economies, agricultural productivity—which can be an important indicator of overall productivity—is still largely characterized by subsistence farming, with limited participation in international markets and low levels of competition (ADB 2014). As summarized in this chapter, while progress has been taking place, there still exist a variety of opportunities for the enhancement of agricultural productivity as a driver of economic growth and as a channel for improving the livelihoods of the populations engaged in agricultural production.

As agricultural production continues to intensify in the region, stakeholders must encourage investment in smart and ethical agriculture and consider ways to measure and mitigate any risks associated with growth in the sector. These include, in particular, the depletion of natural resources and the threats posed by climate change. Rising temperatures of between 0.14°C and 0.2°C per decade have been measured across Southeast Asia since the 1960s (IPCC 2013), and current climate change-related costs to natural resource assets and infrastructure services for Viet Nam, Cambodia, the Lao PDR, and Thailand have been valued at $16 billion per year (USAID 2014). These risks must be closely monitored if sustainable and inclusive growth is to be achieved through the enhancement of agricultural productivity in the region.
Cambodia

Background and Policy Trends

Cambodia has identified the development of its agriculture sector as being of key importance in driving economic development. In 2012, agriculture employed an estimated 67% of the country’s workforce and contributed to around 37% of gross domestic product (GDP) (FAO 2014). As noted by the President of the Asian Development Bank, Takehiko Nakao, Cambodia is “among the world’s fastest-growing economies,” and agriculture has contributed significantly to poverty reduction and the country’s transition to middle-income status (ADB 2015a).

After many years as a net importer of rice, Cambodia has evolved into becoming a net exporter, exporting over 370,000 tons of rice in 2013 and dedicating around 75% of cultivated land to rice production. The net production value of rice paddy grew by an impressive 6.8% per year during 2007–2012; however, the sector still lags behind its regional neighbors in the global rice market (ADB 2014). Cambodia’s average rice paddy productivity yield was estimated at 3.3 tons/hectare in 2013, compared to 4.1 tons/hectare for the Lao PDR and 6.2 tons/hectare for Viet Nam. Similarly, the gross production value of rice paddy production in 2012 for Cambodia was measured at $2 billion—higher than the Lao PDR’s $1 billion, but significantly lower than Viet Nam’s $13 billion, Thailand’s $15 billion, and Indonesia’s $61 billion (Figure 7.1). This suggests substantial potential for growth in productivity and production value in Cambodia’s rice market.

The Government of Cambodia has focused on the agriculture sector in its long-term strategy for furthering development, the Rectangular Strategy Phase III, by implementing measures for boosting agricultural productivity, which include encouraging commercialization, diversifying production, and establishing a system for the monitoring and management of natural resources (Government of Cambodia 2013).

In 2010, the government introduced the Policy on the Promotion of Paddy Production and Rice Exports (known as the Rice Policy), which is implemented and coordinated by the Agricultural Produce Export Promotion Committee. The main goal of the Rice Policy is to expand rice production and exports and for Cambodia to become a key exporter in the global market. The Rice Policy is comprehensive and includes a wide range of proposed developments to the industry for increasing rice yields and efficiency in production. These include providing support to farmer associations, facilitating greater trade participation through reducing trade barriers such as informal fees and processing times and costs, increasing financial support to producers in the form of
microfinance, improving land titling to allow greater access to finance, investing in infrastructure and irrigation facilities, and using innovative technologies and improved inputs such as seeds and fertilizers.

**Emerging Issues and Opportunities**

Some of the major factors limiting agricultural productivity in Cambodia include limited market access for farmers, insufficient management of land-use planning and land tenure, underdeveloped infrastructure, inadequate links with value chains for agricultural production, and limited food safety and sanitary and phytosanitary standards (SPS).
Regional integration and cooperation have provided, and will continue to provide, new opportunities for the commercialization and trade of high value and diversified agricultural products. Cambodia has been active in engaging with the World Trade Organization (WTO) and the Association of Southeast Asian Nations (ASEAN), and has initiated several trade agreements, including with Australia, the People’s Republic of China (PRC), India, and New Zealand. Accordingly, it is vital that farmers have the opportunity to access both international and domestic markets to sell their products commercially. To facilitate this, growth of agro-processing enterprises is needed and support must be given to farmers to provide them with the knowledge and skills to transition from subsistence-based production to commercialized production (World Bank 2007).

Quality grades, weights, and measures are generally not standardized and thorough inspection by buyers is often necessary. This requires extensive travel by traders and increases transaction costs. Trading efficiency could be greatly enhanced through the introduction of modernized, more consistent production techniques. Certified standards for quality and safety should also be adopted and this could lead to diversification into organic or “green” products, increasing competitiveness and attracting productivity-enhancing investment along with increased participation in agricultural value chains. This would also help Cambodia to develop national branding and marketing strategies, allowing the country to promote and raise its reputation in international markets.

Poor infrastructure in Cambodia is another major impediment to further development. Many rural roads are in disrepair and are not suitable for the transport requirements of commercialization. Local markets and exports are undermined by the increase in marketing costs caused by inadequate road connections and poor transport infrastructure in rural areas. A vast improvement in road connections is vital in order to better connect the rural economy to national and international markets. Irrigation is also not widespread in rural areas, which has hampered crop yields and the growth of productivity.

**Women in Agriculture**

The role of women in Cambodia’s agriculture sector is an important issue for both economic and social development. Cambodian women have higher levels of participation than men in agriculture, but suffer from a range of constraints and unequal access to benefits. Many women in the sector are unable to improve their livelihoods and are trapped by reduced access to finance, markets, and the
technology needed to enhance productivity. Agricultural households headed by women (around 20%) on average have access to 0.4 hectares less land than households headed by men. Women are also particularly disadvantaged in land titling and ownership. This marginalization within the land registration process hampers growth in income in many rural households and perpetuates gender biases, constricting development and aggravating issues such as food and nutrition security (ADB 2015b).

Policymakers should implement measures to increase women’s access to the benefits of agricultural production, which in turn will enhance agricultural productivity. These may include raising awareness of the legal rights of women for land ownership and registration. Programs should also be designed to educate and train women to provide them with the skills to access and use improved technology, inputs, markets, and finance.

Lao People’s Democratic Republic

Background and Policy Trends

At present, agriculture contributes to around 27% of GDP and employs the majority (61%) of the population in the Lao PDR (World Bank 2014). More than 80% of households are located in rural areas and are dependent on the agriculture sector for their livelihoods (Lao PDR Statistics Bureau 2012). Due to policies and initiatives focusing on developing agriculture, there have been positive trends in agricultural production and productivity; however, total production area for most crops is not growing, and is even declining for some crops.

Agricultural activities are predominantly subsistence based, with 76% of farming households engaged mainly in rice production. The Lao PDR joined the WTO on 2 February 2013 and agricultural exports have been increasing, but inputs such as seeds, feed, and fertilizers are still mostly imported from other countries in the region.

Boosting agricultural productivity is a priority for the government in tackling economic development and reducing hunger and poverty. Through its National Growth and Poverty Eradication Strategy, the government aims to identify and prioritize investment in the poorest areas. The country’s Seventh National Social and Economic Development Plan (NSEDP) was created to achieve inclusive and sustainable development.

Public and private sector support has increased investment in the agriculture sector, allowing for improved production facilities, advances
in technology, and improvements to infrastructure. This has facilitated greater involvement in supply chains and improved access to markets. The Lao PDR’s membership of the WTO is a sign of increased integration in the region and willingness to attract greater foreign direct investment (FDI). Membership has also contributed to raising awareness of the country’s exports, helping to establish national branding and recognition of the country’s products.

**Food and Nutrition Security**

While the Lao PDR has witnessed strong and sustained economic growth in recent years, poverty is still a major policy issue and food and nutrition security is an important area of concern. An estimated 33% of the population live on less than $1.25 per day, and the country ranked 139th of 187 economies in the United Nations Development Programme’s (UNDP) Human Development Index (HDI)—ahead of Myanmar (ranked 150th), but behind Cambodia (ranked 136th) and Viet Nam (ranked 121st) (UNDP 2014). Malnutrition is a significant challenge in the country, and as agricultural production is mainly subsistence based, natural disasters—such as Typhoon Ketsana, which caused substantial crop damage in 2009—can have devastating effects on livelihoods.

Boosting agricultural productivity can contribute to food and nutrition security by allowing the country to move away from subsistence production. Increased income can directly benefit the livelihoods of the rural population and allow them to withstand fluctuations in food prices and production yields. This social potential is an important driving factor for continued development of the agriculture sector in the Lao PDR.

**Emerging Issues and Opportunities**

Although market access is increasing and policy is being increasingly oriented toward enhancing productivity in the agriculture sector, greater investment in training for increasing the technical skills and knowledge of farmers is required. Farmers’ organizations are scarce and most do not have adequate resources to assist members effectively. Without adequate financial and technical support from external agencies, governments, and donors, farmers’ organizations will struggle to provide members with the assistance they need to contribute to development in the agriculture sector (World Bank 2007).

Likewise, limited funding from both public and private organizations for research and development (R&D) and insufficient management and adoption of safety and quality standards has led to limited value creation and stagnating levels of competition in the industry’s domestic
and export markets. Interdisciplinary, targeted, and cost-effective research initiatives and programs are needed to encourage and attract further contributions from the public and private sectors (Wesley and Faminow 2014).

**Organic Production**
Geographical and ecological conditions vary throughout the country and agricultural producers are able to grow a wide range of crops. Many rural areas still depend mainly on traditional farming techniques, with limited use of chemical fertilizers or pesticides. At the same time, demand from consumers for improved food quality and safety is increasing as diets more closely follow global trends. This desire for higher-value products is fueled by rising incomes, greater female workforce participation, rising urbanization, and increased access to the media. This presents a significant opportunity for growth through the expansion of organic farming.

Organic produce is able to command high market prices, and rising domestic and regional incomes are likely to stimulate demand for these products from health and safety conscious consumers. This has the potential benefit of raising the awareness and competitiveness of the Lao PDR’s agricultural products. However, implementation of appropriate product certification systems and sufficient market access for farmers are still needed in order for agricultural producers to move effectively into the organic market and tap its full potential.

**Myanmar**

**Background and Policy Trends**
Myanmar’s agriculture sector contributes a major share (36%) of GDP and as much as 70% of the population is employed in the sector. The country is a net exporter of food, making the agriculture sector important for food and nutrition security and critical for poverty reduction and economic growth. Agriculture is one of the key growth sectors essential for GDP growth and poverty reduction in Myanmar.

The HDI measures human development outcomes through a value calculated from a range of development indicators. As can be seen in Table 7.1, Myanmar ranks lowest among the CLMV countries in the index, although its relatively high percentage change in HDI value

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1 For more information on the Human Development Index, see UNDP (2014).
Table 7.1: Human Development Index for ASEAN Countries

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ASEAN = Association of Southeast Asian Nations, HDI = Human Development Index, Lao PDR = Lao People’s Democratic Republic.

Note: Rankings are out of a total of 187 economies.


since 1990 compared to other ASEAN countries does indicate progress in the country. While HDI values only represent a broad measure of development, the results suggest that Myanmar has vast room for improvement, and, due to the key role of agriculture in the country, it is clear that increasing agricultural productivity will have important benefits for the livelihoods of the population.

Policy in Myanmar has been formulated to reflect the importance of the agriculture industry. This can be seen in the government’s Framework for Social Reforms and the National Strategy on Poverty Alleviation and Rural Development. These both highlight the centrality of the agriculture sector and the need to increase competitiveness, attract FDI, and increase domestic and export market access.

Myanmar has abundant water resources and untapped potential for increased agricultural production with large areas of land suitable for farming. Its location is favorable for exporting to other ASEAN members, the PRC, and India, and trade and infrastructure links within the region have been growing rapidly due to increasing political stability in the country and its key role as the “bridge” connecting South Asia and
Southeast Asia. However, despite these advantages, agricultural growth in Myanmar has been held back by a lack of clear policy formulation and planning, with limited implementation. Investment has been rising, but the government still has little capacity for extension activities, leading to as yet limited technical progress and innovation in the sector.

**Emerging Issues and Opportunities**

The formation of farmers’ organizations in Myanmar has been largely inadequate and there are only limited links between farmers and the public and private sectors. Difficulty of access to finance is a problem for many agricultural producers, preventing them from buying improved inputs and contributing to the low level of land ownership. Infrastructure in many areas is also underdeveloped, with a need for better roads and electricity and communications services. Similarly, irrigation is not widespread and water management systems have yet to be extensively adopted.

Myanmar is capable of growing substantial quantities of fruit and vegetables for export to other countries in the region and valuable prospects lie in increasing market access for farmers and moving toward commercialization. Through investment in the right channels, and with substantial public and private support, the agriculture sector could make significant gains through diversification of production, and the country could also increase competitiveness through the adoption of food safety and SPS certification, and diversification of its agricultural products (ADB 2013).

The positioning of Myanmar as a global brand is yet to be fully explored. Developing a “national brand” based on local knowledge, specialized techniques, and agro-ecological conditions; supporting fair trade initiatives; or offering organic produce are some of the other opportunities Myanmar could explore in developing its agriculture in innovative ways. As has been implemented in other countries such as Nepal, the government could take a step in this direction through the phased introduction of Good Agricultural Practices (GAPs) for different horticultural products, based on the recommended set of principles of the Food and Agriculture Organization of the United Nations (Himalayan Times 2015). This would help with increasing exports by giving preferential market access to agricultural products in export destinations.

Individual smallholders should be encouraged to participate as partners in both export markets and modern procurement systems with private sector support. This can lead to mutually rewarding relationships with farmers or groups of producers and increase access
Emerging Issues and Opportunities

To other benefits such as credit and certification. Furthermore, farmers can be encouraged to develop their skills to ensure good agricultural practices in order to meet national and international standards for food safety, quality, and sanitation.

For agricultural productivity to improve, the government needs to be clear and transparent in the implementation of its policies for reform. Failure to do so may result in land grabbing, a lack of investment, and detrimental effects on the environment and natural resources. With increasing competition from other countries in the region, Myanmar should make the most of its potential while ensuring the proper management of its policy measures and programs.

Viet Nam

Background and Policy Trends

Viet Nam has achieved significant growth in its agriculture sector with vast improvements in food and nutrition security and alleviation of poverty since its economic reforms of the 1980s. Agriculture was largely responsible for helping the economy transition to a market economy, and growth in the sector has been relatively high compared to that in neighboring countries. Unlike the other CLMV countries, which remain subsistence based, Viet Nam has been successful in moving toward commercialized production through greater food security and diversification to high-value products.

The country’s agricultural growth is partly attributable to its abundant natural resources. With agricultural growth a main focus of the government’s policies for economic reform, farmers have also been equipped with the necessary technical skills and knowledge to achieve high productivity in production, with irrigation systems, for example, being in widespread use.

During the liberalization of Viet Nam’s agricultural markets, smallholders were encouraged to become more market oriented and as much as two-thirds of subsistence farmers entered the market. Poverty rates among this group fell dramatically, with incomes almost doubling. At the same time, industrial and high-value crop production increased. Farms with larger landholdings saw the biggest increases in agricultural sales, while producers located close to markets, or in communities with non-agricultural industries, also experienced substantial growth. Subsistence farmers who did not choose to enter the market also saw levels of poverty fall, as they were more likely to diversify and explore...
alternative sources of income outside the agriculture sector (World Bank 2007).

**Emerging Issues and Opportunities**

There is still, however, much room for improvement and Viet Nam’s agriculture suffers from a variety of obstacles to further progress. The structure of agricultural production has been slow to change and land productivity has stagnated due to a reliance on the import of inputs. The majority of agricultural exports are still primary products with little value added and limited integration into agricultural value chains. Further policy framework should be established to cope with the negative externalities of modernization and commercialization, with particular focus on issues related to sustainability and environmental hazards.

Investment in agricultural R&D is currently insufficient, but is especially important for enhancing agricultural productivity through technological development and the improvement of production techniques to allow producers to cultivate more resilient and diverse crops. Funding for R&D should come not only from the government, but also the private sector. However, private investment in Viet Nam is impeded by the poor investment climate coupled with a lack of demand from farmers for technological improvements due to financial constraints, limited information, and wariness of the perceived risks. Going forward, facilitating collaboration between all stakeholders will be vital for improving the efficiency and effectiveness of R&D for agriculture.

As part of achieving continued progress, Viet Nam must continue to compete with the other rapidly growing CLMV countries, while at the same time taking advantage of any emerging opportunities and addressing the challenges associated with growth in the sector.

**National Branding**

The industry has had success in diversification of its agricultural exports, with coffee being perhaps the most well-known example. Viet Nam is one of the world's top coffee exporters and the commodity is one of the country's main exports. Many coffee producers have been successful in achieving certification to prove their use of sustainable and equitable production techniques, allowing products to be sold at premium prices in international markets.

In a similar way, Viet Nam's Ministry of Agriculture and Rural Development plans to develop a brand name for the country's rice by 2020. Through this, the ministry hopes to be able to raise its competitiveness in high-value markets, particularly in East Asia, North
Emerging Issues and Opportunities

America, and Europe. In order to achieve this goal, Viet Nam will need to continue to improve quality and health standards, but if successful, this initiative will help to raise awareness of Viet Nam’s agricultural products and have valuable spillover benefits for agricultural productivity and investment in the country (Asia News Network 2015).

Seed Industry

Another opportunity for Viet Nam lies in the seed market. Viet Nam’s seed market is currently relatively small and relies on the informal system, but there is significant potential for investment and development in the seed industry for raising agricultural productivity. The government manages the seed industry under the Seed Ordinance and Law on Intellectual Property, but currently there is little capacity for implementation of seed certification programs or formal seed management and testing. Farmers generally lack incentives to use developed seeds because of high prices and biases due to information asymmetry. However, FDI in the seed industry has been increasing and this has contributed to the development of quality requirements.

Increasing market orientation in the seed industry has the potential to help Viet Nam become more resilient to external shocks and crises. A stronger genetic base for crops would allow producers to avoid large food price fluctuations and mitigate physical damage from pests and natural disasters, such as floods and droughts.

In order to realize these benefits, efforts should focus on increasing access to seeds and local seed systems. Farmers should be involved in the development of new seed varieties that are consistent with local agro-ecological conditions and suited for commercialization. Focus should also be placed on local crop diversification and variety, and production should be on a sufficient scale that allows for appropriate quality control.

Environment and Sustainability

As may be expected, economic growth has been accompanied by growing dangers for sustainability and the environment. Intensive farming methods and cropping systems negatively impact ecosystems due to the heavy use of agro-chemicals. In addition, excessive irrigation has been a contributing factor to the increased scarcity of water, damage to previously prime agricultural land, and depletion of groundwater supplies. Intensive agricultural practices are further associated with deforestation and loss of important wetlands, leading to soil erosion and associated problems. Intensive livestock farming also presents a unique set of problems. High numbers of livestock being kept near densely populated areas increase the risk of the spread of disease, posing potential dangers to human health.
Viet Nam is particularly susceptible to the effects of climate change due to its geographical location and vulnerability to rising water levels, particularly in the Mekong Delta. The country’s agriculture industry risks devastating damage and costs from climate change, with the poorest members of society being the most at risk. Greater incidences of crop failure and an increase in livestock deaths are likely in the case of continuing global warming and could have severe consequences for Viet Nam’s food and nutrition security.

In this regard, steps need to be taken to attract investment into smart and ethical agriculture, with targeted research programs and initiatives for implementing climate change adaptation and mitigation. Natural resource management should be effectively coordinated by the appropriate government ministries, and the governments of all the CLMV countries, along with other countries in the region, should seek ways to collaborate to minimize risks and cooperate on disaster risk management.

**Conclusion**

From the economic and geographic characteristics of the CLMV countries, it is clear the agriculture sector is key for continued development in the region. Enhancing agricultural productivity shows promise for improving livelihood systems, with prospects for alleviating poverty and ensuring food and nutrition security. In order to realize this potential, policymakers must work to minimize the structural, economic, and physical constraints on agriculture.

Cooperation between producers, policymakers, and all other stakeholders will be vital for the continued development of the institutional framework required to achieve sustainable and improved agricultural productivity. Overcoming the variety of challenges faced by the agriculture sector will be instrumental in securing future economic, environmental, and social progress and growth.

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8. Conclusion: Challenges and Agenda for Reforms of Agricultural Productivity

Aladdin D. Rillo and Mercedita A. Sombilla

Introduction

Cambodia, the Lao People’s Democratic Republic (Lao PDR), Myanmar, and Viet Nam (CLMV) are catching up with the rest of Asia, having registered stellar economic performance in the 3 decades since the mid-1980s. This was underpinned by the growth of their respective agriculture sectors, which responded positively to economic reforms. Through agricultural reforms, the productivity of the sector has improved and created other knock-on effects on the income and well-being of rural populations. Higher productivity also promoted broader economic growth through the expansion of non-farm economic sectors, thus promoting economic development and reducing poverty.

However, recent developments have raised concerns surrounding the ability of the CLMV countries to sustain further increases in agricultural production given the slow pace of reforms and emerging problems in the agriculture sector. The key inputs to production, land and water, have been increasingly constrained with adverse impacts on productivity and, hence, on production. Not only have they become more scarce, but their quality and that of the ecosystem services have deteriorated also. The observed yield growth rate has been on the decline. Moreover, yield has been increasing at differential rates
resulting in the widening gaps across the countries. These observed trends are happening not only with rice and wheat, the key food staples, but also among other agricultural commodities.

A looming question now is whether the sector will continue to sustain its growth to further support economic development, improve food security, and enhance the living conditions of the people, particularly those in the rural areas. The current uncertain global environment, with problems of soaring food and fuel prices, volatile markets, and climate change, also presents new challenges to the CLMV countries. Considering that reforms have traditionally played a critical role in the development of the agriculture sector in the CLMV countries, it was argued that the reform process should be stepped up to attain sustained productivity gains and to support the structural transformation of the agriculture sector. However, how these reforms should evolve to enhance the sector’s performance not only to sustain further improvement in food security and enhancement of welfare but also to take advantage of the opportunities that come along with the globalization of markets remains a challenge to the CLMV countries.

**Overview of Agricultural Reforms in CLMV Countries**

Over the last 3 decades, the CLMV countries have implemented reforms to improve the efficiency and productivity of agricultural markets. Reforms involved the liberalization of prices for inputs and outputs, elimination of subsidies, and removal of trade restrictions to improve farmer incomes and enhance competition. They also involved removal of regulatory controls and other quantity restrictions on input and product markets, lifting of production quotas, restructuring of state-owned enterprises, and modernization of the financial systems through tax reforms and exchange rate unification. All these reforms had great bearing on the development of the countries’ respective agriculture sector and their move toward free trade and greater participation in the global market.

As seen in Figure 8.1, agricultural production in the CLMV countries increased steadily over the period from 1961 to 2013. Notably, the CLMV countries registered a sharper increase in their production from the mid-1980s onward as compared to their neighbors in Southeast Asia. In fact, CLMV production increased by hundreds from the mid-1980s not only in cereals but also in other commodities including meat and fish products (Table 8.1). Some of these countries have become major exporters of key commodities.
This remarkable growth performance of the agriculture sector was motivated by the various policy reforms that started in the second half of the 1980s—and with significant impacts on the sector and the economy.

**Cambodia**

A combination of economic liberalization and generous external assistance led to Cambodia’s rapid economic recovery. Following Viet Nam, Cambodia initiated partial and ad hoc reforms in 1989 to privatize markets. These included the removal of price controls, restoration of private land ownership for family plots, permission for private enterprises to participate in markets, and permission for farmers to sell their surplus in the free market after meeting a small requirement for state procurement. As a result of these reforms, Cambodia’s rice production increased more than 200-fold, enabling the country to reverse its position from a net importer to a net exporter of around 200,000 tons of rice in 2012 (Khin and McNaughton 2013). The target is to further expand this volume to 1 million tons in the coming years. The country’s root crops production likewise grew as fast, particularly cassava, primarily for animal feed but also to cater to the increasing demand for feedstock in bioethanol production.

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Lao PDR = Lao People’s Democratic Republic.
Source: Food and Agriculture Organization of the United Nations, FAOSTAT online (accessed July 2015).
Cambodia’s more recent social and economic development plan is laid out in the Rectangular Strategy for Growth, Employment, Equity and Efficiency Phase III 2014–2018. Similar to the earlier phases of the plan, enhancement of the agriculture sector is given top priority in Phase III, alongside the rehabilitation and construction of physical infrastructure, private sector development and employment generation, and capacity building and human resources development. The focus of the plan will no longer just be on improving agricultural productivity but also on promoting diversification toward commercialization. Good governance is the core of the rectangle, notably the maintenance of peace, political stability, security, social order, and additionally environmental sustainability.

**Lao PDR**

The Lao PDR launched a far-reaching reform program, the New Economic Mechanism (NEM), which marked the decisive move away from central planning toward a market-oriented economy (Strategy for Agricultural Development 2011–2020 (draft), 2010). The implementation of the reform was not piecemeal, but bold and rapid. It involved the liberalization of foreign investment that allowed foreign investors to infuse and hold 100% of their capital and guaranteed against their nationalization. Moreover, it allowed them repatriation of after-tax profits. At the same time, exchange rate adjustment and various tax reforms were instituted. Price and trade liberalization were started, which ended the involvement of major state monopolies.

In the early 1990s, a new constitution was adopted, while the monetary policies continued to be strengthened. By that time, a modest inflow of foreign direct investment was seen. The Asian financial crisis in 1997/98 greatly affected the Lao PDR’s economic reform efforts. The country experienced extreme financial destabilization from foreign exchange losses, recurring bouts of inflation and currency depreciation, deficit financing, and other budget problems. In early 2000, the country embarked on a 5-year recovery plan that improved fiscal discipline and structural transformation and increased regional integration. During this period, the National Growth and Poverty Eradication Strategy was also formulated and adopted.

Compared to its neighbors in the subregion, the impact of the reforms was subdued by the geographic characteristics of the country. Being landlocked with a rugged terrain limits access to domestic and international markets, and the relatively slow development of infrastructure has exacerbated this isolation. Despite all these constraints, lucrative cross-border trade has been taking place with
the People's Republic of China (PRC), Thailand, and Viet Nam. The Lao PDR's coffee production increased more than 500-fold and was geared toward exports (Pravongviengkham, Douangsavanh, and Sysaneth 2014). The country’s vegetables, on the other hand, have been enjoying an enhanced market with its neighbors through cross-border trading.

**Myanmar**

The agricultural marketing reform in 1987/88 was the very first measure taken to facilitate Myanmar's transition to a market economy. The major feature of the reform was a reduction of the state's intervention in the marketing of major agricultural commodities. It marked the end of the so-called “Burmese Way to Socialism,” a regime where economic management is based on self-sufficiency and state ownership. The market liberalization process, however, happened in other commodities like pulses and beans and not rice. Control of domestic rice prices continued, as did the state procurement system but with quota levels at 10%–12% of the production to allow farmers to sell the remaining directly to markets. The other incentive that was afforded producers was the cultivation of summer paddy that was exempted from the state procurement policy.

The market restrictions for rice were finally abolished in 2003–2004. Private traders participated in rice marketing and, for the first time, the private sector was allowed to export rice. Input markets experienced the same liberalized markets. Various plans, programs, and policies have been formulated since, indicating the desire of the country to catch up with its neighbors. The National Strategy on Rural Development and Poverty Alleviation was developed in November 2011 with eight priority areas for support, including the agricultural production sector, the livestock and fishery sector, rural productivity and cottage industries, micro savings and credit enterprises, rural cooperative tasks, the rural socio-economy, rural renewable energy, and environmental conservation (LIFT 2011). In December 2012, the government announced the Framework for Economic and Social Reforms: Policy Priorities for 2012–2015 towards the Long-Term Goals of the National Comprehensive Development Plan, in which agricultural development is a focus sector. In February 2013, through a joint effort of the Food and Agriculture Organization of the United Nations and the Government of the Republic of the Union of Myanmar and in consultation with all stakeholders, they developed the Country Programming Framework (CPF) which reiterated the importance of agricultural development for Myanmar.
With its abundant land and water resources, Myanmar is in a position to accelerate the production of key commodities and become a significant player in the world market (Shwe and Vokes 2013). Rice exports fluctuated in the early 2000s due partly to government policy that imposed production quotas and restrictions on rice trading to follow only the normal channels. In 2012, rice was allowed to be exported across the border to the PRC. This trade facilitation measure resulted in a doubling of rice exports from 0.63 million tons in 2011/12 to 1.25 million tons in 2012/13. The production of Myanmar’s pulses, the major export crop and foreign exchange earner, has remained strong and rose almost 800-fold from the 1986–1990 average production level of 506,000 tons to an average level of close to 5 million tons in 2006–2012.

**Viet Nam**

The period between 1986 and 1990 was one of high growth in Viet Nam, due primarily to the new incentive structures afforded by the economic reforms (or Doi Moi). In agriculture, Resolution No. 10, popularly known as Contract 10 (or Khoan Moi) issued by Viet Nam’s Communist Party in 1988, initiated the process of de-collectivization, confirmed the household as the basic production unit, and limited the role of cooperatives (Tuan, Nhan, and Kien 2013). Farmers were given land tenure for at least 15 years and, subsequently in 1993 with the passage of the Land Law, the land market started to be developed. Land-use certificates were issued that enabled land exchange, transfer, inheritance, and mortgage. Additionally, farmers were no longer forced to sell contracted amounts of produce to the state, but instead were allowed to sell to the market. In 1987, the internal control posts were abolished, which accelerated trade within the country. In 1989, agricultural prices were liberalized and the official exchange rate devalued to reflect a more free market. Tariffs began to replace quantitative restrictions and the government ceased its exclusive control of foreign trade. More intensified use of inputs, particularly irrigation, took place in the 1990s with the further liberalization of markets that brought large inflows of foreign direct investment (FDI) and the successful implementation of the 1996 Decision No.99/QD-TTg on investment in irrigation in the Mekong River Delta. It is also during this period that a series of efforts on international integration and the lifting of export quotas for most commodities except rice were observed.

Through all these reforms, Viet Nam regained its number 2 position in the rice export market. The reforms not only had a significant effect on rice but also on other crops, including livestock, fishery, and forestry. The country is also now a leading player in the world market for coffee,
rubber, pepper, cashew nuts, aquaculture, wood, and wood products (Nguyen, Tran, and Nguyen 2013).

**Impact of Reforms on Agricultural Production**

**Higher Rice Production**

The significant increase in agricultural production in the CLMV countries has been accounted for by both area expansion and yield growth. This is evident for rice especially from the mid-1980s when the countries started to embrace a more liberalized market (Figure 8.2). As second wave adopters of Green Revolution technologies, which started being introduced in the mid-1960s, the CLMV countries had the benefit of learning from the experiences of their neighboring countries and of accessing and adopting improved production technologies. The quick adoption and spread of Green Revolution technologies was enhanced by government reforms that ensued, especially in the 1980s, in support of achieving more rapid agricultural development, not only to improve food security but also to promote greater participation in regional and global markets.

Table 8.2 shows the performance of rice production from the 1960s to 2013, indicating the relative contribution of area expansion and yield increases. The contribution of yield was bigger compared to area in 1980–1995 with the rapid adoption and spread of Green Revolution technologies, particularly the high-yielding seeds that were suitably cultivated in the river deltas of the Lao PDR, Myanmar, and Viet Nam. Average yields more than doubled their levels in the 1960s when they averaged about 1.8 tons per hectare. Yield growth rates have slowed in more recent years, particularly in the Lao PDR and Myanmar.

In Cambodia, the substantial recovery from the dismal performance of rice production (and the agriculture sector as a whole) during and immediately after the Khmer Rouge period is also evident in Table 8.2. Production growth rates after 1996 were estimated high as these were coming from negative figures. The remarkable performance continued as government support strengthened because of the desire to participate in the rice export market. The slower yield increases in the initial years of the reform period were overcome by huge rice area expansion in Cambodia. This was made possible by intensified government investment in irrigation development, especially in the wake of the food crisis in 2007–2008 and the policy announcement made by the government in 2010 to export rice in 2015. Cropping intensities doubled in the irrigated
Figure 8.2: Growth Trends in Rice Area and Yield in CLMV Countries, 1961–2013

Area Harvested
('000 hectares)

Yield
(kilograms per hectare)

CLMV = Cambodia, Lao PDR, Myanmar, and Viet Nam; Lao PDR = Lao People’s Democratic Republic. Source: Food and Agriculture Organization of the United Nations, FAOSTAT online (accessed July 2015).
## Table 8.2: Paddy Rice in CLMV Countries: Area, Yield, Production Levels, and Growth Rates by Period, 1962–2013

<table>
<thead>
<tr>
<th></th>
<th>Annual Average</th>
<th>Change from Previous Period</th>
<th>Average Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>'62–'79</td>
<td>'80–'95</td>
<td>'96–'05</td>
</tr>
<tr>
<td></td>
<td>('000 hectares)</td>
<td>('000 tons)</td>
<td>('000 tons)</td>
</tr>
<tr>
<td><strong>Area</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>1,635</td>
<td>1,593</td>
<td>2,049</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>701</td>
<td>627</td>
<td>696</td>
</tr>
<tr>
<td>Myanmar</td>
<td>4,785</td>
<td>4,885</td>
<td>6,239</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>4,974</td>
<td>5,979</td>
<td>7,401</td>
</tr>
<tr>
<td><strong>TOTAL CLMV</strong></td>
<td>12,095</td>
<td>13,084</td>
<td>16,385</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>1,966</td>
<td>2,158</td>
<td>4,118</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>773</td>
<td>1,290</td>
<td>2,128</td>
</tr>
<tr>
<td>Myanmar</td>
<td>8,459</td>
<td>14,648</td>
<td>21,235</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>10,036</td>
<td>17,715</td>
<td>32,010</td>
</tr>
<tr>
<td><strong>TOTAL CLMV</strong></td>
<td>21,234</td>
<td>35,811</td>
<td>59,490</td>
</tr>
<tr>
<td><strong>Yield</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cambodia</td>
<td>1,174</td>
<td>1,343</td>
<td>1,997</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>1,129</td>
<td>2,091</td>
<td>3,033</td>
</tr>
<tr>
<td>Myanmar</td>
<td>1,767</td>
<td>2,997</td>
<td>3,384</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>2,019</td>
<td>2,936</td>
<td>4,321</td>
</tr>
<tr>
<td><strong>TOTAL CLMV</strong></td>
<td>6,089</td>
<td>9,367</td>
<td>12,735</td>
</tr>
</tbody>
</table>

CLMV = Cambodia, Lao PDR, Myanmar, and Viet Nam; Lao PDR = Lao People's Democratic Republic.
Source: Food and Agriculture Organization of the United Nations, FAOSTAT online (accessed July 2015).
rice areas of the country, especially those areas that were once rain-fed and single-cropped. Cambodia exported rice as early as 2013.

In the Lao PDR, area growth in 2006–2013 was similarly strong but was not enough to overcome the huge reduction in yield growth. Nonetheless, average rice production in the Lao PDR more than tripled from 1962–1979 to 2006–2013. The slowdown in the yield growth rate is not of much concern to the government at present considering the fact that the Lao PDR has a more than sufficient supply of the staple food. Further area expansion in the central and southern provinces is expected because of large areas with great potential for irrigation development. Their uplands are devoted to organic specialty rice cultivation for export.

Rapid area expansion in Viet Nam and Myanmar was key to their production growth, especially after the initiation of their respective economic reforms. Production increases were sustained with the enhancement of cropping intensity and yield improvement, particularly in the monsoon rice areas that used to be cultivated only during the rainy season. The economic reforms in Viet Nam complemented the effect of investments in irrigation made during the central planning period. Rice areas expanded and farmers were motivated to increase land productivity. This was also the case in Myanmar with the full removal of the compulsory production quota in 2003. Further area expansion and yield increases in the country continued, notably in the areas cultivated for summer paddy where private producers were provided support to install pump irrigation and/or shallow tube wells for rice production. Area growth has gradually slowed down in both countries in the most recent period. This was due to the reduction in cropping intensities of rice farms in the Mekong Delta of Viet Nam and the country’s shift in cultivation of its marginal areas in favor of high-value crops such as vegetables and coffee. Rice yield growth remained strong, which enabled the country to maintain its position as a major rice exporter. Unlike Viet Nam, Myanmar’s almost nil area growth rate was not complemented by strong rice yield growth. This was deemed to be due not only to the low rate of fertilizer application but also to the poor quality of fertilizer applied (Shwe and Vokes 2013).

There are other reasons for the slower trends in yield growth rate, which are, in fact, not unique to the CLMV countries because they apply to the rest of Asia as well. Foremost, these reasons pertain to the exhaustion of Green Revolution technologies, mainly the potential of available varieties of rice seeds. Aggravating the situation is the deterioration of land and water quality due to the excessive application of chemical fertilizer and pesticides. Poor farm management practices and illegal activities such as the uncontrolled cutting of trees have
resulted in rapid degradation of natural resources, particularly the loss of topsoil cover due to erosion. The rapid conversion of agricultural lands, including prime irrigated areas to non-agricultural use, has contributed to the reduction of farmlands.

There are also economic factors that account for the slowing trends. A key one relates to the eroding profit margins from rice cultivation due to the decline in its international price while the cost of inputs continues to rise. Enhancing the ability of farmers to compete in the global market by moving toward greater regional integration and liberalization of trade also continues to be a big challenge in the CLMV countries.

**Widening Yield Gaps**

The other evident trend shown in both Figure 8.2 and Table 8.2 is the widening yield gap across the CLMV countries. In the early 1960s, average yield levels in the CLMV countries were within the 0.8–2.0 tons per hectare band, the Lao PDR being the lowest and Viet Nam the highest. Viet Nam’s average rice yield (see Table 8.2) has more than doubled in the last 5 decades and stood at an average level of 5.3 tons per hectare in 2006–2013. The Lao PDR more than tripled its rice yield, which started from just slightly over 1 ton per hectare in the 1960s, increasing steadily to an average level of 3.7 tons per hectare in 2006–2013. Cambodia’s yield level tripled as it underwent a bumpy trend during the 1980s when the country was starting to recover from domestic conflicts and an unstable political environment. Average rice yields in Myanmar were about 348 kilograms less than those of Viet Nam in 1962–1979. The yield differences between these two countries increased by more than 1 ton per hectare in 2006–2013.

Yield gaps are also apparent when comparing the CLMV countries with other countries outside the subregion. In Figure 3, Viet Nam’s rice yield, which is the highest in the subregion, is still far lower than that of the PRC. Cambodia is among those with the lowest yield levels in the region, while the Lao PDR and Myanmar are not far ahead.

The increasing yield gaps are mainly attributed to the countries’ varying landscapes, topographical characteristics, and, hence, soil qualities. Also contributing to such gaps are the different levels of commitment and quality of interventions that came with the economic reforms. Foremost of these interventions is the provision of investments for the agriculture sector, the key one being irrigation development. Table 8.3 shows the state of key agricultural inputs. Despite the vast river deltas in Cambodia, Myanmar, Thailand, and Viet Nam, extensive areas cultivated are still rain-fed lowland or in deep water. Among the CLMV countries, Viet Nam’s irrigated area is most extensive at 49% of
total cultivated area and Cambodia’s is the least extensive at only 9% of total cultivated area. Enhanced investment in irrigation facilities in Cambodia came in the aftermath of the 2007–2008 food crisis. In Myanmar, expansion of sown area in the Ayeyarwady Delta from the late 1990s was due to the installation of pumps for irrigation.

The extent and type of irrigation systems influence cropping intensities, which are shown to vary across the countries. Countries with relatively high cropping intensities are those with high percentages of cultivated area under irrigation. These include Viet Nam, Indonesia, and the PRC. Crop intensification seems to have a direct relationship with the rate of fertilizer application. Crop intensification and rates of fertilizer application have accounted for the different productivity growth rates especially among countries with almost homogenous environments such as Viet Nam, Cambodia, the Lao PDR, and Myanmar. It should be noted that the figures on irrigation and fertilizer application refer primarily to rice but also cover a number of other commodities (e.g., fruits and vegetables, pulses, maize, and sugarcane).

The relatively low proportion of energy use in agriculture and forestry as compared to total energy used is clear not only in the CLMV

**Figure 8.3: Comparing Average Rice Yields across Asia, 2011–2013**

(3-year average, kilograms per hectare)

CLMV = Cambodia, Lao PDR, Myanmar, and Viet Nam; Lao PDR = Lao People’s Democratic Republic; PRC = People’s Republic of China.

Source: Data from Food and Agriculture Organization of the United Nations, FAOSTAT online (accessed July 2015).
countries but also in the neighboring countries (Table 8.3). The level of farm mechanization also remains low in a number of countries shown in Table 8.4, including in Cambodia where the majority of farmers continues to use traditional tools in their production activities. In contrast, mechanization is high in the PRC, India, and the Republic of Korea, where significant development in agricultural mechanization has been taking place (Soni and Ou 2010). Table 8.4 also shows that not all farm activities are mechanized. Land preparation is highly mechanized, followed by threshing and harvesting. Rice milling is also highly mechanized in most countries in the region.

Production Performance of Other Crops

Contributing to the growth in agriculture and agricultural productivity of the CLMV countries is the relatively strong production performance of other crops. The major ones include cassava, sugarcane, yellow corn/maize, cashew nuts, coffee, pulses, fruits, and vegetables. The livestock and fishery subsectors recorded significant production growth performances as well.
For many of these crops, area expansion has been the key reason for production growth. Yield improvement has nonetheless been happening for some of the crops, but at a relatively slow pace such that the levels are still lower than those of the neighboring countries in the region (Figure 8.4). This is especially the case for oil crops, fruits, and vegetables. The yield levels of pulses, roots and tubers (primarily cassava), maize, soybean, and coffee are shown to be relatively competitive with other Asian countries. The average yield of coffee in Viet Nam, in fact, is highest among the other countries.

Cassava production in Cambodia exhibited a huge increase from 147,763 tons in 2000 to about 7.6 million tons in 2012 owing to area expansion (Khin and McNaughton 2013). Exports of the commodity rose exponentially from 2007 until the second half of 2012, raking in huge amounts of export revenues for the country. Key markets for cassava are Thailand and Viet Nam. Yellow corn production increased as a result of both area expansion and yield improvement.

### Table 8.4: Level of Mechanization in Selected Asian Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Farm Activities/Level of Mechanization</th>
<th>Overall Level of Mechanization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>Land Preparation: 80%, Planting: Low, Threshing: &gt;80%, Harvesing: Low, Overall: Low</td>
<td>LOW</td>
</tr>
<tr>
<td>Cambodia</td>
<td>Low, Low, Low, Low, &lt;10%</td>
<td>LOW</td>
</tr>
<tr>
<td>People’s Republic of China</td>
<td>60%, 35%, ..., 30%, 42%</td>
<td>HIGH</td>
</tr>
<tr>
<td>India</td>
<td>30%, 10%, 60%, 20%, 25%–30%, HIGH</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>Low, Low, Low, Low, ...</td>
<td>LOW</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>High, High, High, High, &gt;70%, HIGH</td>
<td></td>
</tr>
<tr>
<td>Nepal</td>
<td>..., Low, Low, 9 units of combine harvesters, Low, MEDIUM</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>13.20%, 0.20%, 69%, Low, ...</td>
<td>LOW</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Low, Low, Low, Low, Low, Low, Low</td>
<td>LOW</td>
</tr>
<tr>
<td>Thailand</td>
<td>High, Medium, ..., Medium</td>
<td>MEDIUM</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>72%, 20%, 100%, ..., MEDIUM</td>
<td>MEDIUM</td>
</tr>
</tbody>
</table>

... = not available.
Source: Soni and Ou (2010).
Cambodia’s corn yield is now on par with that of Thailand but still lower than that of the PRC. The rapid production increase is associated with the expansion of the poultry and aquaculture industries. Cashew production from small orchards has made Cambodia the 10th biggest producer in the world. Vegetables and fruits cultivation has been increasingly widespread, primarily on a small household scale. It is done commercially in particular areas with high population density and close proximity to urban markets.

Coffee is the most important export crop of the Lao PDR. Plantation areas devoted to coffee, however, have been on a decline since 2008. Nonetheless, yield levels have more than doubled from 0.54 tons per hectare to 1.54 tons per hectare between 2008 and 2012. The two other agricultural commodities in the Lao PDR whose production has been on the rise because of area expansion are maize and sugarcane. Vegetable area has been on the rise, especially with the cultivation of the uplands with organic vegetables. Likewise, yield levels have also significantly improved.

Positively affected by the liberalization policies of Myanmar are the edible oils and pulses. Production growth of these crops has come from steady increases in both area and yield. Despite the yield growth,
however, the levels have remained low, especially for pulses, which are grown mostly under rain-fed conditions where seedling establishments are generally poor and application of fertilizers, including pesticides and insecticides, are at low levels. Among the pulses, green gram, black gram, and pigeon pea are most important in terms of their export potential. Oilseeds for the production of edible oil are largely grown in the dry zone of central Myanmar. Sesame occupies approximately 46% of the area sown to oil crops, groundnut 25%, and sunflower 16%.

The diversification toward higher-value products in Viet Nam resulted from its greater exposure to the international market with the country’s accession to the World Trade Organization in 2007. Greater market participation of the private sector, including in foreign trade, facilitated private investment in the rural sector, promotion of contract farming, application of modern technologies, and development of rural non-farm activities that helped diversify and improve agricultural products through efficient integration in the value chain. While rice production continued to increase, so did that of the other commodities. Maize production increased 1.8 times in sown area and 2.8 times in output terms from 1986 to 2011. Cash crops for exports such as peanuts, soybean, rubber, coffee, and tea have all expanded in terms of both sown area and output. There has also been a rapid increase of 571,500 hectares of fruit crop area from 261,200 hectares in 1986 to 832,700 hectares in 2011. Viet Nam’s yield levels in most commodities are 2–5 times higher than their respective levels prior to the economic reforms. All these developments led Viet Nam to achieve agricultural growth of more than 6% annually in the 1990s.

**Livestock, Poultry, and Fishery Production**

New technologies developed for the livestock and fisheries subsectors include, among others, the development of high-yielding animal breeds and fish species and the formulation of more effective animal feeds that enhance vigor and resistance to diseases. Many of these new technologies have been tested, validated, and adopted by the CLMV countries.

In Cambodia, the fisheries subsector is the second largest contributor to the country’s agricultural gross value added with a share of 25%. With annual fish catch estimated at 400,000 tons per year, the fisheries sector indeed provides direct and indirect employment and income to about 2 million people, especially those who live within the Tonle Sap basin whose means of livelihood and nutritional well-being is fishing. The fisheries subsector recorded an average annual real growth rate of 3.6% during 2007–2012. The removal of restrictions on fishing lot ownership encouraged greater access to fishing grounds. This was complemented
by the development of inland aquaculture. Animal husbandry has not been as lucrative, however. While it accounts for 15% of agricultural gross value added, this share has not changed for years due to either stable or declining cattle and swine production. Poultry numbers have increased by 40%, however, during 2007–2012.

Livestock and fish production have both been on the rise in the Lao PDR. Production of livestock increased from 24.2 million heads in 2005 to about 32.8 million heads in 2011. While lowest in number, goats exhibited the highest rate of increase. This was followed by swine and poultry. Fish production increased by 29% from 74,200 tons in 2009 to 95,600 tons in 2011.

Livestock production has been increasing in scale and is becoming more modernized. Farm-based and concentrated industrial forms of animal husbandry are gradually replacing scattered household-level practices. Livestock farms across the country increased from 1,761 in 2001 to as many as 23,558 in 2011, indicating a sharp growth rate of more than 150% annually. In response to increasing consumer demand, livestock production has been growing relatively fast at an average 6% annually. Pork output increased from 0.6 million tons in 2000 to 3.1 million tons in 2011, which has resulted in a rise in livestock output as a share of overall agricultural output from 13% in 1986 to 16% in 2011.

In the fisheries sector, there have been positive improvements in both offshore fishing and aquaculture development. The overall fisheries output increased by 7.5 times, of which aquaculture production increased by 14.5 times during 1986–2011.

**Agricultural Productivity and Growth in CLMV Countries: Constraints and Challenges**

As covered in the previous chapters, productivity increases through policy reforms have enabled the CLMV countries to sustain the growth of agriculture over the years. Table 8.5 shows the subregion is still flourishing with abundant and diverse resources, which include land, water, and coastal and/or marine resources. The countries also boast ample human resources, with the majority still engaged in agricultural activities. Even though the share of the agriculture sector has declined, from 49% in 1993 to 28% in 2014, the sector has remained strong and has supported overall economic growth in these countries (World Bank 2015). During the last 10 years (2005–2014), the CLMV countries as a subregion grew faster than the more advanced Association of Southeast Asian Nations countries (ASEAN-6, i.e., Brunei Darussalam, Indonesia,
Table 8.5: Strengths, Weaknesses, Opportunities, and Threats of the Agriculture Sector in CLMV Countries

<table>
<thead>
<tr>
<th>Cambodia</th>
<th>Lao PDR</th>
<th>Myanmar</th>
<th>Viet Nam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Large agricultural land with special soil types for specialty rice</td>
<td>• Inadequate infrastructure: irrigation, rural roads, electricity</td>
<td>• Diverse agro-ecological zones allow for wide range of crops</td>
<td>• Appropriate natural resources for agricultural production</td>
</tr>
<tr>
<td>• Abundant water resources</td>
<td>• Absence of land-use planning and agricultural zoning</td>
<td>• Abundant fertile land and water resources</td>
<td>• Extensive system of irrigation infrastructure</td>
</tr>
<tr>
<td>• Diverse agro-ecological zones</td>
<td>• Lack of R&amp;D and extension services</td>
<td>• Farmers responsive to policy reforms and incentives</td>
<td>• Farmers with good skills in agricultural production</td>
</tr>
<tr>
<td>• Large portion of population engaged in farming</td>
<td>• Very limited credit and risk-hedging schemes for farmers</td>
<td>• Strategic location for exports to the PRC, India, and ASEAN</td>
<td>• Low cost and high volume of agricultural production</td>
</tr>
<tr>
<td>• Government’s priority sector for development</td>
<td>• Inadequate infrastructure facilities, particularly road and transportation network that negatively impact development of both input and output markets</td>
<td>• Limited quantity of resource endowment: small farm sizes</td>
<td>• Strategic location in region</td>
</tr>
<tr>
<td><strong>Strengths</strong></td>
<td><strong>Weaknesses</strong></td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Large and productive arable land with low population density</td>
<td>• Poor connectivity (major roads, agricultural roads, internet, telephone network) and power scarcity</td>
<td>• Extensive system of irrigation infrastructure</td>
<td>• Farmers with good skills in agricultural production</td>
</tr>
<tr>
<td>• Different ecological conditions that are suitable for growing different specific crops and varieties</td>
<td>• High level of landlessness</td>
<td>• Farmers with good skills in agricultural production</td>
<td>• Low cost and high volume of agricultural production</td>
</tr>
<tr>
<td>• Less polluted environment due to continued practice of traditional farming: conducive to promoting organic agriculture</td>
<td>• Rural indebtedness and limited farm credit</td>
<td>• Strategic location for exports to the PRC, India, and ASEAN</td>
<td>• Strategic location in region</td>
</tr>
<tr>
<td>• Large portion of population engaged in farming</td>
<td>• High cost of agricultural inputs as well as outputs</td>
<td>• Limited quantity of resource endowment: small farm sizes</td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Low labor cost</td>
<td></td>
<td></td>
<td>• Low uniformity of products, low food safety</td>
</tr>
<tr>
<td>• Strong development partner support to agricultural development: financial and technical</td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
<td>• Slow structure change, low efficiency</td>
</tr>
<tr>
<td><strong>Weaknesses</strong></td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Inadequate infrastructure: irrigation, rural roads, electricity</td>
<td>• Limited quantity of resource endowment: small farm sizes</td>
<td>• Limited quantity of resource endowment: small farm sizes</td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Absence of land-use planning and agricultural zoning</td>
<td>• Low uniformity of products, low food safety</td>
<td>• Low uniformity of products, low food safety</td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Lack of R&amp;D and extension services</td>
<td>• Slow structure change, low efficiency</td>
<td>• Slow structure change, low efficiency</td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Very limited credit and risk-hedging schemes for farmers</td>
<td>• Dependence on import of agricultural inputs</td>
<td>• Dependence on import of agricultural inputs</td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
<td><strong>Threats</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Diverse agro-ecological zones allow for wide range of crops</td>
<td>• Good connectivity (minor roads, agricultural roads, internet, telephone network) and power scarcity</td>
<td>• High level of indebtedness and limited farm credit</td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Abundant fertile land and water resources</td>
<td>• Farmers responsive to policy reforms and incentives</td>
<td>• Lack of clear strategy and policy</td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Farmers responsive to policy reforms and incentives</td>
<td>• Strategic location for exports to the PRC, India, and ASEAN</td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Strategic location for exports to the PRC, India, and ASEAN</td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
<td><strong>Threats</strong></td>
<td><strong>Threats</strong></td>
</tr>
<tr>
<td>• Strategic location for exports to the PRC, India, and ASEAN</td>
<td><strong>Opportunities</strong></td>
<td><strong>Threats</strong></td>
<td><strong>Threats</strong></td>
</tr>
</tbody>
</table>

continued on next page
Table 8.5  continued

<table>
<thead>
<tr>
<th>Cambodia</th>
<th>Lao PDR</th>
<th>Myanmar</th>
<th>Viet Nam</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Very limited standards on agricultural products</td>
<td>• Small land sizes that hinder taking advantage of economies of scale</td>
<td>weak capacity in policy formulation and planning and implementation</td>
<td>• Underdeveloped agricultural products processing</td>
</tr>
<tr>
<td>• Weak information system in agriculture sector</td>
<td>• Weak public extension and dissemination system on production-related and market-related technologies and information</td>
<td>• Weak land policy: problem of land grabbing</td>
<td></td>
</tr>
<tr>
<td>• Ineffective legal framework and enforcement</td>
<td>• Weak farmers’ organizations</td>
<td>• Low human resources capacity</td>
<td></td>
</tr>
<tr>
<td>• Limited roles of contract farming and farmers’ cooperatives</td>
<td>• Inadequate working capital and access to credit, insurance and other financial services for agricultural production and value addition</td>
<td>• Legal framework not conducive to agribusiness investment (e.g., taxes, land laws, banking regulations) and value chain development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Very little entrepreneurship knowledgeable on agricultural value chain</td>
<td>• Weak farmers’ organizations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Low trade facilitation and inadequate export promotion of high-quality and value agricultural and agro-processing products (e.g., organic products)</td>
<td>• Unreliable database</td>
<td></td>
</tr>
</tbody>
</table>

Opportunities

• Worldwide potential market access
• Crowding in support from various stakeholders (government, donors, private sector)
• “Land lock to land link” policy through development of regional linkage and infrastructure development enhance opportunity for agricultural exports
• Large areas for developing irrigated agriculture
• Available technologies to increase yields
• Prospect of substantial aid flows
• Growing demand for agricultural products
• Further international integration
• Increasing opportunities to attract FDI
Table 8.5  continued

<table>
<thead>
<tr>
<th>Cambodia</th>
<th>Lao PDR</th>
<th>Myanmar</th>
<th>Viet Nam</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Geographical benefits from Thailand and Viet Nam (technological diffusion, market integration)</td>
<td>• Free trade agreements can ease importation of agricultural inputs and lower their cost</td>
<td>• Potential to become major exporter of high-quality rice through integrated rice operations (seedling, milling, logistics)</td>
<td>• Support of international donors, especially on climate change response</td>
</tr>
<tr>
<td></td>
<td>• Growing market of organic products</td>
<td>• Huge potential to export high-value crops, including fruits, vegetables, pulses, rubber, sugarcane, etc.</td>
<td>• Technology/science base development</td>
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<tr>
<td></td>
<td>• FDI policy attracts more foreign investment</td>
<td>• Potential to increase fertilizer production</td>
<td>• Government commitment to economic restructuring and support for agriculture and rural development</td>
</tr>
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<td></td>
<td>• Increased public–private partnerships (PPP) in value addition/value chain development of agricultural production, especially for export</td>
<td>• Potential to embark on green growth to produce organic crops</td>
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<td></td>
<td>• Regional integration that increases cooperation in exchanging technical knowledge and other information</td>
<td></td>
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<tr>
<td></td>
<td>• Development of agro- and eco-tourism</td>
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Threats

- Rural migration
- Climate change and deforestation
- Loss of fisheries resources
- Limited support for agro-industry
- Competition in the use of land and water for non-agricultural purposes
- Low competitiveness of the agriculture sector
- Unscrupulous farmers and traders taking advantage of the growing agriculture markets
- Land grabbing might result in extreme social fragmentation
- Lack of clarity and transparency in land laws may undermine investment
- Neglect of smallholder farming might result in persistence of poverty and
- Increasing competition from neighboring countries
- Evolving demand for standard compliance
- Competition of industrialization and urbanization of agricultural resources
- Increasing risks due to natural disasters and

continued on next page
Table 8.5  continued

<table>
<thead>
<tr>
<th>Cambodia</th>
<th>Lao PDR</th>
<th>Myanmar</th>
<th>Viet Nam</th>
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<td>• Unscrupulous farmers and traders taking advantage of the growing agriculture markets</td>
<td>• Neglect of smallholder farming might result in persistence of poverty and aggravate social tension</td>
<td>• Competition of industrialization and urbanization of agricultural resources</td>
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<tr>
<td>• Weather conditions and adverse effects of climate change like drought or flood are threats to agricultural production</td>
<td>• High-input agriculture might lead to environmental damage and unsustainable use of natural resources</td>
<td>• Increasing risks due to natural disasters and epidemics, including climate change</td>
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<tr>
<td>• Weak regulatory mechanism and certification of agricultural products for export</td>
<td>• Land degradation in dry zone and hill areas and lack of action plans to address slash and burn agriculture</td>
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<tr>
<td>• Limited proper quarantine checks for agricultural production across borders (illegal border trade), which can lead to outbreaks of pests and diseases</td>
<td>• Natural disasters/ climate change</td>
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<td></td>
</tr>
</tbody>
</table>

ASEAN = Association of Southeast Asian Nations, FDI = foreign direct investment, Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China, R&D = research and development. Source: Authors.
Malaysia, the Philippines, Singapore, and Thailand), with average gross domestic product growth rates of 7.5% compared to 5.1% for ASEAN-6 (ASEAN Secretariat 2015).

Despite these gains, the potential of the subregion to achieve higher agricultural productivity and production is not fully realized. In fact, over the last decade, productivity has actually slowed or stagnated because of a number of challenges and constraints that confront the agriculture sector.

For one, the economies of the CLMV countries still face economic and technological constraints that inhibit the exploitation of productivity in agriculture. Farm size and land tenure are the principal constraints. Farm areas are typically small in the CLMV countries, which prevent them from maximizing the productivity and cost-saving benefits from mechanization. Another challenge is access to technology, such as technologies to harness the potentials of marginal areas (e.g., rain-fed and upland) and the use of biotechnologies to develop new food varieties.

For example, while Cambodia’s agriculture sector has demonstrated strong agricultural growth performance in the last 15 years as a result of new policies and programs, it still suffers from serious underinvestment in irrigation, rural roads, extension services, and rural credit. The large, mountainous, and hilly terrain of the Lao PDR has limited its scope for lowland irrigation. The challenge still includes the expansion of rice production using similar high-yielding varieties in the lowlands adapted to the upland ecosystem. In terms of economic efficiency alone, the comparative advantage of the country’s agriculture does not seem to lie in the expansion of rice production, but in the increase of high-value cash crops such as coffee and livestock production, especially in conjunction with road network improvement to expand cross-border trade. While Myanmar has opened up and development and transformation processes are taking place even in poorer areas of the country, the present policy framework has still not been able to provide much dynamism for agriculture, including investment in goods transport and other infrastructure facilities.

New developments arising from the globalization of agricultural markets are also putting pressure on efforts to sustain the stability of food markets. As domestic markets are exposed to global markets, food prices become volatile. As a result, the availability, accessibility, and affordability of food production are affected. Because of globalization, the agriculture sector in the CLMV countries has to contend with increased competition from other markets due to removal of trade barriers, higher food standards, and changes in terms of trade that affect the competitiveness of domestic producers. Similarly, due to their small size and increasing reliance on imports of food supplies, local producers
become more vulnerable to changes in world market conditions, resulting in lower incentives for farmers to engage in production (FAO 2002). Openness to external markets also exposes domestic markets to greater uncertainty and risks, as the 2008 global food crisis has shown.

Finally, the CLMV countries have to overcome emerging challenges posed by climate change and environmental risks, notably the degradation of natural resources, rising temperatures, and extreme weather events such as floods and droughts. Evidence suggests that global warming (including climate change) can reduce agricultural productivity in developing countries by around 9%–21%, with adverse impacts on agricultural food production and food security (Meyers et al. 2012). Moreover, climate change creates further uncertainty on the production decisions of farmers, thus negatively affecting food production and distribution.

Unfortunately, current environmental conditions in the CLMV countries have further increased their vulnerabilities to climate change. For example, due to economic and political pressures and underinvestment in infrastructure, most of the CLMV countries suffer from inefficient use and management of natural resources. Because the production systems in the subregion are small and have low productivity, and because many farmers lack adaptation skills and practices, adjusting agricultural production to changing climate conditions is also rendered difficult and very challenging.

Future Prospects and Agenda for Reforms

Considering their rich natural resources, favorable tropical climate, and abundant labor, the agriculture sectors of the CLMV countries can perform beyond their conventional role of providing food (especially for their own needs), tapering inflation, generating foreign exchange, and providing the basis for rural growth. However, this will only be possible if the constraints to the agriculture sector are alleviated by further reforms. Identifying appropriate reforms and implementing good policies are key to unleashing the potential of these countries and seizing the opportunities that are becoming available because of changes in the market environment. Collectively, the CLMV countries can become a veritable subregional food center, specializing in commodities on the basis of comparative and competitive advantage.

As highlighted throughout this book, reforms have the potential to increase agricultural productivity. To be effective, however, reforms have to be carefully designed and sequenced. Thus, deciding the appropriate policy reforms for such a transformation is crucial. This should involve,
among other considerations, an assessment of development pathways that would enable the agriculture sector to overcome threats and challenges, follow a green growth strategy, and ensure more sustainable production growth that benefit everyone, including poor and small farmers. Policy reforms should also remain dynamic and responsive to the changing realities of the markets and economic and political conditions in the region.

**Land Management**

The first element of the reform agenda is sustainable land management. Due to the limited resource base in the region, particularly land and water, and the continued degradation of these resources, the CLMV countries have to contend with land scarcity and competition among crops for land allocation. This leads to further land-use pressures and degradation, which, in turn, impact adversely on agricultural production and productivity. Because the majority of farmers in the CLMV countries own small landholdings, with very limited experience in managing land and other resources, many of them have to deal also with low and unpredictable crop yields and incomes.

Scaled-up efforts to improve land and water management practices are therefore needed to increase crop yields and long-term productivity, with positive impacts in terms of increased incomes and employment opportunities to farmers, and increased resilience of the sector. Evidence suggests that effective land management is an integral part of sustained agricultural development (Winterbottom et al. 2013). Thus, it is crucial that policy makers ensure a good balance between promoting land concessions and providing incentives for farmers through secured land tenure and property rights. They should also create enabling policies for improved land inventory schemes and more effective land-use planning. A more integrated approach to land and water management is also needed to ensure that best practices are implemented and benefit all agricultural landscapes of the region. Part of this approach is bringing together all relevant stakeholders, smallholders, and farmers to design a plan to restore agricultural productivity and rural livelihoods.

**Investment**

Second, investment in agriculture has to be accelerated to generate sustained increases in yields and production given the limited resources. While this can be challenging because of the region’s weak investment environment and low level of agricultural productivity stock, renewed emphasis on effective investment measures in agriculture is needed.
Key areas in which such investments can be directed are technological innovations, advancement in seed varieties, cost-effective irrigation, communications, transport, and other market infrastructure. At the same time, investment incentives that improve access to markets by private investors in the agriculture sector should be encouraged.

In addition to rural infrastructure and institutions, there is a need to focus on investments that address the productive safety nets and capacity constraints of poor farmers (Schmidhuber and Bruinsma 2011). It is widely recognized that agricultural investments have the potential to increase productivity, although the intended impacts are sometimes not being realized because of limited capacity of beneficiaries. For example, many best agricultural practices (e.g., land management and seed development) are not effectively implemented because farmers do not know how to apply them. Thus, investment in knowledge management in agriculture is critical.

**Risk Management**

Third, in view of the increased uncertainty in agricultural production systems brought about by changing climate conditions, a comprehensive risk management program must be in place to preserve the capacity of natural resources in sustaining productivity achievements. Policy makers need to give renewed emphasis to understanding the implications of climate change to agriculture, as well as in implementing environmentally effective policies such as regulations that maintain soil carbon content and make efficient use of fertilizers and irrigation (FAO 2008).

More important are those policies related to climate change mitigation and adaptation, and the assessment and monitoring of impacts of climate change in agriculture. While mitigation (e.g., emissions reduction) and adaptation (e.g., land and water management) measures are supposed to complement each other, a key challenge is how to strengthen those linkages. One practical approach is to develop national adaptation strategies in each country to support the implementation of policies (Meyers et al. 2012). For example, the CLMV countries should implement measures to mainstream climate change adaptation with food security, conduct climate change vulnerability assessments, and strengthen capacities and coordination for adaptation and mitigation.

**Linking Agricultural Markets**

Fourth, with the increasing importance of regional economic integration, linking the agricultural markets in the CLMV countries is now a
necessary condition for sustained agricultural productivity growth. One approach that is widely promoted is the idea of “agricultural supply chains” where the production process in agriculture is interrelated in many ways through a series of chains of functions (from seed development to marketing of final product) and players (from small farmers to big producers and/or distributors). While the benefits of participating in food supply chains are many, a key challenge is how to identify the weakest links within the supply chain and address them with appropriate policies (Wong 2013).

Thus, it is important that policy measures remain supportive of the markets. This involves linking the farmers to the markets, technologies, knowledge flow, and delivery (Singh 2009). A case in point is the development of the supply chain in rice, a key industry that offers huge potential for the CLMV countries. To develop the rice supply chain, countries need to undertake policies that promote certified seeds and fertilizers; effective agricultural support services such as technology transfer, credit, and marketing; and other innovative developments along the chain (Wong 2013). In a global context, this also means creating linkages with external markets through appropriate policies. These include measures such as improving food standards, quality, and certification; enhancing trade facilitation and logistics; and removing tariff and non-tariff barriers to agricultural trade—key factors that can impact significantly on the competitiveness of the agriculture sector. Such measures, although not new, are still critical if the region is to take advantage of the opportunities being offered by regional production networks, including the benefits of structural transformation in the economy arising from external competitive forces.

**Institutional Changes**

Finally, institutional changes matter if these policies are meant to work. The dramatic transformation of the agriculture sector implies that the conditions and institutions that governed the sector over the last 3 decades are no longer relevant given the new opportunities and risks confronting the sector. For example, the institutions that contributed to the success of the Green Revolution in the 1970s may no longer be appropriate in the current context of globalization and rapidly integrating markets. Similarly, technologies, sources of comparative advantage, and institutional arrangements in agriculture (e.g., increasing role of the private sector in agricultural supply chains) have changed—and, along with those, so too have the policy responses to problems and constraints facing the sector.
In such a new environment, policy makers should be ready to adapt to new institutions and mechanisms when they implement and formulate policies. New institutional changes have to be considered, such as the need to strengthen coordination with relevant agencies in charge of agricultural development, so that policies can address holistically the problems of the sector. Strong partnerships and networking are also needed. In particular, the private sector has to play an increasing role to ensure that policies are consistent with market demands by driving, for example, the organization of value chains that link the markets to small farmers and commercial farms. Furthermore, there is a need for more effective governance mechanisms to ensure that the various initiatives intended for agricultural development are being implemented effectively. For example, a new form of governance that corrects market failures through regulatory interventions can be designed to increase the competitiveness of the agriculture sector and support greater inclusion of farmers in the entire production system.

Conclusion

Enhancing agricultural productivity in predominantly agrarian economies as in the CLMV countries is crucial. The transition from an inefficient, state-controlled agriculture sector toward a more open, market-oriented production system has so far produced profound impacts for these economies. Such a transition would not have been possible without the comprehensive reforms that have been implemented over the years. However, while reforms have enabled the CLMV countries to enhance the efficiency and productivity of their agriculture sector, existing constraints (e.g., inadequate investment and market infrastructure) and emerging challenges (e.g., rising competition from integration and effects of climate change) suggest that the reform process is far from complete, and that more efforts are still needed to achieve sustainable agricultural development in the region.

Perhaps one important lesson learned from the experiences of the CLMV countries in promoting agricultural development is the realization that productivity enhancement is not an end in itself. Instead, it should be viewed as one of the many means by which development goals can be achieved. In the CLMV countries, where poverty and food insecurity are still very much prevalent in large parts of the population, the need to ensure sustainable food systems and adequate nutrition should be the ultimate objectives. While productivity has the potential to enhance the incomes of small farmers, economic growth needs to be inclusive in order to sustain long-run improvements in the livelihoods of
the poor. Without inclusive growth, the agriculture sector will continue to be marginalized and measures to achieve productivity gains are bound to fail.

This suggests that the reform agenda in the agriculture sector should go beyond the traditional view of expanding yields and supply of agricultural products. Agriculture has to be transformed as a viable and productive sector of the economy. Such transformation requires changing the market structures and regulatory policies that govern the sector. The growth in agriculture has to be mainstreamed as part of the overall development agenda of the economy, which implies targeting as well improvements in health, nutrition, education, employment, and job creation. More importantly, it requires a change in the mindset, priorities, and political will of the governments implementing the reforms.

Bibliography


Asian Development Bank Institute
The Asian Development Bank Institute (ADBI), located in Tokyo, is the think tank of the Asian Development Bank (ADB). ADBI's mission is to identify effective development strategies and improve development management in ADB's developing member countries. ADBI has an extensive network of partners in the Asia and Pacific region and globally. ADBI's activities are aligned with ADB's strategic focus, which includes poverty reduction and inclusive economic growth, the environment, regional cooperation and integration, infrastructure development, middle-income countries, and private sector development and operations.

Agence Française de Développement
Agence Française de Développement (AFD) is a public development-finance institution that has worked for seventy years to alleviate poverty and foster sustainable development in the developing world and in the French Overseas Provinces. AFD executes the French government’s development aid policies.

Working on four continents, AFD has seventy-one field offices and bureaus, including nine in France’s overseas provinces and one in Brussels. The Agency provides financing and support for projects that improve living conditions, promote economic growth, and protect the planet.
Cambodia, the Lao People's Democratic Republic, Myanmar, and Viet Nam share many agrarian similarities, macroeconomic constraints, and development challenges. But they also have the opportunity now to harness the potential of their economies by introducing reforms to increase productivity and competitiveness in the agriculture sector.

In this collaboration between the Asian Development Bank Institute and Agence Française de Développement, national practitioners and regional experts propose specific policies to boost agricultural productivity in the countries of the lower Mekong.

The volume identifies common priorities for agricultural productivity, including improving agricultural bureaucracies and regimes; moving into organic and niche products; promoting farmer organizations, contract farming, and seed industries; and implementing certified international food and safety standards.