



Improving Farm Productivity and Rural Livelihoods

A Knowledge-Sharing Experience

Summary of the Proceedings of the
2011 People's Republic of China–Asian Development Bank
Knowledge Sharing Platform on Agricultural and Rural Development

Asian Development Bank

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Foreword

In the process of becoming a middle-income country, demand for knowledge solutions in the People's Republic of China (PRC) has grown fast. The PRC's successful experiences in economic development and poverty reduction could also be beneficial to other developing countries. Recognizing the key role of knowledge generation and application to development in its long-term strategic framework, Strategy 2020, the Asian Development Bank (ADB) has increasingly emphasized knowledge production and management in cooperation with its developing member countries. Knowledge sharing within a South–South framework has become important.

In 2009, ADB and the Ministry of Finance of the PRC established a Knowledge Sharing Platform (KSP) to (i) promote South–South cooperation on key development issues faced by developing countries, (ii) contribute to sound development management and policy making, and (iii) promote regionally inclusive development. A KSP on agricultural development and rural livelihood improvement was held in Beijing and Henan Province in November 2011. This publication is a summary of the proceedings of the KSP.

Modernization of agriculture has been a key factor in the strong pro-poor growth everywhere in Asia. Over the past few decades, we have witnessed significant achievements in agricultural production and rural development in Asia. In recognition of the importance of the agriculture sector to the economy and society, investments in the sector have again become a priority in many developing countries in recent years. Agriculture and natural resources accounted for more than 10% of ADB's overall lending. In the PRC, ADB's involvement in the agriculture sector includes improving rural infrastructure, promoting value chain development, and developing biomass clean energy and low-carbon agricultural production. Integrating knowledge and innovation into operations plays a key role for ADB to contribute to agricultural and rural development in the PRC.

On the other hand, we are still facing enormous challenges for agricultural development and rural livelihood improvement. With more than half of the global population living in Asia, the region needs to deal with increasing food demand, rising food and agricultural input prices, competition for agricultural resources from urbanization and industrialization, and enlarged gaps between urban and rural areas, among others. It is hoped that with enhanced regional collaboration in knowledge production and sharing as well as in agricultural infrastructure, countries can help each other confront the challenges and overcome barriers to agricultural development more efficiently.

The KSP identified five key topics that were of common interest to many developing member countries for in-depth discussions: (i) policies and institutional mechanisms to promote modern agriculture, (ii) agricultural value chain and logistics system

development, (iii) bridging of agricultural research with practices, (iv) rural infrastructure and green development, and (v) financial development in rural areas. Participants from the PRC as well as 12 other developing member countries of ADB generously shared their experiences, views, and ideas with respect to these topics. This publication documents the discussions and highlights the key messages and insights from the KSP and is intended to serve as a basis for continuous networking and knowledge sharing among the KSP participants and practitioners in the agriculture sector.

ADB and the PRC have been exploring knowledge partnerships to expand mutual learning with other developing member countries in urban development, sustainable transport, water security, and agricultural and rural development. We expect that both parties will continue such endeavors to enhance knowledge sharing for the benefit of South–South relations.

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Acknowledgments

This report documents the experiences, views, and lessons shared during the 2011 People's Republic of China (PRC)–Asian Development Bank (ADB) Knowledge Sharing Platform (KSP) on agricultural and rural development, held in Beijing and Henan Province on 8–11 November 2011. We thank all participants from Bangladesh, Cambodia, the PRC, India, Indonesia, the Lao People's Democratic Republic, Mongolia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, and Viet Nam for their presentations and discussions, which constitute the basis of this report.

We would also like to thank the International Poverty Reduction Center and the Henan provincial government for their excellent logistical support for the KSP and arrangements for a field trip to visit agricultural development project sites and research institutes in Henan Province during the KSP. The KSP is also an outcome of effective collaboration within ADB. The South Asia, Southeast Asia, and Central and West Asia departments, and their respective resident missions assisted in nominating government officials and making travel arrangements for the participants. The Public Management, Financial Sector, and Regional Cooperation Division and the Urban and Social Sectors Division of the East Asia Department helped identify topics and resource speakers for the KSP. Staff from the Environment, Natural Resources, and Agriculture Division and the PRC Resident Mission in Beijing made great efforts in organizing and coordinating the event.

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Abbreviations

ADB	–	Asian Development Bank
BDS	–	business development service
CDD	–	community-driven development
DMC	–	developing member country
GDP	–	gross domestic product
IAARD	–	Indonesian Agency for Agricultural Research and Development
KSP	–	Knowledge Sharing Platform
Lao PDR	–	Lao People's Democratic Republic
P2P	–	peer-to-peer
PRC	–	People's Republic of China
SMEs	–	small and medium-sized enterprises
TFP	–	total factor productivity
VCF	–	value chain finance

Executive Summary

With globalization and regional integration under way, South–South cooperation and knowledge sharing have become increasingly important. To facilitate knowledge and experience sharing, the Asian Development Bank (ADB) and the Ministry of Finance of the People’s Republic of China (PRC) jointly initiated the PRC–ADB Knowledge Sharing Platform (KSP) in 2009, which has become an annual event since then. The KSP brings together senior government officials from the PRC and from ADB’s other developing member countries (DMCs) as well as experts from relevant fields to discuss development challenges and opportunities, and share innovative ideas related to policies, institutions, and practices for sustainable development. The 2011 KSP focused on agricultural and rural development, and was held in Beijing and Zhengzhou, Henan Province in the PRC on 8–11 November 2011.

The 2011 KSP aims to facilitate knowledge sharing regarding successful policies, institutions, and practices in developing agriculture and rural areas; promote discussion on the challenges and strategies for sustainable agricultural and rural development; and support policy dialogue and future cross-border collaboration between the PRC and ADB’s other DMCs. The 2011 KSP was organized around several themes crucial to the modernization of agriculture in Asian DMCs. The common thread of the chosen topics is to highlight practices and approaches to accelerate the transformation of the agriculture sector of DMCs into modern agricultural systems through value chain development and improved logistics, application of agricultural research, rural infrastructure and green rural development, and financial development in rural areas. The purposes of this publication are to document the knowledge and experiences presented during the 2011 KSP and the views exchanged among participants on further collaboration on agricultural and rural development in the region, and to share lessons learned with agricultural practitioners.

Modernization and logistics. Underlying the theme of the 2011 KSP Agriculture and Rural Development: Improving Farm Productivity and Rural Livelihood’s is the complex set of processes commonly referred to as modernization of agriculture and structural transformation. In spite of enormous socioeconomic and agroecological differences, most of the countries in the region face common issues, including a large labor force engaged in agriculture; mounting pressure on natural resources, particularly land and water; and growing urban populations. A shrinking resource base and a reduced labor force in agriculture are expected to fulfill an increasing demand for safe, quality, and affordable food.

The expectations of an increasingly urbanized society and a rural population that is still large and diversifying out of agriculture will need to be met through the emergence of new structures of production and exchange. Organized and effective agricultural and food

value chains have already emerged in response to this need. Their further development will accompany the modernization of agriculture. During this process, policy and investment should ensure inclusion and integration of smallholder farmers into value chains.

Logistics systems have to adapt to a changing structure whereby cooperatives, large farms, and corporations work together in an organized fashion to increase the supply of food and agricultural products in Asia. This will require a different way of organizing warehouses, transport, packaging, storage, grading, and quality control.

Modernization highlights the increasing importance of standards and compliance systems to assure food safety and efficient systems of distribution. Harmonization within countries as well as among countries will be needed. The traditional support of governments for improvement of infrastructure (e.g., roads, seaports, airports, warehouses, cold storage, or controlled atmosphere storage) will turn to support for software (e.g., logistics, standards, compliance systems, and information systems).

Agricultural research. Part of the solution to counter the increasing pressure on natural resources and the declining labor force in agriculture comes from science and technology. The contribution of agricultural science and technology to agricultural growth is increasing. In the PRC, the contribution of science and technology to the country's agricultural growth almost doubled between 1979 and 2010 and is currently more than 50%.

Countries have started to apply participatory approaches to establish priorities for agricultural research to ensure that the demands of farmers and enterprises are met. As the agricultural system becomes more complex, the private and cooperative sectors will play a greater role in the generation and dissemination of technology.

Scaling up investment in agricultural research and extension will benefit from a multi-approach and multichannel orientation to ensure that innovation reaches farmers and enterprises. Different models of extension have been applied and have shown success in different contexts. Demonstrations, direct technology supply, technology programs, technology incubators, and the use of information and communication technology have also shown promise. All can coexist in the process of modernization.

Rural infrastructure. All countries involved in the workshop emphasized the critical role of infrastructure in ensuring higher productivity and improved livelihood in rural areas. Modernization of agriculture requires multiple types of infrastructure, such as irrigation, transport, energy, social, marketing, and environmental. Common problems throughout the region are the insufficient level of rural infrastructure and the lack of efficiency of investment in rural infrastructure.

Community-driven development in infrastructure is a possible solution to the problems of lack of efficiency and resources. If communities benefit directly from infrastructure and are involved in planning and implementation of rural infrastructure projects, there is scope to increase their contribution to finance and improve the efficiency of rural infrastructure.

Circular economy and renewable energy. Renewable energy technologies are proving to be increasingly viable and effective to meet localized energy requirements. The concept

of a circular economy deserves deeper analysis and replication. It focuses on recycling agricultural wastes (e.g., straw) to produce biogas, biofuel, or soil and environmental improvement materials.

Both the PRC and Viet Nam face the environmental impacts of increasing amounts of livestock waste, which has great potential for rural renewable energy and additional income for farmers. ADB is assisting the two countries to construct household biogas plants and biogas plants to solve rural pollution and rural energy problems. ADB is also helping the PRC to remove institutional barriers to grid connections in order to improve financial incentives for biogas plants, and to develop regulatory enforcement capacity and a monitoring system to improve the performance standards of biogas plants.

Rural finance. A number of innovations in rural finance, microfinance, and agricultural finance have emerged over the past 30 years. To ensure that innovation works, it should respond to rural clients' needs and generate benefits over costs incurred and risks taken. For rural financial markets, it is crucial to keep innovative products simple and supportive of activities in the real economy. Microfinance has proved to be a powerful tool but not a panacea for poverty reduction. Each country and/or organization may have its own approach and area for financial innovation. Interesting examples include mobile payment and banking, no-frills saving accounts, credit-plus approaches, value chain finance, and peer-to-peer lending provided through a peer-to-peer platform.

1 Introduction

1.1 Background

With globalization and regional integration under way, South–South cooperation and knowledge sharing has become increasingly important. To facilitate knowledge and experience sharing, the Ministry of Finance of the People’s Republic of China (PRC) and the Asian Development Bank (ADB) jointly initiated the PRC–ADB Knowledge Sharing Platform (KSP) in 2009, which has since become an annual event. The KSP brings together senior government officials from the PRC and ADB’s other developing member countries (DMCs) as well as experts from relevant fields to discuss development challenges and opportunities and share innovative ideas related to policies, institutions, and practices for sustainable development. The 2011 KSP focused on agricultural development and was held in Beijing and Zhengzhou, Henan Province in the PRC on 8–11 November 2011.

Agricultural development is critical to the structural transformation of a developing nation from an economy that is fundamentally agricultural to one that is based on industry and services. Modernization of agriculture has been a key factor in the strong pro-poor growth witnessed in most of the successful Asian countries. The Asian nations that grew earliest and fastest also later witnessed rapid growth in industry and services. These countries have emphasized farm productivity and diversification in their strategic development approaches and have implemented reforms to diversify their rural economy.

Investment in agriculture, after falling out of favor in the late 1990s, has again become a priority in the 2010s. Drivers for this change have been not only the 2008 food price crisis, but also recognition of the impact of improved agriculture sector performance on the wider economy and society. Agriculture has served as a basis for growth and poverty reduction in many countries, but many more countries could benefit if governments and donors were to reverse years of policy neglect and remedy their underinvestment and misinvestment in agriculture.

1.2 Themes

The theme of the 2011 KSP was Agriculture and Rural Development: Improving Farm Productivity and Rural Livelihoods. Food security is the priority for most developing countries in the region. The demand for food has been increasing, while land and water resources have generally been stable. Moreover, in economies such as that of the PRC, the majority of the rural labor force **has been moving** into industry in urban areas. Therefore, improving farm productivity plays a key role in ensuring food supply to sustain development and growth. Along with enhancing agricultural production comes the need

to improve rural livelihoods, which is essential to reducing poverty, closing rural–urban income gaps, and achieving inclusive growth.

The PRC and ADB’s other DMCs have made significant achievements in developing their agriculture sectors and improving rural areas with ample knowledge and experiences obtained from policy and strategy development. Meanwhile, each country is also facing internal and external challenges in the sector. The KSP on agricultural and rural development aimed to inspire knowledge sharing and discussions, which would lead to cross-border collaboration and benefit all parties. Five subthemes supported the overall theme of the 2011 KSP: modernization policies for agriculture, value chain development, application of agricultural research, rural infrastructure and green rural development, and financial development in rural areas.

1.3 Objectives

The 2011 KSP aimed to facilitate knowledge sharing regarding successful policies, institutions, and practices in developing agriculture and rural areas; promote discussion on the challenges and strategies for sustainable agricultural and rural development; and support policy dialogue and future cross-border collaboration between the PRC and ADB’s other DMCs.

The objective of the workshop and the field visit was to discuss and compare countries’ experiences of and approaches to similar problems related to agricultural productivity and rural livelihoods as dialogue and sharing of knowledge provide a fertile environment for cross-border collaboration. This report summarizes the findings, lessons, and conclusions of the knowledge-sharing experience.

1.4 Audience

The KSP targets senior officials from the PRC and ADB’s other DMCs at the level of vice-minister or permanent secretary, director-general, or equivalent from line ministries and agencies responsible for agriculture, rural development, comprehensive planning, and finance. Three senior officials were invited from each of the following 12 participating DMCs: Bangladesh, Cambodia, India, Indonesia, the Lao People’s Democratic Republic (Lao PDR), Mongolia, Myanmar, Nepal, Pakistan, Sri Lanka, Thailand, and Viet Nam. In addition, participants and speakers from research institutions, the private sector, and international organizations were also invited.

1.5 Topics of the 2011 Knowledge Sharing Platform

The 2011 KSP workshop was organized into five sessions discussing several topics crucial to the modernization of agriculture in Asian DMCs. The common thread of the chosen topics was to highlight practices and approaches to accelerate the transformation of the agriculture sector of DMCs into modern agricultural systems through value

chain development and improved logistics, application of agricultural research, rural infrastructure and green rural development, and financial development in rural areas.

Policies and Institutional Mechanisms to Promote Modern Agriculture. As Asian DMCs continue their structural transformation, they face challenges arising from an increasing and urbanized population; the need to ensure food security and food safety for its population; improvement of rural livelihoods within the context of a globalized economy; and the degradation of natural resources, such as water and soil.

Value Chain and Logistics System Development. Developing an effective agriculture and food value chain is important for improving farm productivity and increasing farmers' incomes. Experiences and challenges to improving logistics systems and market access were also shared.

Application of Agricultural Research. Adequate agricultural research and successful diffusion of research outputs are the keys to increasing agricultural productivity. However, various barriers exist in scaling up investment in agricultural research and extension, prioritizing research, and transforming research findings into actual productivity gains. Policy interventions are required to address these issues. Two topics were discussed: (i) applying agricultural research and strategies in setting priorities in agricultural research; and (ii) scaling up investment in agricultural research and extension—issues, obstacles, organizations, and finance.

Rural Infrastructure and Green Rural Development. The role that rural infrastructure plays in agricultural production and rural poverty reduction can never be overstated. Participants discussed both conventional and innovative strategies and approaches to promoting infrastructure development in rural areas, and assessed their effects. Environmental quality also represents an important aspect of rural livelihoods. Great potential in the green and circular economy in rural areas could be identified and realized. The three topics covered in this session were (i) strategies and policies to promote rural infrastructure development, (ii) community-driven development and delivery of rural infrastructure, and (iii) policies and strategies toward renewable energy and the promotion of the circular economy in rural areas.

Financial Development in Rural Areas. Access to finance, though important for agricultural productivity improvement and increased income, often lags behind demand in rural areas. To establish better policies to promote rural financial development, it is essential to deepen understanding of the financial needs of farmers, merits and limitations of financial products available in rural areas, and potential policy options. The two topics covering the issues were (i) rural financial market development status, strategies, and outlook; and (ii) innovations in rural finance institutions and products—how to ensure that rural credit works.

2 Policies and Institutional Mechanisms to Promote Modern Agriculture

2.1 Trends

Asia encompasses a great diversity of agricultural systems, including those in least developed countries such as Cambodia and Nepal where the potential productivity gains from fully extending green revolution technologies such as irrigation and the use of fertilizers and improved seeds and other inputs have not yet been fully realized; those in countries such as Viet Nam working to address challenges of food safety and quality to improve competitiveness; those in countries such as Thailand working on advanced challenges such as logistics improvement for competitiveness in global markets and integration with modern retail systems; those in developed economies such as Japan engaged fully in global food and agriculture import; as well as those in the PRC and India dealing with the full range of these challenges due to their wide internal diversity.

Common trends among DMCs in Asia are a growing population that is becoming increasingly urbanized and a slowly declining but still large rural population depending on agriculture. Ensuring food security continues to be a priority in most of Asia, but new concerns for food safety and quality, sustainable use of natural resources (particularly land and water), safeguarding of increasing rural incomes and standards of living, and integration of the rural economy with the urban and global economy are taking center stage in the policy discussion.

Although the agriculture sector continues to grow in Asian countries, it is declining in relative importance, both in terms of its contribution to gross domestic product (GDP) and its share of the labor force. Farm households are diversifying their sources of income toward services and industry, or leaving the agriculture sector altogether. Much of the off-farm labor is easier to access for men, leaving women to care not only for family but also the farming. The feminization of agriculture extends into women's critical roles in production choices and marketing. Modernization policy needs to ensure that the large numbers of small farmers—including women—effectively participate and benefit from it.

With greater investment in agricultural enterprise and security in land tenure, farmers and firms tend to pay more attention to ensuring the long-term viability of their productive assets, and they therefore manage them sustainably. Advances in infrastructure, communication, and education, as well as increases in costs of farm inputs, will see this

trend continue. The decline of the agricultural labor share will stop when people engage in agriculture by choice rather than by default, and to achieve this goal, modern farming must generate a competitive reward for agricultural labor and investment.

To meet the demands of expanding of urban populations and changing food preferences, modern storage and retail systems, increased food processing, and globalized trade will be required. It is expected that traceability systems will be increasingly adopted in food-exporting countries as a strategy to improve competitiveness in the global food market; countries such as Thailand have already moved toward adoption of global standards. This will require both public and private investment in infrastructure, traceability system monitoring and analysis capacity, information systems, and strengthened regulatory capacity.

Intensive agriculture has occurred often with significant environmental consequences. The result is that agriculture in some countries in the region is becoming increasingly vulnerable to climate change and natural disasters. The realization that modernization must incorporate environmental management systems and cross-sectoral mechanisms to pay for environmental services is increasing. Risk management must incorporate preventative and preparedness measures, disaster response systems, and insurance.

Costs of agricultural inputs, energy, and food are increasing. Phosphate and other fertilizer resources and fossil fuels are finite resources, and countries are becoming increasingly aware of the need to take measures both to establish fertilizer and energy security, and to improve efficiency and sustainability in the use of resources.

Global and national food production and distribution systems are increasingly becoming integrated as firms and farmers have taken advantage of opportunities to reduce market uncertainties and to gain supply chain efficiencies through advances in communication, monitoring, transport, technology, and workforce education. Restructuring agriculture to compete in the global marketplace is being facilitated by internal and external diversification and specialization into comparative advantages, development of supporting infrastructure, labor force training to ensure productive employment, cross-border business development, and supportive regulation. Globalization can give individual countries the opportunity to concentrate on commodities and processes for which they have a comparative advantage, such as cotton in Pakistan and rice in Thailand. Policy, investment, and business coordination among trading countries could promote efficiencies in use of natural resources, labor, and infrastructure by reallocating production, processing, and financial resources beyond national boundaries.

Agricultural modernization will require substantial investment in capital assets such as infrastructure and irrigation, and also in recurrent operations such as research, extension, and regulation. To meet the food and agricultural needs of the future, major agricultural investment planning must incorporate due diligence on all aspects, including financial, environmental, and social impacts.

Land use planning will become more critical in rural areas to protect agricultural resources, and also in urban areas to facilitate logistics, processing, and marketing of agricultural

products. Land will become more valuable and pressure from population growth and urbanization will increase the need for comprehensive and well-regulated land use planning systems. Many countries have legislation related to land, but few developing countries in Asia have fully established effective land use planning and monitoring institutions.

2.2 Presentations and Discussions

The presentations by delegates from the PRC and Thailand¹ focused on the policy and institutional mechanisms to promote modern agriculture. Despite considerable differences in the socioeconomic structure of the two countries, the presentations highlighted some common features, including the (i) need to improve and stabilize farmers' incomes, (ii) key role of science and application of technology to agriculture, (iii) links between farm production and agro-industry and agribusiness development, (iv) critical importance of natural resources management (land and water primarily) to counter climate change, and (v) role of the government in promoting rural livelihoods.

In the case of the PRC, one of the major concerns for achieving modern agriculture is the integration of rural areas with the rest of the economy. In 2003, the central government proposed an important strategy to balance urban and rural development, based on the guideline "industry supports agriculture, urban areas support rural areas." Key policies to support the urban–rural development balance in the PRC have included the abolishment of agricultural taxes and fees in 2006; a remarkable increase in central government investment in agriculture reaching CNY2.8 trillion (about \$443 billion) during the 11th Five-Year Plan 2006–2010 and CNY1 trillion (about \$158 billion) in 2011; and improvement of rural infrastructure.

In the case of Thailand, in addition to support for farmers' incomes and agro-industry, new policies to support the modernization of agriculture include the promotion of green products and organic agriculture, improvements in the management of natural resources, and better preparedness for natural disasters and adverse impacts of climate change. As a global leader in agricultural exports (ranking number one in world exports of rubber, rice, cassava, canned pineapple, and shrimp) and with agriculture that is strongly oriented toward export (agriculture accounts for 20% of total Thai exports), Thailand is well aware of the role that high-quality and safe food production plays in meeting the demands of consumers worldwide with their high incomes and unique preferences. As such, great emphasis is placed on systems to ensure food quality and safety.

Thailand is also a leader in promoting grassroots farmer organizations to improve productivity through better links with research organizations; developing systematic production with precise planning facilitated by futures trading; and fostering business development through training of farmers and their transformation into entrepreneurs. Thailand has an overall vision of becoming the "Kitchen of the World," by ensuring that Thai agricultural products and Thai food are appreciated worldwide.

¹ Presentations by Xu Xiaoqing, Director General, Research Department of Rural Economy, Development Research Center of the State Council, PRC; and Wiroj Saengbangka, Senior Expert on Farmers and Farmers Organization Development, Department of Agricultural Extension, Thailand.

An important theme that is part of the development strategy of both the PRC and Thailand is the balance among three dimensions of development: economic, environmental, and social. A demonstration of sustainable development was provided during the field visit to Henan Province, where the delegates visited a biogas cooperative in Dongjie Village, Baibi Town, Anyang County. The integration of agricultural development with rural and social development is pursued through new rural development approaches in which rural housing and industrial cluster district development take place, thus saving scarce land resources and improving farmers' and rural incomes.²

The discussion during the conference indicated that limited and degrading land and water resources and recurrence of natural disasters will remain major challenges for agricultural modernization. The participants also discussed opportunities for farmers to contribute to the formulation of agricultural modernization policy, as for example in Thailand's National Farmer Council. The development of rural women was pointed out as a major challenge for the modernization of agriculture.³

2.3 Key Lessons Learned

During the process of agricultural modernization, several things take place at the same time. The share of agricultural GDP in total GDP and the share of agricultural labor in total labor decline, even though agricultural GDP increases. The overall rural economy diversifies away from agriculture and rural livelihoods improve. A narrow focus on farming technology will not be sufficient to meet the needs and aspirations of an increasing prosperous population. The main lessons from the presentations, discussions, and field visit are summarized as follows.

Food security. In the process of modernization, priority should be given to assuring food security for the population. This is a necessary condition for any other development of the agriculture sector.

Comprehensive policies for modernization. Agricultural modernization strategies and policies are quite comprehensive. They include the introduction not only of modern farming technology, infrastructure, and high-yielding varieties, but also of policies, service systems, research, and rural financing for agricultural modernization and rural development.

Sustainable development. Asian countries are increasingly realizing the importance of management of natural resources and adverse impacts of climate change. There is awareness that development needs to be sustainable, balancing the economic, environmental, and social dimensions. There is an increasing concern for the pressure on land and water resources and their scarcity arising from unplanned and unsustainable practices. Water scarcity and the efficient and sustainable development of water as a resource will be increasingly important to support the modernization of agriculture.

² Xianghe community in the new rural development of Guguzhai Town, Xinxiang County.

³ Contribution by Mar Mar Kyu, Professor, Yezin Agricultural University, Myanmar.

Acceleration of investment in science and technology. Efforts will need to be made to speed up investment in science and technology and to ensure that knowledge about technology, marketing, and business reaches the farmers through effective extension and education systems (e.g., academia, training institutes, demonstrations, and vocational training).

Promotion of rural infrastructure and rural agro-enterprises. The process of rural–urban migration can be socially disruptive; the emphasis should therefore be on bridging the gap between rural and urban areas and improving rural livelihoods through the creation of a vibrant rural economy.

Participatory planning and policy formulation. It is necessary to ensure the participation of farmers, agro-enterprises, rural women, and other groups in the formulation of plans and policies to accompany modernization. In their absence, fundamental issues of equity, sharing of benefits, and natural resource management will be neglected.

3 Value Chain Development and Logistics Systems

3.1 Trends

The modernization of agriculture in Asia implies a massive reorganization of the agricultural economies and the food distribution systems. This reorganization requires the development of innovative production and marketing systems, sophisticated logistics (in addition to appropriate infrastructure), and quality assurance and standards compliance systems. Given that most producers in Asia are smallholder farmers, the role of smallholders during the transformation process and their capacity to adapt to the new systems is of economic and social relevance throughout Asia.

The drivers of these developments are a rapidly increasing urban population—most urban population growth in the world will occur in Asia; a growing affluent middle class with the demand for higher-quality, diversified, safe, convenient, healthy, and nutritious food; and the globalization of food trade, including stricter requirements for quality and safety.

The tensions between these new demands and the persistence of a traditional food distribution system are evident throughout Asia. For example, larger cities and urban populations present the following challenges:

- More food is supplied from diverse and distant sources.
- The degree to which food is processed, conveniently prepared, better packaged and stored, and scrutinized for quality and safety is becoming higher.
- Agricultural land, particularly peri-urban land, is under pressure for conversion to nonfarm uses.
- The need for improved food logistics and infrastructure is increasing.

Traditional food distribution systems are not well prepared for meeting the challenges of rapid urban growth. Instead, modern value chains that provide organized systems of exchange from production to consumption with the purpose of increasing value and competitiveness are required. Modern value chains strengthen business links by getting stakeholders to work together. This requires effective coordination of decisions and exchange, and hence governance. To increase value, the value chain needs to meet consumer demand and be competitive; to maintain competitiveness, the value chain needs to innovate continuously; and to establish effective links, the value chain needs to distribute benefits that provide incentives for the participants.

Supermarkets are the most sophisticated value chains to meet the food demand of a growing urban population. A supermarket revolution (Reardon et al. 2003) has been spreading throughout Asia and moving fast, particularly in East and Southeast Asia. South Asia has been lagging behind so far, but it is catching up. Supermarkets imply a massive reorganization of food distribution. In this reorganization, new standards are established and smallholder farmers are often at a loss to meet the standards and integrate along these modern value chains. Yet, unless they integrate, they will be left out of the most dynamic food distribution sector in developing Asian economies.

There are examples of successful integration of smallholder farmers with supermarket chains and value chains. Vegetable smallholder farmer cooperatives in West Java, Indonesia; dairy cooperatives in India (e.g., Amul); and feed and poultry integrators (e.g., the Charoen Pokphand Group in Southeast Asia and the PRC) provide models for replication.

Many countries have been successful in organizing the farm production base to facilitate the transfer of technology and information, and other extension services. Examples include policy to promote agricultural cooperatives, water user associations, integrated pest management groups, and cluster or pocket development strategies. Public–private partnerships with nongovernment organizations to extend the reach of public sector agricultural services is another mechanism (e.g., the Vietnam Gardening Association).

Policy to promote the role of agribusiness in organizing the production base and delivering technology transfer has been successful in the PRC. Growth of contract farming for high-value produce through which large-scale agro-processing firms seek to ensure a steady supply of quality produce are a feature of modern agricultural value chains. Farmers in the PRC have identified price stability and market access as the key advantages of contracts, while firms consider improved product quality ensured through contracts as the critical incentive to exercise contracts. Contracting firms tend to favor direct contracts with larger farms, although contracts with farmer-owned cooperatives and middlemen are also used. Such schemes can help small-scale farmers and livestock producers overcome the technical barriers and transaction costs involved in meeting the increasingly stringent demands of urban consumers in domestic and international markets. The public sector can support them by providing legal safeguards, and management and business training, as well as by encouraging the private sector to assist cooperatives and contract farmers in areas such as market information and production technologies (FAO 2006).

3.2 Presentations and Discussions

In the PRC, more consumers want healthy and nutritious food.⁴ Food distribution systems are becoming more complex; a multitude of brokers, cooperatives, and shippers are developing and specializing along the supply chain. Farmers' markets are becoming

⁴ Presentation by Wang Wei, Deputy Director General, Research Institute of Market Economy, Development Research Center of the State Council, PRC.

more important in the cities and a major source of fresh vegetables for urban dwellers. Supermarkets are mushrooming in the cities, and modern retail outlets are penetrating rural towns as well.

Modern and innovative value chains are emerging, not only in the food sector but also throughout the agriculture sector. In Henan Province, the participants had the opportunity to visit the Henan Yongchang Feitian Starch Sugar Company, which has an annual processing capacity of 360,000 tons of corn and an annual production capacity of 80,000 tons of starch, 50,000 tons of crystalline dextrose, 50,000 tons of maltose, and 50,000 tons of maltose dextrin. The company has established a long-term corn purchase and sales relationship with 50,000 local and surrounding farmers.

Still, about 50% of slaughterhouses in the PRC have no proper equipment or temperature control, and do not comply with hygiene standards. Wholesale markets bridge the gap between farmers and retail markets, but there are no dedicated logistics for wholesale markets. The challenges that remain include (i) poor compliance with standards as most markets are scattered; (ii) large amounts of waste along the chain estimated at 30.0% compared to 5.0% in the United States, 5.5% in Japan, and 10.0% in the European Union; (iii) large cities requiring different models of logistics and distribution, namely, large-scale systems that can be organized by either cooperatives or supermarkets; (iv) increasing land prices, particularly around cities, which also affect food prices; (v) food safety requirements growing faster than institutional capacity to meet those requirements; and (vi) compliance with standards as a major constraint to ensuring further export growth.

During the field visit to the Henan Academy of Agricultural Sciences, the KSP participants had the chance of visiting the Agricultural Quality Standards and Testing Technology Research Center. The center is engaged in crop and farm produce quality control, and safety risk monitoring and assessment. It is a third-party agricultural product quality inspection agency issuing data and results that can assure quality and safety to the public.

Logistics is also important in this context as it can be harnessed and optimized to reduce the time needed to acquire supplies, maintain quality, shelf life, and transport produce/finished goods to market, which is a key element to value chain competitiveness.⁵ Weak infrastructure often limits the opportunity for value addition along the value chain; high transport costs and poor logistics systems are a constraint on countries such as Cambodia, Indonesia, and the Lao PDR.

During the discussion, it was noted that the focus of the Government of the PRC's support for logistics services has been on rural cooperatives and improvement of the service capacity of wholesale markets, while regulation of middlemen is an area where not much has been done.

The case of Mongolia is an example of the combination of weak logistics systems and emerging market regulations still being a serious impediment to trade and value chain

⁵ Schwartz et al. 2009; de Souza et al. 2007; Bhattacharyay 2009; Carruthers, Bajpai, and Hummels 2003; Alvarado and Kotzab 2001; and Asia Foundation 2008.

development.⁵ Mongolia is a large country with an agricultural system based on livestock products. The problems of integrating smallholder farmers along the value chain and improving access to the major urban market of the capital Ulaanbaatar are compounded by difficulties of transport and logistics. Both infrastructure and logistics need to be developed; what is needed is a system to coordinate infrastructure, logistics, market information, and regulations to allow the use of multimodal solutions (e.g., rail, air, trucks, and boats).

During the discussion, participants noted that the establishment of standards for product categorization, packaging, and storage temperature is as important as the infrastructure of logistics systems, given the impact on international trade and exports of agricultural products of the country and on food safety.

3.3 Key Lessons Learned

Globalization has brought tremendous technological change and increased international competition to farmers and agribusiness. Demand and supply are no longer restricted to local or even regional forces, and the agribusiness/food industry has become part of an interconnected system with a variety of complex and integrated relationships that change the way food is brought to market. These changes require the adoption of new practices to ensure that smallholder farmers can benefit rather than lose from agricultural transformation.

Form partnerships and trust relationships. At the core of good practices is the need to form partnerships and long-term trust relationships between different value chain actors and to promote collaborative interaction among these actors to increase the potential for adding value and revenue at each stage of the value chain. These types of collaboration are based on well-defined agreements and alliances (contract farming, private label, marketing arrangements like agency/representative and distributor agreements, etc.) that make risk reduction possible, thus allowing the parties to optimize functions and pursue market opportunities more effectively than those value chains that do not have such arrangements in place. The field visit to the Henan Yongchang starch factory highlighted the advantages of long-term relationships between farmers and agro-industrial groups.

Collaboration within the chain also helps the value chain actors gain timely access to market information that can be used to adjust production to meet changing market conditions. In addition, these relationships can help them obtain specialized inputs, which may be used to develop a better or a differentiated product. Collaboration is also critical to the development of value addition and brand building. Finally, the most important benefits of collaboration are reduced transaction costs and improved access to finance.

Introduce standards. Modern agricultural quality and safety systems are based on standards of best practice operating procedures, internal control systems, and product

⁵ Presentation by Battsetseg Bataa, Specialist, Department of Strategic Planning and Policy, Ministry of Food, Agriculture and Light Industry, Mongolia.

traceability. They require strong government regulatory systems with sufficient capacity for monitoring, regulation, and enforcement, supported by nongovernment industry-based institutions to provide training, certification, auditing, and analytical laboratory services. The regulatory capacity must encompass the whole food chain, from rigorous assessment and registration of agricultural inputs (e.g., pesticides, veterinary medicines, and biotechnology products) and livestock feeds, through to food processing additives.

The tragic incident in 2008 involving milk tainted with melamine shocked Asia. The fact that melamine was not previously monitored as it was not considered a potential agricultural input highlighted the need for a dynamic and rigorous food safety system. Despite such headline-grabbing incidents, the most frequent agricultural food safety events are due to bacterial contamination, such as the deaths caused by *E. coli* in tomatoes in the United States in 2007 and in bean sprouts in Germany in 2011. In all cases, a system to trace the source of contaminated products was essential for a rapid and effective response.

Monitor benefits and losses of smallholder farmers in the process of integrating with modern value chains. The increased requirements for documentation and reporting systems are taking a toll on developing countries that are hoping to expand their trade in food or break into new markets. Smallholder farmers, in particular, could be further marginalized from the global food trading system by the burden of the reporting requirements.

Strengthen monitoring systems for biosecurity. Monitoring of indicators, such as agricultural chemical residues in water sources, erosion, soil organic matter, and fertility, must be fed into policy and strategy. The policy imperative for capable biosecurity protection institutions has been highlighted not only by epidemics of avian influenza and bovine spongiform encephalopathy (mad cow disease), but also by the huge costs to agriculture from invasive weeds, and crop pests and diseases.

4 Application of Agricultural Research

4.1 Trends

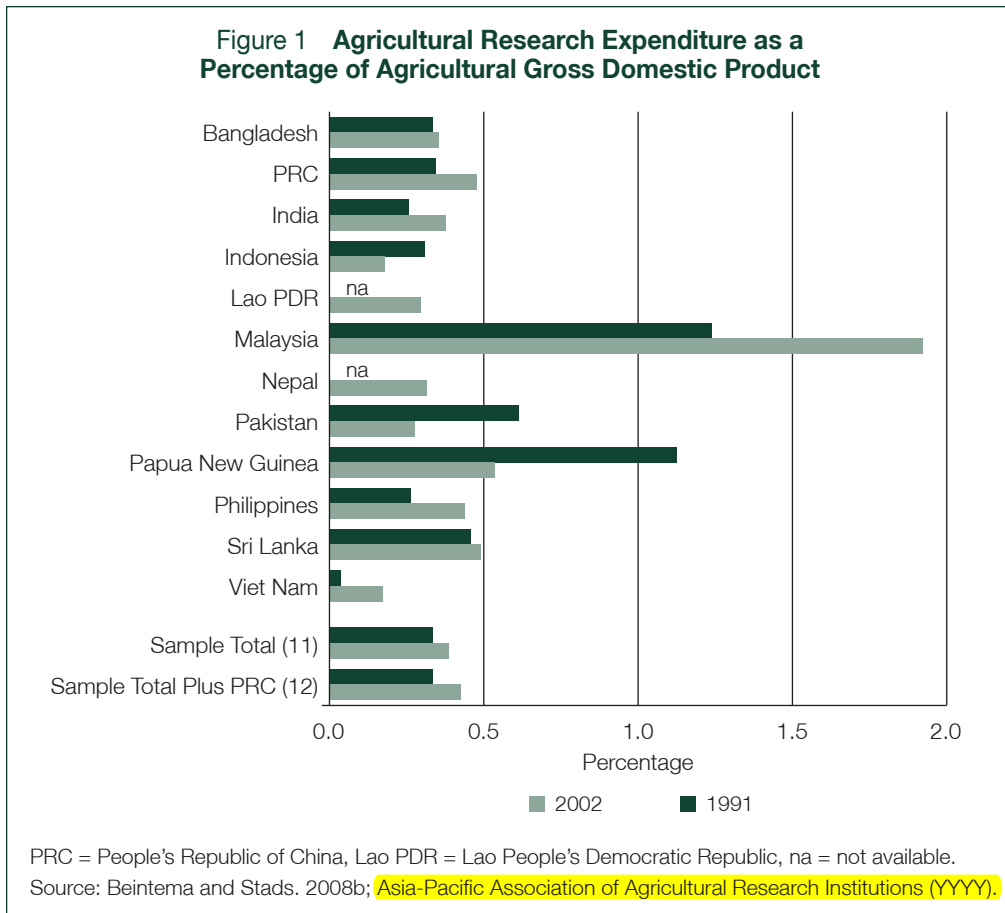
Traditional publicly funded research and extension bodies in many countries are struggling with insufficient budgets and lack of incentives, and are often out of touch with farmers' needs. In other countries, well-resourced and performance-oriented institutions (e.g., the Indian Council of Agricultural Research and the Chinese Academy of Agricultural Sciences) make major contributions to agricultural modernization. The private sector also plays a major role in commercialization and extension of modern technologies. Examples of policy supporting these are India's Green Revolution II and the PRC's emphasis on innovative and high-tech agriculture. Effective research institutions are those that are adequately funded, including competitive and performance-based mechanisms. They maintain forward and backward links with farmers and agro-industry and utilize mechanisms that involve forms of public-private partnership with industry and farm communities in services delivery.

The national agricultural research systems in the region are quite heterogeneous. Commensurate with the needs of each country, research and development in the agriculture sector has, over time, gained prominence. Various models from simple to highly complex systems now operate. While some of them are successful, many others are still struggling (Beintema and Stads 2008a). Agricultural research expenditure is about 0.62% of agricultural GDP in developing countries as a group and 2.80% in developed countries as a group. The World Bank recommended in the 1980s a level of 2% of agricultural GDP, but 1% has subsequently been accepted as a better target. However, this ratio does not take into account the policy and institutional environment within which research takes place, nor the broader size and structure of the country's agriculture sector and economy (Beintema and Stads 2008a). Malaysia, a middle-income country, was the only country in the region to approach this level of funding (Figure 1).

4.2 Presentations and Discussions

Agricultural modernization relies heavily on effective policy and institutions to generate and transfer modern technologies. The application of science and technology to agriculture is perhaps the most important factor contributing to agricultural performance. This is demonstrated by the case of the PRC,⁶ where science and technology has represented

⁶ Presentation by Tang Huajun, Vice President, Chinese Academy of Agricultural Sciences, PRC.



an increasing contribution to agricultural growth, rising from 20% in 1949 to 27% in 1979 and 52% in 2010. Today, the PRC is at the global forefront in performance of crop varieties and control, prevention, and treatment of diseases and pests.

The field visit to the Henan Academy of Agricultural Science gave participants an appreciation of the commitment of the PRC to agricultural research. The academy includes 13 research institutes and a staff of 1,000, including more than 700 scientific and technical personnel. It is at the forefront of crop and animal science research, having bred 75 national varieties and the world's first sesame hybrid, Yu Chi No. 9.

Some common concerns among participants were how to ensure that agricultural research meets farmers' needs and how to involve farmers in the process of setting priorities for agricultural research.

Although recognized as essential, the links between research and extension, i.e., between the generation of agricultural technologies and their dissemination to farmers and agribusiness enterprises, are weak throughout most of the agricultural systems in Asia. **Part of the reason is that often there is no institutional link between research and extension organizations and no financing mechanism to promote integration, but**

a difference in attitude, remuneration, and career opportunities for researchers and extension agents.

The fundamental reason for the existence of agricultural research and extension organizations is to serve farmers. In Pakistan (and several other Asian countries), however, both research and extension organizations follow a top-down approach that results in minimizing farmer participation.⁷

This single factor makes the whole process of organization of research and extension unbalanced as the ultimate beneficiaries have no voice in the process. The common mode of farmer participation in Pakistan is confined to the appearance only of progressive farmers at meetings on agricultural subjects arranged by different agencies. In some committees they are regular members, while in others they participate by special invitation. Small farmers are usually only called in large groups without any meaningful participation.

Governments are trying to address the issue by promoting either a participatory bottom-up approach or, more frequently, a hybrid between top-down and bottom-up approaches, as is the case in Bangladesh.⁸

In Indonesia, a speeding up of the dissemination of agricultural innovations is needed.⁹ Currently, the Indonesian Agency for Agricultural Research and Development (IAARD) is considering the use of multiple channels aimed at a more effective and efficient dissemination process and a stronger link between research and extension. In order to work closely with extension service institutions, IAARD has established the Assessment Institute for Agricultural Technology at the provincial level and the Institute for Technology Transfer-IAARD at the national level. Financially, both extension service institutions and IAARD are supported by the national budget.

The PRC has a developed extension system, but changes and reforms are also needed. The discussions echoed the need for research to be closer to farmers and suggested the adoption of the bottom-up approach and performance evaluation systems in reforming the country's extension system.

One remarkable example of high technology and standards was the Demonstration Area of Farmland for Comprehensive Agricultural Development in Huangling Town, Fengqiu County in Henan Province, PRC, a site visited by the participants of the KSP workshop. With the help of scientists of the Henan Academy of Agricultural Science, a large demonstration area has been established including leveled fields, a forest network, canal and roads connected with one another, electricity connection, a sewage and drainage system, use of machinery, and integration with value chains. At the same time, the demonstration area has been combined with reforms in property rights and project management. The property rights of the small water conservation facilities, power

⁷ Presentation by Amer Irshad, Chief, Section for Food and Agriculture, Ministry of Planning and Development, Pakistan.

⁸ Presentation by Md. Abdus Satter, Chief Scientific Officer, Bangladesh Agricultural Research Council, Bangladesh.

⁹ Presentation by Agung Hendriadi, Head, Institution for Technology Transfer and Intellectual Property Rights Management, Indonesian Agency for Agricultural Research and Development, Indonesia.

facilities, and forests in the project area have been auctioned or contracted, thus providing incentives for the effective management of the rural assets.

Another concern in many Asian countries about agricultural research is lack of funding and incentives for researchers to stay in their laboratories, which is critical to the sustainability and quality of agricultural research.

The presentations also acknowledged the importance and opportunities for regional cooperation and collaboration. Two of the presentations made excellent suggestions on regional cooperation and collaboration through exchange visits, joint research projects, and capacity building.

The presentation and floor discussions seemed to show the extremes of agricultural research and extension in the region. On one end, the PRC, Thailand, and Viet Nam have an active interest in research and extension and want to even make use of information technology in the extension system to help farmers access information. On the other, countries such as Cambodia are frustrated with the low priority given to the extension system by government policies and the limited incentives for specialists to stay in the extension system.

4.3 Key Lessons Learned

Agricultural growth driven by agricultural research and extension. Growth can be achieved in different ways, including expansion of factors of production, increase in modern inputs resulting in yield enhancement, increase in value added, and improvement in comparative and competitive advantage. However, the main driver of growth in a modern economy is total factor productivity (TFP), which is the part of growth in output that is not explained by growth in physical inputs. TFP accounts for intangible growth factors such as technology, innovation, efficiency, creativity, and governance. TFP growth contributed between 40% and 70% to agricultural output growth in Asia in XXXX (Fuglie 2010). Over time in Asia, TFP has contributed more and more to output growth. In some Asian countries, most notably the PRC, India, and Viet Nam, investment in agricultural research is increasing, but the level is still low. In other countries, investment is low and not increasing. In Indonesia, Pakistan, and Papua New Guinea, agricultural investment declined between 1991 and 2002 (Figure 1).

Traditional approaches to the generation and dissemination of agricultural research are not sufficient to reach the majority of farmers. A public sector and top-down approach has limitations in its outreach to the majority of farmers and particularly in meeting the specific needs of a diversified farming and agro-industry community.

Promote regional collaborative research arrangements. Agriculture has been an important part of the cooperation between countries in Asia and the Pacific. Since it became a member of Asia-Pacific Economic Cooperation in 1991, the PRC has been actively engaged in agricultural cooperation with other member economies in various forms and through various channels.

The PRC has signed agricultural cooperation agreements with many member economies of Asia-Pacific Economic Cooperation, including Chile, Mexico, Peru, the Philippines, Thailand, and Viet Nam. Since 2004, the PRC has provided training for officers and agricultural extension technicians in developing countries in the region on hybrid rice, avian influenza prevention and control, **breeding of vegetables**, processing of agricultural products, and sustainable agriculture through bilateral and multilateral cooperation. Such training has promoted the economic development of participating economies.

Asia has a large and diverse range of national agricultural research institutions that share experiences and technologies, and contribute to regional policy through the Asian Association of Agricultural Research Institutes. Asia is also home to a number of regional agricultural research and development institutions, such as the Consultative Group on International Agricultural Research network including highly productive institutions such as the International Rice Research Institute (Philippines), the Asian Vegetable Research and Development Center (Taipei, China), the WorldFish Center (Malaysia), the International Center for Research in Agriculture Technology (India), Center for International Forestry Research (Indonesia), the International Water Management Institute (Sri Lanka), and allied agencies including the Food and Agriculture Organization Regional Office for Asia and the Pacific (Thailand) and the Australian Centre for International Agricultural Research. These institutions and their contributions to global and regional agricultural modernization are a major asset.

5 Rural Infrastructure and Renewable Energy

5.1 Trends

Modernization of agriculture and improvement of rural livelihoods require many types of interrelated infrastructure, including rural roads; irrigation systems; and energy, social (e.g., health, education, and culture), marketing (e.g., marketplace), and environmental (e.g., waste disposal, parks, clean water, and sanitation) infrastructure. In the past, most Asian countries neglected the development of rural infrastructure relative to urban infrastructure, which received a larger share of investment.

This is changing. Currently, there is an emerging trend toward investment in rural infrastructure. This trend is clearly visible in the PRC where the ratio of the central government's fixed asset investment for rural infrastructure construction increased from 36% in 2003 to 49% in 2009.¹⁰

Another important trend relates to the management of rural infrastructure. Traditionally centrally managed and funded, there is now a variety of new approaches where infrastructure can be locally managed, community-driven, or co-funded by the private sector. The trend is toward a progressive and increasing involvement of communities in planning, implementation, and monitoring of rural infrastructure. New options for financing rural infrastructure are emerging and the dominant concept is that of public-private partnerships.

The relationship between rural infrastructure and agricultural development is both direct and indirect. Direct links are those related to improvement of production (e.g., irrigation systems) and marketing (e.g., roads, storage facilities, mobile, and internet). Indirect links are those that improve human capital (e.g., education and health facilities).

Besides contributing to increasing agricultural productivity, rural infrastructure also contributes to the modernization of agriculture by making possible the development of rural nonfarm activities. Some of these activities are directly based on agriculture (e.g., agribusiness and agro-industry).

In addition to rural infrastructure, there is another important link that has multiple impacts on the rural economy: the link between agriculture and energy. The development of

¹⁰ Presentation by Zhang Yansong, Deputy Director General, Agricultural Department, Ministry of Finance, PRC.

renewable energy through utilization of biomass (which avoids competition with food production) and the recycling of animal and plant wastes (e.g., biogas) is spreading rapidly throughout Asia and is accompanying the modernization of agriculture while improving rural nonfarm incomes and the environment.

The concept of a “circular economy” is gaining momentum as a new approach to environmental sustainability. The approach tries to combine what is good for the environment with what is good for the efficiency of the economy. Agricultural waste (e.g. straw and husks) can be used as biomass to generate renewable energy and fertilizer, thus reducing carbon emissions and contributing to higher farm incomes. For the approach to be further integrated into the rural economy, supporting infrastructure (e.g., grid network and energy plants) will be required.

5.2 Presentations and Discussions

Rural Infrastructure

The reorientation from urban to rural infrastructure has already been mentioned. Rural infrastructure is regarded in its comprehensive nature, spanning from transport to connectivity, production to environmental, and social to cultural. The PRC has made the most remarkable improvement in rural infrastructure over the last decade. Table 1 summarizes the infrastructure efforts undertaken by the PRC on multiple fronts.

Policies and strategies promoting rural infrastructure are based on the overall priority areas of economic and social development and agricultural and rural development. The main bodies involved are governments, farmers, enterprises, and other social groups, among which governments and farmers are the most important forces.

Rural infrastructure is characterized by two overall problems: insufficient investment and low efficiency.¹¹ The low level of investment might be partly due to insufficient emphasis from the government. Low efficiency of investment in rural infrastructure has different dimensions, including bad quality, poor operation management and maintenance, mismatch between provision and demand, and fund leakage. The low efficiency might partly be the result of weak citizen participation and lack of public-private partnerships.

The need for improving rural infrastructure is immense. Traditional approaches based on government investment will not yield the necessary investment to meet the challenge. Both the volume and efficiency of infrastructure investment must be improved. It has also increasingly become clear that public financing does not equate with public provision.

Different options to finance rural infrastructure include through the government, public-private partnerships, and community-driven development (CDD). The community and beneficiaries can decide what needs to be implemented and how to implement

¹¹ Presentation by Lin Wanlong, Professor, College of Economics and Management, China Agricultural University, PRC.

Table 1 **Types of Rural Infrastructure Supported by the People's Republic of China**

<p>Rural water conservancy construction</p> <ul style="list-style-type: none"> • During 2006–2010, the central government invested more than CNY300 billion for construction of water conservation facilities, and in 2011 more than CNY170 billion. Local governments have also invested heavily in water conservation facilities for rural areas. • Projects include supervision of big rivers and lakes, reinforcement of reservoirs, supplementary technology transformation in irrigated areas, construction of water conservation facilities for small farm fields, construction for a rural safe drinking water project, control of medium and small river dredging, and effective water-saving irrigation.
<p>Agricultural infrastructure construction</p> <ul style="list-style-type: none"> • Soil reclamation to improve land quality • Seed stock breeding and agricultural technology infrastructure • Infrastructure for livestock and plant disease/epidemic prevention • Inspections of quality and safety of farm products • Circulation and warehousing of farm products
<p>Rural roads construction</p> <ul style="list-style-type: none"> • During 2006–2009, total rural roads construction investment was CNY755 billion, of which CNY160.3 billion was invested by the central government. The cumulative newly built or rebuilt rural roads amounted to 1.5 million kilometers. • Asphalt and cemented roads with access to village (township) governments reached 93% nationwide; asphalt and cemented roads with access to the countryside reached 91% nationwide.
<p>Rural electric power development</p> <ul style="list-style-type: none"> • Rural power facility construction in areas with no access to electricity • Rural power grid improvement projects in the central and western region • Rural “Replacing Fuel Wood with Small Hydro Power Electricity” projects • Rural biogas construction projects
<p>Ecological protection construction</p> <ul style="list-style-type: none"> • Projects have been implemented such as natural forest resources protection, returning of grain plots to forests, Beijing–Tianjin sandstorm control, northwest–north–northeast and Yangtze River Basin protection forest construction, Qinghai Sanjiangyuan Nature Reserve ecological protection and construction, comprehensive control of stony desertification in karst regions, and grassland ecological control • The central government has cumulatively invested about CNY420 billion. From 2011, the central government set up a special fund to implement the Grassland Ecological Protection Award and Subsidy System. • Forest coverage has been enhanced, the eco-environment improved, and farmers’ incomes raised.
<p>Rural infrastructure construction (e.g., culture, education, and health care)</p> <ul style="list-style-type: none"> • Education projects include reconstruction of rural middle and primary school buildings, construction for a modern remote education project for rural middle and primary schools, and basic capacity building for rural secondary vocational education. • Medical and health care initiatives include infrastructure construction for rural medical and health care institutions, and a rural hygiene and disease control and health care system. • Rural culture initiatives include the project to provide access to radio and TV for all villages, the rural movie projection project, the construction of village and township comprehensive cultural stations, and the information-sharing project.
<p>Improvement of rural public environment</p> <ul style="list-style-type: none"> • Rebuilding of rural residents’ old and endangered housing • Development of plans for village and township construction • Treatment of rural garbage and sewage • Transformation of village appearance • Improvement of rural living conditions

Source: Presentation by Zhang Yansong, Deputy Director General, Agricultural Department, Ministry of Finance, PRC.

development plans and programs so as to realize the objectives of self-organization, self-management, self-supervision, and self-development. The core of CDD is the transfer of decision making and management from the government to the community and beneficiaries. As a consequence, it is expected that CDD will improve the efficiency of investment and even mobilize investment.

In the view of the participants, CDD has the following expected benefits:

- realizing multi-channel financing to narrow the gaps in rural infrastructure investment and financing options; and
- improving efficiency of delivery of rural infrastructure by promoting (i) demand orientation, thereby making it more likely to improve the match between supply and demand; (ii) self-management, thereby improving investment efficiency; and (iii) the self-development capacity of the community and beneficiaries.

When discussing rural infrastructure, it is important to distinguish between financing and implementation. Both the public sector and communities might have a role to play in each dimension and they can combine to optimize their interaction as highlighted in Table 2.

Table 2 Financing and Implementation of Rural Infrastructure by the Public and the Community

	Public implementation	Community implementation
Public financing	Low financing cost High implementation cost	Low financing cost Low implementation cost
Community financing		High financing cost Low implementation cost

Source: ???.

In Viet Nam, the major challenges related to rural infrastructure include (i) huge investment needs but lack of financial resources, (ii) weak planning and coordination leading to overlapping and inefficient use of resources, and (iii) climate change and sea level rise.¹²

The Government of Viet Nam has two approaches to rural development. The first approach provides assistance to address shortages and hardship. Through this approach, a number of rural infrastructure improvements are made, including access to clean water; construction of roads, clinics, and schools; provision of electricity, housing, and resettlement facilities; and natural disaster prevention and relief.

The second approach is based on unleashing the potential of communities and removing obstacles to achieve innovative contributions. Measures include allocation of land to autonomous production units, facilitation of access to credit and extension,

¹² Presentation by Nguyen Minh Tien, Deputy Director, Economic Cooperation and Urban Development Department, Ministry of Agriculture and Rural Development, Ha Noi, Viet Nam.

trade liberalization, decentralization of decision making to the grassroots through the Grassroots Democracy Decision, and targeted assistance to ethnic communities.

The Government of Viet Nam has launched an ambitious initiative¹³ to approve the National Target Program on New Rural Development. The program objectives include

- (i) growth rate of agricultural production value to reach 3.5%–4.0% every year;
- (ii) income of rural households in 2020 to reach 2.5 times the 2010 level;
- (iii) poverty rate in rural areas to be reduced by 2% every year;
- (iv) agricultural labor to be reduced to 30% of the total labor force, 50% of agricultural labor to receive training courses; and
- (v) comprehensive improvement in rural infrastructure at the commune level, including agricultural infrastructure.

The approach of the national target program is to mobilize resources from all of society while providing certain but limited government funds. The program puts greater emphasis on resources in place (including financial resources, land, labor forces, etc.). The government supports 100% of the construction of rural roads to commune centers, cultural houses, schools, and health stations. In other cases, the government budget only accounts for a limited percentage of the total costs and raising funds from land resources to finance infrastructure works is encouraged. These other resources can be mobilized through (i) public–private partnership initiatives for rural infrastructure, (ii) greater decentralization to the grassroots level to improve adaptation to local specific conditions, and (iii) more sustainable operation and maintenance with greater participation of rural people and their communities.

In India, the approach to finance rural infrastructure has been quite systematic through the combination of the Rural Infrastructure Development Fund and community participation.¹⁴ The fund was created 17 years ago by the Government of India with the National Bank for Agriculture and Rural Development to complete the existing unfinished rural projects. Financing of the fund is through a mechanism whereby commercial banks are expected to allocate 18% of their total lending to agriculture, and they have to contribute to the fund the unfulfilled target of agriculture lending.

The cumulative allocation of the fund is \$29 billion and disbursements total \$18 billion. Project implementation occurs through government agencies, local government bodies, nongovernment organizations, and self-help groups. The interest rate is fixed at 6.5% per year. Projects take place in the agriculture and allied sector, social sector, and rural connectivity sector.

Through this mechanism, India has developed projects for rural infrastructure that have involved community participation and enhanced productivity. One of the most successful

¹³ Decision 800/QĐ-TTg on 4 June 2010.

¹⁴ Presentation by Harish Java, General Manager, National Bank for Agriculture and Rural Development Karnataka Regional Office, Bangalore, India; and Bhavesh K. Joshi, Assistant Agricultural Marketing Adviser, Directorate of Marketing and Inspection, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India.

models has involved watershed development. The objective of this project is to improve soil and water conservation while developing agroforestry, horticulture, animal husbandry, and rural communities. The community contributed 16% of the total cost. The impact has been an increased groundwater level, higher farm productivity, and improved community economic status.

Sri Lanka provides an interesting example of the recovery path of a post-conflict country.¹⁵ The government is trying to meet the basic needs for rural development, including roads, irrigation, and water supply based on national and regional plans. In the meantime, the government is also dealing with the institutional and regulatory framework, and trying to mobilize private sector funds for rural infrastructure development.

The Lao PDR's challenges in rural infrastructure development include changing farmers' behavior of traditional slash farming and mobilizing private sector involvement through financing incentives.¹⁶

Renewable Energy and Circular Economy

Clean technologies (e.g., biogas and biomass utilization) could complement other nonagricultural strategies toward sustainable energy use. The PRC is very active in developing technologies and programs for utilizing renewable sources of energy. The concept, practice, and policy for an agricultural circular economy have been developed considerably in the PRC over the past decade. The core of an agricultural circular economy lies in resources conservation and utilization in order to maximize resource utilization efficiency. The aim is to eradicate the conflict between economic growth and resource and environmental protection in order to achieve a balanced environment–economic–social effect by not only protecting the environment but also promoting agro-production and improving farmers' living standards.¹⁷

An agricultural circular economy makes it possible to reduce the waste of resources, thus lowering the pollutant emissions from their origins. Pollutant emissions refer not only to greenhouse gas emissions but also to all waste gas and refuse damaging the environment, such as emissions of chemical fertilizers, pesticides, and animal dung to the surrounding environment.

Using straw biomass energy is one important component of an agricultural circular economy. While most of agriculture focuses only on using the grain energy of crops, ignoring and discarding their straw energy, in an agricultural circular economy the stems, leaves, and roots of crops can all be turned into farm produce. As a major country of both grain and straw production, the PRC produces more than 500 million tons of grains and more than 700 million tons of straw every year. More than 200 million tons of straw are completely wasted.

¹⁵ Presentation by Godaliyadde G. A. Godaliyadda, Director General, Ministry of Irrigation and Water Resources Management, Sri Lanka.

¹⁶ Presentation by Sipheng Sengphompanh, Chief, Administration and Finance Division, National Leading Committee for Rural Development and Poverty Eradication, Lao PDR.

¹⁷ Presentation by Zhu Lizhi, Director General, Institute of Agricultural Economics and Development, Chinese Academy of Agricultural Sciences, PRC.

Developing straw energy will greatly contribute to the environment by reducing carbon dioxide and sulfur dioxide emissions, reducing environmental pollution caused by straw burning and decomposition, preventing transmission of plant diseases and insect pests caused by long-term accumulation of straw, and using straw energy by-products to replace some chemical fertilizers and pesticides to reduce agricultural pollution.

National plans and expert research predict that the volume of biomass resources developed by the PRC by 2020 will be equivalent at least to 1.5 billion tons of standard coal; 30% will come from traditional biomass and 70% from agricultural and forestry energy plants. The Ministry of Agriculture's *Plan for Agricultural Biomass Energy Industrial Development* states that the PRC's production of major crop straw by 2015 will have reached about 900 million tons, approximately half of which can be used as raw materials for the biomass energy.

In addition to biomass originating from crop straw, another major development in the circular economy is the greater utilization of animal waste, particularly for the production of biogas.¹⁸ In rapidly growing countries such as the PRC and Viet Nam, livestock's contribution to GDP is increasing, yet waste treatment and utilization is still limited.

In the PRC, total animal waste exceeded 2.7 billion tons in 2006, about 3.4 times that of industrial solid waste. A large portion is not treated, costing 1% of GDP. Total animal waste is expected to reach 6.8 billion tons by 2020. It should be noted that the agriculture sector accounted for 17% of total emissions of greenhouse gases methane and nitrogen oxide. In Viet Nam, a 2008 survey on current practices of livestock manure management found that only 2.3% of animal waste is utilized as fertilizer for crops; 61.4% is discharged to drains and sewers and 9.9% to fields, ponds, lakes, rivers, and streams; and 16.4% is treated by biogas plants and 10% in other forms. Cognizant of these facts, both in the PRC and Viet Nam, a number of regulations and programs have been established to promote renewable energy, biogas development, and a circular economy.

5.3 Key Lessons Learned

After years of neglect, several countries in Asia are giving increasing importance to rural infrastructure in policy and investment priorities.

There is a widespread realization of the multifaceted dimension of rural infrastructure and how it contributes to increasing farmers' incomes and agricultural productivity.

Separate financing and implementation of rural infrastructure. While in the past, rural infrastructure development was considered the domain of the public sector, there is now a paradigm shift. The combination of both the public sector and the private and community sectors' involvement in financing and implementation is possible and might contribute to reducing the investment gap and improving the efficiency of the investment.

¹⁸ Presentation by Agustina Musa and Yue-Lang Feng, ADB.

Promote benefits of circular economy. There is an increasing awareness of the benefits of the circular economy both for its environmental impacts and for further improving rural income through the generation of renewable energy and utilization of agricultural wastes.

The Government of the PRC will continue to support the development of rural renewable energy in its 12th Five-Year Plan. Rural renewable energy sources in the country are diversified and include wind power, solar energy, small hydropower plants, biofuel, biomass briquettes, and biogas. Action plans on rural renewable energy are in place, and more policies to encourage the development of rural renewable energy are under consideration.

Create a policy environment conducive to the participation of different actors.

The public, private, and community sectors should be encouraged to take part in the financing and management of rural infrastructure.

Ensure that both the level and efficiency of investment in rural infrastructure are increased.

Promote renewable energy policies. Particularly in the field of biogas and biomass utilization, renewable energy policies should be promoted and sharing of knowledge from the experiences of the PRC and Viet Nam ensured.

6 Financial Development in Rural Areas

6.1 Trends

In the background of financial development in rural areas in Asia is the failure of the traditional approach to agricultural credit based on the government's directed credit programs and subsidies, and more recent doubts on whether a purely commercial-based microfinance is able to achieve the poverty reduction goals. Related issues have been raised on social responsibility of microfinance, consumer protection, and financial stability in the wake of the subprime lending crisis that triggered the 2007–2009 global financial crisis. A rethinking of the microfinance and rural finance paradigm is under way in many Asian countries, including how to strike a balance between financial sustainability and social responsibility of the microfinance/rural finance industry and how best to combine efforts in the financial and social sectors for poverty reduction.

One major problem is the limited outreach of financial institutions in rural areas. There is still a largely insufficient supply of loans to small and microenterprises, and to farmers for production, processing, and sales.

With microfinance proven to be an effective way to reach smallholder farmers, the challenge is how to replicate the successful cases and make it sustainable. Professionalism, risk reduction, regulations, and safety nets have to accompany the development of effective rural finance systems.

Microfinance institutions and operations have spread widely in urban environments and highly densely populated South Asian countries, but much more has to be done in low-density population areas and in the PRC.

In the PRC, microcredit was piloted using the Grameen model: small loan size, group guarantee without collateral requirement, frequent loan repayment, and targeting of women. The initiatives were donor-supported, project-based, restricted to a county, in limited funding, unlicensed, and time-bound. By mid-2000, only a few of the initial 300 microfinance programs survived.

In some parts of India, microcredit is experiencing severe setbacks due to over-indebtedness and spread of massive defaults by rural households on their loans from microcredit financial institutions. Authorities at the national and state levels are continuously following up on the situation.

A considerable part of the expansion of microcredit has proceeded without proper regulations that would normally apply to financial institutions such as commercial banks. While this status has contributed to the flexibility of the institutions and their greater outreach in rural areas, it has also limited their capacity to mobilize funds and therefore to achieve the intermediary function to allow sustainable growth.

Due to the limited size of loans, microfinance does not seem to be able to meet the demand for credit of small and medium-sized commercial farmers who constitute a different market segment from individual entrepreneurs and households borrowing from microfinance institutions. The network of commercial banks in rural areas also remains limited.

In India and Nepal,¹⁹ there are national programs that force commercial banks to direct part of their portfolio to lending to the agriculture sector or a deprived sector. So far, such priority sector lending programs have not been very effective in reaching their objective. In practice, the commercial banks that are not able to meet the program targets provide funds to wholesale microfinance institutions or, as mentioned on page 23 in relation to India, to the Rural Infrastructure Fund.

Challenges in rural finance outreach to the intended beneficiaries include:

- difficult access and lower population density,
- high transaction cost,
- **volatile/seasonal** cash flows,
- higher vulnerability and lower risk-bearing ability of borrowers,
- lower financial literacy, and
- asymmetry of information.

Since 2005, there have been institutional innovations in rural finance in the PRC. To improve the outreach of financial services and increase competition in rural areas, the China Banking Regulatory Commission changed market-entry requirements in 2006. The new policy promoted the development of “new-type” rural financial institutions, such as village and township banks, lending companies, and rural mutual credit cooperatives. To encourage both domestic and foreign firms to invest in these new entities, the policy lowered minimum capital requirements, expanded the scope of permitted banking activities, and authorized flexibility in corporate governance structures for new-type rural financial institutions. In addition, the government enacted a series of preferential tax policies and other incentives.

By the end of June 2009, 118 village and township banks had been established, attracting a variety of capital worth CNY4.7 billion (\$689 million), absorbing CNY13.1 billion in deposits (\$1.9 billion), and providing CNY5.5 billion (\$806 million) in loans to rural households and CNY8.2 billion (\$1.2 billion) to rural small and medium-sized enterprises. According to the commission, these new financial institutions have helped to bring financial services to underserved regions, channeling funds from urban to rural areas and delivering specialized products to local customers.

¹⁹ Presentation by Ashok Kumar Paudel, Deputy Director, Nepal Rastra Bank, Office of the Governor, Nepal.

As of the end of 2010, there were over 2,500 microcredit companies covering every province in the PRC. Microcredit companies are companies that have been started up by individuals, banks, venture capital companies, or private industry, and often serve small and medium-sized enterprises that do not have access to formal financial services. They are legally able to charge up to 4 times the central bank's lending base rate (i.e., $4 \times 6\% = \text{about } 24\%$ in 2011). Microcredit companies are able to maintain high profit margins as the demand for small and medium-sized enterprise loans is high, and many operate with less than 10 employees. The average gross loan portfolio for these companies is CNY76 million, and the central bank's research department estimates that the average loan size exceeds CNY400,000.

6.2 Presentations and Discussions

Incentives for institutional innovations in the PRC include the disappointment over the microfinance performance of nongovernment organizations and the need to open up for competition and service quality, while contributing to sustainable and commercial microfinance.

Innovations in rural finance in the PRC include product innovations, most of which are still in their pilot phase, and innovations in lending procedures and management. Examples of product innovations are

- microfinance downscaling by city and rural commercial banks;
- trials in agricultural value chain credit;
- debit cards, points of sale, agents for lending, and disbursement; and
- land use rights and movable properties as collateral

Innovations in lending procedures and management by the rural commercial banks and China Merchants Bank include

- well planned and conducted sales based on seasonality;
- applicant reviews, obtaining information by compiling financial statements, soft information, and credit scoring;
- better training and management of bank loan officers;
- computerized management information systems, and monitoring of clients and loan officers; and
- piloting lines of credit based on credit scores for farmers.

A summary evaluation of innovation in the PRC is presented in Table 3.

A number of innovations in rural finance has been emerging in different parts of Asia. Among them the following were mentioned:²⁰

²⁰ Presentation by Zhang Qifeng, Principal Financial Sector Specialist, Office of Regional Economic Integration, ADB.

Table 3 Evaluation of Innovation in the People's Republic of China

<p>Nongovernment organization microfinance test in the People's Republic of China</p> <ul style="list-style-type: none"> • Better outreach to farmers and poorer clients • Higher repayment rate in the initial years of operation • Promotion of some features, such as poverty loans • Difficulty in attaining sustainability • Capital difficulties preventing expansion in the longer term
<p>Pilot of microcredit companies</p> <ul style="list-style-type: none"> • High rate of repayment and profitable • Targeting of small and medium-sized enterprises (SMEs) instead of low-income clients or farmers • Some microcredit companies move beyond guidelines in terms of fund raising and interest rates
<p>Village and township banks</p> <ul style="list-style-type: none"> • Difficulties in savings mobilization and SME lending • Sponsored by existing banks, some experimentation
<p>Village mutual self-help funds</p> <ul style="list-style-type: none"> • Poverty funds reached households in poor rural areas • Sustainability to be tested; results so far are good • Two major operational issues: influence from local administrations and elite control within a village • Expansion, networking, and supervision still undecided
<p>Microfinance downscaling by local commercial banks</p> <ul style="list-style-type: none"> • Slow progress in the pilot project since 2005 but expanding quickly, and tested and proven by at least 10 community commercial banks: <ul style="list-style-type: none"> – Serving urban and peri-urban SMEs with average loan size of CNY100,000, ranging from CNY20,000 to CNY500,000 – Nonperforming loans below 1%, most below 0.5% – Reaching breakeven points in 12–24 months • Technology spreading to SME and rural lending • Profitable, but implementation depends on local market conditions, corporate loan profit, and bank strategy

Source: Presentation by Cheng Enjiang, Senior Research Fellow, International Poverty Reduction Center, PRC.

Mobile payment and banking. This is one of the most promising models to expand outreach and reduce transaction costs. The system needs information technology infrastructure and an agent network, thus a partnership between a financial institution with a mobile network operator. A major challenge in most countries, even greater than the availability of technical support, is the lack of a regulatory framework, in particular to ensure consumer protection and interoperability between different schemes. Operational profitability is a major challenge for most schemes being experimented with around the world as it needs transaction volume to break even. It is more suitable for markets with high-density populations. Grassroots microfinance institutions could eventually join the agent network, while larger-scale formal financial institutions can consider investing in mobile banking and establishing partnerships with mobile network operators for outreach to rural areas.

No-frills accounts. These are savings accounts with basic **services/features** free of charge and with no minimum balance that target low-income and underprivileged

customers. Access to the account could be through ATMs, with a debit card provided by the bank free of charge. Quarterly statements are typically sent out free of charge. There are some limitations on the number of cash transactions at bank branches (e.g., 12 per quarter, beyond which a fee applies); there are also limitations on the number of free leaves in a checkbook (e.g., 15 leaves per year, beyond which a fee applies). Internet banking and mobile banking are not available, or provided upon request and against an annual fee.

Kisan credit card. This is a revolving credit line to farmers in which a credit card and passbook are issued to eligible farmers, with personal identification information. The limit of the revolving credit is determined based on operational land holding, cropping pattern, and scale of finance. Security, margin, and rate of interest are as per banking norms. Each withdrawal has to be repaid within a maximum period of 12 months. The advantage of the card is assured availability of credit at any time, with minimum paperwork and simplification of documentation for withdrawal of funds from the bank.

Credit-plus approach. This approach, which typically bundles rural credit with business development services (BDS), is not new and used to be popular with not-for-profit nongovernment organizations and microfinance institutions. The positive impacts of BDS have been proved by empirical studies as improved business knowledge, practices, and revenues of borrowers. BDS may cover feasibility studies, market information, technical training, management training, financial literacy, mentoring, networking, etc. There has been renewed interest in BDS, but one major issue is about who should shoulder or share the cost. It is potentially an area where the government could provide financial support.

Value chain finance. A value chain denotes a cooperation process among actors from production to delivery of a product to the final consumer (including input suppliers, farmers, traders, processors, and retailers). Value chain finance (VCF) is financial service built on and in support of these relationships in the chain. For instance, a working capital loan could be provided to **traders/processors** that organize the production via contract farming and provide advance or trade credit to small farmers. Farmers' associations could also play an important role in social collateral and business support services. VCF reduces credit risks into performance risks, lowers transaction cost, and increases the size of the portfolio for lenders. VCF may include different instruments and schemes, such as warehouse receipt loan, and factoring.

Peer-to-Peer lending. Peer-to-peer (P2P) lending provided through a P2P platform (online or offline) helps connect fund requestors and providers, and assists them in directly entering into loan contracts with mutually agreed terms (e.g., interest rate). A P2P platform charges fees for matching and loan administration services, but does not take on the risk of borrowers defaulting on payments. P2P platforms are often registered as information technology service companies, and stay outside the scope of financial sector regulation and supervision. There has been fast growth of P2P lending since the 2007–2009 global financial crisis, in particular in urban areas. Credit and other risks involved with P2P lending could be sources of concern.

Other innovative approaches. These include flexibility of interest and repayment schedules dependent on the activity, link with agricultural insurance, and leasing.

6.3 Key Lessons Learned

One size does not fit all. Each country and organization may have its own approach and area for financial innovations. The development of new institutions and products will require professionalism, risk reduction, and development of safety nets. Moreover, physical infrastructure, regulations, and innovations must be developed.

Take into account changes in client situations and the demand for loans. As rural areas diversify, client needs will vary and will be subject to significant changes that may include mixed farm operations and rural enterprises; most entrepreneurs are not just farmers.

Use microfinance as an effective way to reach smallholder farmers. Microfinance has made a contribution in overcoming smallholder farmers' lack of capital, and addressing the need for very small amounts of credit. The challenge however is how to replicate the experience and make it sustainable. Replication is possible to a certain extent, but it requires new institutions and more sophisticated products.

Fixed form product innovations may work for a time, but cannot last. The mixed results from experience with Grameen microcredit in the PRC points to the need for microfinance to innovate in management, procedures, management information systems, branch support, training, credit scoring, and scale. However, product innovations need institutional, management, and technology support. Financial institutions need to spend money on research and development.

Consider fund scale and source for targeting low-income households. To reach low-income households and provide micro-loans, scale and source of funds are the keys for sustainability. Imperfect information and an uncertain regulatory environment make significant expansion risky. The lessons from microcredit companies and village and township banks are that geographic restrictions and wholesale funds need to be taken into account; their success is not linked to micro-loans.

Pilot test prior to rolling out. The key success factor lies with implementation and details. For rural financial market development, innovative products should be kept simple and supportive of activities in the real economy. It is important to be practical and not dogmatic.

Avoid moral hazard in innovations. Benefits should be aligned with accountability for actions taken, and creativity and innovation supported while identifying and closely monitoring associated risks.

Change and open up the legal and policy framework for rural finance. Ceilings on deposit interest rates create an incentive for funds to flee to the informal markets where there is no supervision. Monitoring needs to be improved, as the lessons from rural cooperation funds and the current credit crisis in Wenzhou—such as bankruptcies and inaccessible access to credit by small and medium-sized enterprises—teach us.

There is a need for infrastructure and market support facilities, including (i) credit bureau services, to which access is limited and generally not available to nongovernment organizations/microfinance institutions, microcredit companies, or finance companies; (ii) wholesale funds, which are limited and have restrictions for microcredit companies; and (iii) credit rating, which is lacking and for which training and technical assistance are insufficient. The legal status of microfinance institutions is uncertain. In the PRC, for 15 years, 300 microfinance institutions were never institutionalized and operated as a project. The microcredit companies have legal status under corporate law but are not formally recognized as financial institutions. It is necessary to recognize that profit is not the only motive and that nonprofit financial institutions can be effective.

7 Conclusions

The theme of the 2011 KSP was Agriculture and Rural Development: Improving Farm Productivity and Rural Livelihoods. Underlying this broad theme is the complex set of processes of modernization of agriculture and structural transformation. Despite enormous differences in socioeconomic and agroecological contexts, most of the countries in the region face common issues, including a large labor force engaged in agriculture; mounting pressure on natural resources, particularly land and water; and growing urban populations. A shrinking resource base and a reduced labor force in agriculture are expected to fulfill an increasing demand for safe, quality, and affordable food.

The following are the main conclusions of the 2011 KSP:

- (i) Organized and effective agricultural and food value chains will need further development to meet the expectations of increasingly urbanized societies. During this process, policy and investment will need to ensure inclusion and integration of smallholder farmers with value chains.
- (ii) Improved value chains will require not just better infrastructure but also improved logistics, standards, compliance systems, regulations, and information systems.
- (iii) The contribution of agricultural science and technology to agriculture will grow so that solutions can be found to the increasing pressure on natural resources and declining labor force in agriculture. This will require a multi-approach and multichannel orientation to ensure that innovations reach farmers and enterprises.
- (iv) Common problems in rural infrastructure throughout the region are the insufficient level of rural infrastructure and the lack of efficiency of investment. Community-driven development (CDD) of infrastructure provides a solution to the problems of lack of efficiency and mobilization of finance and resources. As long as local communities benefit directly from the infrastructure and are involved in planning and implementation of rural infrastructure projects, there is scope to increase their contribution to finance and improve the efficiency of rural infrastructure.
- (v) Renewable energy technologies are proving increasingly viable and effective to meet localized energy requirements.
- (vi) The concept of a circular economy deserves deeper analysis and replication. It focuses on recycling and reuse of agricultural waste to produce biogas, biofuel, or soil and environment improvement materials.
- (vii) Microfinance has proved to be a powerful tool but not a panacea for poverty reduction. Each country and organization may have its own approach and area for financial innovations. Promising examples include mobile payment and

banking, no-frills saving accounts, credit-plus approaches, value chain finance, and P2P lending provided through a P2P platform.

The KSP highlighted a number of potential areas of collaboration in agricultural and rural development between the PRC and DMCs. The following are potential areas and the mode of collaboration:

- (i) **Integration of smallholder farmers into modern logistics system and value chains.** Promote cross-country studies and sharing of experiences through workshops and seminars.
- (ii) **Agricultural research.** Promote exchanges of scientists; common research projects; sharing of knowledge by PRC scientists on soil testing, precision agriculture, and hybrids; and organization of conferences and training (both short- and long term) at research centers and universities.
- (iii) **Rural infrastructure.** Organize conferences and study tours of CDD to improve rural infrastructure and increase resource mobilization and efficiency of investment.
- (iv) **Circular economy and renewable energy.** Organize study tours to the PRC and invite experts from the PRC to facilitate transfer of technology.
- (v) **Finance.** Share experiences through conferences and studies about alternatives to microfinance to reach smallholder farmers.
- (vi) **Social networking.** Establish a KSP website to maintain contact among participants and facilitate social networking.

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