

Realizing Scale in Smallholder-Based Agriculture:

Policy Options for the Philippines

JUNE 2021



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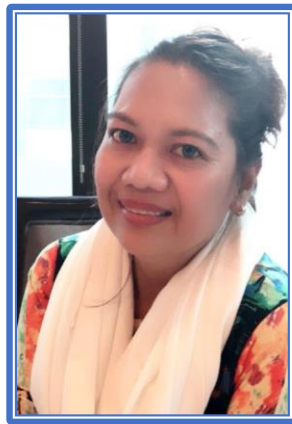
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“In loving memory of our dear friend Carolina (Carol) V. Figueroa-Geron”



Acknowledgments

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Currency Equivalent

Exchange rate effective as of May 31, 2021

Currency unit	= Philippine peso (PHP)
US\$1.00	= 47.8

Acronyms and Abbreviations

A&D	Alienable and disposable
AO27	Administrative Order 27
BARMM	Bangsamoro Autonomous Region in Muslim Mindanao
BFAR	Bureau of Fisheries and Aquatic Resources
BTSL	Big Tenant, Small Landlord
CAR	Cordillera Administrative Region
CAFEP	Collaborative Agriculture and Fisheries Extension Programs
DA	Department of Agriculture
F2C2	Farm and Fisheries Clustering and Consolidation
FMR	Farm-to-market road
GAP	Good Aquaculture Practice
GDP	Gross Domestic Product
GRDP	Gross Regional Domestic Product
GVA	Gross Value Added
IRA	Internal Revenue Allotment
IT	Information technology.
LGU	Local Government Unit
MIMAROPA	Mindoro Oriental & Occidental, Marinduque, Romblon, and Palawan
MRDP	Mindanao Rural Development Program
NCR	National Capital Region
NGO	Non-governmental organization
PAFES	Provincial Agricultural and Fishery Extension Service
PCIC	Philippines Crop Insurance Corporation
PCIP	Provincial Commodity Investment Plan
PHP	Philippine peso
PO	Producer organization
PRDP	Philippine Rural Development Project
PSA	Philippine Statistics Authority
RFO	Regional Field Office
SFLF	Small Farmers, Large Field
SOCCKSARGEN	South Cotabato, Cotabato, Sultan Kudarat, Sarangani and General Santos City
SUCs	State universities and college
USDA	United States Department of Agriculture
WDI	World Development Indicators

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Executive Summary



Executive Summary

In recent decades, the agriculture and fisheries sector in the Philippines has grown but has clearly not lived up to its potential. According to most aggregate-level indicators, the sector's performance has lagged behind that of many regional peers. This lag is illustrated by comparisons in overall sectoral growth rates, growth rates per capita in food and non-food production, and multiple indicators related to productivity. Over the past 25 years, agricultural total factor productivity in the Philippines has increased by 32%, piling in comparison with Indonesia (50% increase), Thailand (67%), Vietnam (73%), and China (130%). Perhaps more concerning, the pace of total factor productivity growth in the Philippines has been steadily declining over time. The sector has also experienced a much slower pace of structural transformation than that observed among many of the regional peers.

The Philippine government recognizes that agriculture, and the ways that government supports agriculture, must take a new direction. Indeed, the government's "New Thinking" for agriculture envisions transformative change in the foci and organization of primary agricultural production as well as the links between primary production and the broader economy, spurred by increased investment in agri-food clusters, logistics, processing, and trade. While the transition to New Thinking policies is clearly underway, there remains a real danger that legacy policies of the old thinking could undermine the transformation. This legacy includes a strong bias in government policies and spending in favor of rice production, as well as heavy reliance on inefficient instruments of support, including input subsidy programs and trade barriers. While the Rice Tariffication Law and the accompanying Rice Competitiveness Enhancement Fund have made a good start in altering this legacy, much remains to be done. Without further comprehensive reforms, a real transformation is unlikely to succeed. All of the discussion in this report related to more specific programs and initiatives needs to be understood in the context of this message regarding the importance of the overarching policy framework.

To support the government in designing and implementing its program of New Thinking, the World Bank is carrying out a series of analytical and advisory exercises. A report in 2020, "Transforming Philippine Agriculture During COVID-19 and Beyond," laid out the kind of broad reform agenda that will be needed to trigger the needed transformation. The current report focuses mainly on one element of the reform agenda, but an important one: policies to promote clustering and consolidation. It draws lessons from relevant experience with such policies in the Philippines and other countries, and it looks at the potential for transformation through a spatial lens.

Clustering and consolidation have not been a central focus of Philippine government programs, although the country has accumulated substantial experience with clustering producers and consolidating production. One notable example is the Philippine Rural Development Project (PRDP), which clusters producers into enterprises that take a business-oriented approach to farming and fishing, supported through complementary investments in infrastructure such as farm-to-market roads, post-harvest facilities, and cold storage. The project has amplified capacity within the Department of Agriculture (DA), especially in the DA's Regional Field Offices (RFOs) and in the Local Government Units (LGUs) that have been involved in PRDP implementation country-wide since 2014.

If lessons from this experience are combined with other relevant lessons on clustering and consolidation from other countries, they provide a solid base for rolling out the government's proposed framework

for **Clustering and Consolidation**, laid out initially in **Administrative Order 27 (AO27)** establishing the **Farm and Fisheries Clustering and Consolidation Program (F2C2)**.¹ Through a series of consultations, stakeholders examined this learning and experience in light of the proposed framework. Their feedback has suggested six key strategies to operationalize the proposed framework:

- **Strategy 1: Provide effective communication of goals, policies, incentives, and opportunities for clustering and consolidation.** An enhanced, intensive Communication Strategy is fundamental for promoting broad awareness and understanding of the changes envisioned through AO27. To reach the entire range of stakeholders effectively, the strategy must tailor communications to different audiences and their interests, including farmers, LGUs, national government agencies, state universities and colleges (SUCs), research institutions, buyers, consolidators, agri-aqua processors, business outlets, and civil society. The Communication Strategy needs to include a feedback mechanism to assess whether key messages have been clearly received and whether the DA in turn has understood stakeholders' concerns, which may call for the strategy or specific programs to be adjusted. The messages to be conveyed must: (1) clearly explain how the DA, in partnership with LGUs, plans to accelerate the modernization of the agriculture and fisheries sectors; (2) describe how programs will be reoriented to focus on providing technical support, building entrepreneurial skills, and facilitating market linkages for small-scale farmers who are willing to cluster and consolidate their production to build economies of scale; and (3) specify the incentives that will be available to promote and support the active engagement of farmers and fishers in clustering and consolidation—for example, the provision of farm equipment, inputs, machinery, and scholarships. The communication about incentives must be clear and consistent from the outset. Success stories and best practices in promoting clustering, consolidation, market opportunities, and other initiatives should be widely shared.
- **Strategy 2: Expand support for business planning and enterprise management along key value chains.** An operational framework for clustering and consolidation must include a strong element of support for the formation of viable clusters and the development of business plans, combined with training to orient, help develop, and sustain viable clusters to become well-managed enterprises, as discussed later. While such support has long been recognized as critical for the viability of associations and cooperatives, it must become an institutionalized, sustained, and core function of service delivery. A practical approach for providing this support would be to build on the considerable capacity in social formation and business plan formulation and evaluation that has been developed (nationally and in RFOs and LGUs) through implementation of the I-Reap component of PRDP. As experience from PRDP has also shown, building DA and LGU staff capacity in business planning and enterprise management takes time and requires concerted, sustained, on-the-job training.
- **Strategy 3: Adopt a spatial approach to agricultural development plans and policies.** Clustering and consolidation already incorporate a spatial approach, although at a more meso level (communities and perhaps townships). The spatial approach should also span a broader land- and sea-scape at a more macro level, taking into account differences across space and customizing interventions accordingly. Such spatial differentiation should explicitly reject a “divide-by-N” mentality and embrace location-specific targeting.

¹ The AO27 series of 2020 is referred to as the Farm and Fisheries Consolidation and Clustering (F2C2) Program. The F2C2 Program, also known as the Bayanihan Agri Cluster (BAC) program, seeks to advance the interests and condition of Filipino small farmers and fishers by encouraging them to adopt the strategy of clustering and consolidating their production, processing, and marketing activities to form community business enterprises, including the pooling of assets, labor, and other resources. A follow-on AO providing for a “One DA Agenda” is being drafted to further consolidate and sustain the integration of the key strategies for transformation of the agriculture and fishery sectors.

- **Strategy 4: Provide targeted support for social preparation, institutional build-up, and enhanced access to technical and financial services for clusters.** While arrangements between the DA and LGUs for provision of technical services are undergoing changes as the Provincial Agricultural and Fishery Extension Service (PAFES) evolves, the nature and quality of technical services needed to support the goals of the proposed Clustering and Consolidation Framework will also need to change. As discussed under Strategy 2, enhanced service delivery (through SUCs, for example) in enterprise management will be essential. With crop diversification, new cropping patterns and more intensive cultivation and fishing techniques will be required, and such factors as pest and disease outbreaks, water shortages, changing weather patterns, and requirements for soil management will add to the risks and challenges facing farmers and fishers.
- **Strategy 5: Strengthen market and value-chain linkages and productive partnerships.** While much has been done by the DA nationally and regionally through RFOs, LGUs, and others to strengthen the collaboration with consolidators and agri-businesses, this must remain a key strategy for operationalizing the Clustering and Consolidation Framework. RFOs in collaboration with Provincial LGUs should establish a regular forum for meeting with consolidators/buyers and relevant agribusiness firms operating in the area to exchange information, identify bottlenecks, and jointly work toward strengthening the value chain and associated logistics for key commodities in the area. To promote tangible results, a key element of the DA's role could be support for public-private partnerships or critical infrastructure, as well as assistance in meeting regulatory requirements. Provinces should be encouraged to support such ventures through tax concessions, permit facilitation, and other means.
- **Strategy 6: Enhance education and outreach through digital agriculture and enabling IT tools.** While the strategies outlined above are designed to accelerate the pace and effectiveness of transformational change in the short to medium term, a strategy for developing employment and business opportunities over the longer term should also be included. In particular, the DA, through its Agricultural Training Institute, should expand the development of short courses specifically designed for managers of cluster, association, and cooperative enterprises, including the financial/accountant managers in such enterprises. Such courses could include applications of modern technologies (digital agriculture and enabling IT tools, such as drones, computer software, geotagging, and others), tailored to the interests of small and larger clusters. To actively promote this training, a program of financial support could be offered to managers of established enterprises (perhaps defined as enterprises that have operated successfully for more than three years) to participate in courses (of one week, for example).

In operationalizing the proposed Clustering and Consolidation Framework, the government must not only build on success but pay attention to cautionary tales. Many countries throughout Asia (and other developing regions) have embarked on programs to accelerate clustering and consolidation in agriculture through adjustments in laws, regulations, incentives, and new programs. But in practice, most near-term targets have been missed, or the results proved to be largely unsustainable. New forms of collaboration and business cannot be decreed into being and are often quite shallow and fragile when they are catalyzed primarily by subsidies. The history of these efforts is filled with short-lived farmer groups and cooperatives, failed contract farming arrangements, mistaken efforts by governments to “pick the winners,” and public-private partnerships that fell short of expectations. Success stories seem to involve a blend of different strategies and interventions, and while the private sector always needs to be in the lead, there are major roles for both the private sector and government, especially local government. A review of experiences suggests that there are no shortcuts to progress; structural changes and institutional innovations take time. There is no evidence that top-down, standardized models “work” for

practically anything in this policy realm. The evidence overwhelmingly points to the importance of synergies—among approaches and objectives—and the centrality of building trust, confidence, and collaborative relationships among different stakeholders—whether they are producers, communities, municipalities, other local government units, or agribusiness companies. All of these perspectives counsel that a bottom-up approach based on patience and flexibility to fit different circumstances (no “one-size-fits-all”), with substantial piloting, is preferable. Above all, before any approach is scaled up in a major way, it must be proven to be cost-effective, have buy-in from stakeholders, and be sustainable over time.

More specifically, this report has drawn upon international experiences to formulate conclusions and recommendations in areas that are particularly relevant for the clustering and consolidation agenda:

- **Realizing scale in primary production.** Apart from land sales, the most obvious way in which land can be consolidated for primary production is through leasing. Steps could certainly be taken at the national and local levels to promote a more fluid land leasing market, although this topic was not explored in depth in this report. But beyond leasing, the development of block or cooperative farming may be an effective way to achieve functional consolidation in some limited areas. In the Philippines, perhaps the most promising areas to pilot or pursue such models would be (1) in selected irrigation schemes where water user associations are already well established, (2) in Ancestral Domains, where there is much underused agricultural land or widespread shifting cultivation, and (3) within Agrarian Reform Communities supported by the Department of Agrarian Reform. Philippine stakeholders can draw insights and lessons from Malaysia’s long experience with block farming and from Vietnam’s much more recent experience supporting the “small farmer, large field” model, both of which have primarily centered on rice.
- **Using collective action through producer organizations to foster more market-oriented smallholder production.** The Philippines has successful cooperatives, yet the vast majority of producers are not affiliated with them. Low participation is common worldwide, despite strong efforts by governments and donors to organize producers. It has many causes, but the implication for policy is that attempts to force cooperation or entice the creation of cooperatives through subsidies or other favored treatment generally either fail or cannot be sustained. A voluntary and incremental approach has a better chance of success. Within the region, Japan, South Korea, and Taiwan (China) have had especially rich experiences promoting farmer groups or cooperatives. The Philippines has its own useful experience to build upon, including the support provided to like-minded farmers under the MRDP and PRDP projects to establish producer groups or enterprises.
- **Fostering the consolidation of value chains via contract farming, productive alliances, or other linkages between farmers (groups) and agro-enterprises.** These models are well understood in the Philippines, although they are not widely applied. Elsewhere in the region, contract farming has become increasingly common in some value chains, including value chains for specialized rice varieties or rice production systems. Thailand, India, and Vietnam have contract farming experiences relevant for the Philippines. Several countries in Latin America have had ample experience with contract farming and productive alliances involving small-scale producers. A very good analytical tool for assessing the potential and support needed for contract farming is available (World Bank 2014),² along with an excellent review of Latin American efforts to support productive alliances (World Bank 2016).³
- **Promoting specialized agricultural and agro-industrial clusters.** Both the potential and limitations of agro-related cluster development are highlighted in this report. Experience shows that greenfield

² See <https://documents1.worldbank.org/curated/en/575871468204575206/pdf/881810REVISED00y020140WB0Internal02.pdf>.

³ See <https://openknowledge.worldbank.org/handle/10986/25752>.

agricultural cluster development (establishing a cluster from scratch) is a risky endeavor, so efforts might focus first on upgrading existing clusters, which can be done through public-private partnerships. The benefits of clustering are likely to be greater in higher-value commodities. Agricultural cluster development can also be fostered in peri-urban areas in close proximity to consumers. Sustainable clustering efforts will need to address environmental, social, and other risks. Agro-industrial clusters (or agribusiness clusters) should be promoted cautiously, and only where there is very strong interest on the part of the private sector to invest, manifested by a willingness to put significant resources on the table up front. Good operational guidelines pertaining to agricultural (and agro-industrial) clusters are available (FAO 2010, 2017).⁴ Some cluster initiatives may need to be accompanied by an integrated approach to landscape management in order to address national resource competition. Guidelines for such efforts are also available.⁵

The decentralization of fiscal resources and functional responsibilities, motivated by the Supreme Court ruling in the Mandanas case, among other factors, implies major changes in the roles of the DA and other central government entities. Increasingly, central agencies will be tasked to incentivize and indirectly influence the decisions taken by LGUs as well as to provide technical backstopping for LGU programs, rather than implementing programs themselves. This backstopping function may include provision of support services that require some critical mass of technical expertise that would not be effectively and efficiently managed at the local level, such as high-quality project appraisal and economic benefit/cost analysis, as well as program monitoring and impact evaluation.

Notwithstanding this devolution, the DA and other central government entities will continue to have responsibilities focused on providing a national strategic and operational policy framework, regardless of the division of labor for its implementation. Key roles at this level will include:

- **Undertake high-quality analysis to assess the scope for, constraints on, and needed policy instruments in support of agricultural diversification.** At the farm level, options will include diversification within or beyond rice-based systems. The analysis also needs to take into account that options for livelihood diversification for “farm households” often extend beyond their own farms to include other sources of income. This is particularly true for poorer households with very limited land and low ability to mitigate the risks that may come with adopting new crops or technologies. Diversification—or new forms of specialization—may also be pursued at the community and landscape levels, in the business lines of particular companies and “vertically” within an industry through the development of new products or commercialization of byproducts. Analysis should also recognize that diversified farming systems yield considerable benefits in the form of ecosystem services, yet often they are not factored into farmer or enterprise decision-making. This oversight sometimes leads to monocropping or other single-commodity investments, when in fact the optimal approach from a social perspective might be a mixed farming, agro-forestry, or other type of system. Selective subsidy schemes and technical support aimed at encouraging these economic activities with positive “externalities” or “spillovers” for society as a whole are likely to be much more beneficial than subsidies aimed at providing farmers with “private goods,” such as inputs.

⁴ See FAO (2010), *Agro-Based Clusters in Developing Countries: Staying Competitive in a Globalized Economy* (<http://www.fao.org/sustainable-food-value-chains/library/details/en/c/267092/>), and FAO (2017), *Territorial Tools for Agro-industry Development: A Sourcebook* (<http://www.fao.org/3/i6862e/i6862e.pdf>).

⁵ See, for example, EcoAgriculture Partners (2017), *Public Policy Guidelines for Integrated Landscape Management*, available at <https://ecoagriculture.org/publication/public-policy-guidelines-for-integrated-landscape-management/>.

- **Implement policies to support the incremental consolidation of farming and agricultural production functions.** This activity could include particular attention to reforms and policies to promote a more fluid land lease market, to expand the market for hiring machinery and other production services, and to respond appropriately to demographic trends in rural areas (for instance, by enabling socially secure agricultural retirement of older farmers and encouraging new, younger entrants into the sector).
- **Develop and institutionalize programs to strengthen the human capital base for a modernizing and sustainable agriculture and agri-food system.** Activities would include reviewing the effectiveness of existing education and training programs and considering new programs where appropriate. Examples would be programs aimed at encouraging agro-entrepreneurship among young adults, programs that support the professionalization of agricultural cooperatives, and programs that help to build capacity in the “soft” (non-technical) skills of LGU agricultural officers.
- **Further develop and clarify the delineation of responsibilities and reporting among central, subnational, and LGU levels for implementing regulatory functions that are important for a modernizing and sustainable agriculture and agri-food system.** This would include regulations affecting: (1) agricultural inputs, (2) animal and plant health measures and practices, (3) food safety and hygiene practices, (4) the management of agro-related natural resources, and (5) environmental protection.
- **Provide improved frameworks and support services that can help guide and incentivize LGUs, private companies, and farmer organizations to adopt contract farming or productive alliance arrangements.** Useful functions that the DA and other central entities could perform might include: (1) development of “codes of practice” for contract farming and productive alliance relationships, including guidelines to resolve problems and conflicts in those relationships; (2) development of analytical tools for assessing the feasibility of contract farming and productive alliance arrangements and for monitoring and evaluating their performance; and (possibly) (3) putting in place financial incentives such as lines of credit or a challenge fund, using partial matching grants, to incentivize especially innovative contract farming and productive alliance arrangements.
- **Facilitate deeper engagement by municipalities in agri-food policies and programs.** While most initiatives to support this engagement need to be designed and implemented at the local level, national agencies can play very important roles to enable effective local action by: (1) providing guidance to cities on policies to protect peri-urban agricultural land; (2) creating an information platform for cities to share experiences; (3) developing a national strategy for wholesale food market development to encourage (yet avoid duplicative) investment; (4) developing and disseminating guidelines for cities to upgrade community food markets; and (5) as mentioned, providing support services that require a critical mass of technical expertise that are beyond the capabilities of local governments, such as high-quality project appraisal and economic benefit/cost analysis, and program monitoring and impact evaluation.
- **Facilitate the development and competitive upgrading of agricultural clusters.** The best way for central agencies to support this development may be to disseminate analytical tools to diagnose cluster status and needs, and provide guidelines to LGUs to facilitate upgrading.

The LGUs and municipalities will be responsible for using block grants from the central government and mobilizing other resources to catalyze the transformation of agricultural production and value chains. Recommendations and options for LGUs include:

- **Use proven approaches to help consolidate local farming and/or realize more economies of scale in farming systems that are still based upon smallholders.** LGUs might aim to facilitate a more active local market for agricultural land leasing by creating an information platform and developing

surveying, recording, and brokerage services, which could greatly reduce the transaction costs and risks for those involved. LGUs can also act to promote more active and competitive markets for the provision of mechanization and other agricultural services by accrediting and incorporating such players into local programs, encouraging links between them and farmer organizations, and ensuring that such service providers are able to participate in existing small business promotion schemes.

- **Incentivize and support different forms of collective action among local farmers.** LGUs can determine the feasibility of and potential interest in joint/block farming arrangements and support pilot testing of this model, perhaps through partial matching grants, yet without locking in farmers for multiple years in case the pilots do not bring satisfactory results. They can also implement a phased program to support the emergence and evolution of different types of local producer organizations, including small groups and multipurpose cooperatives. Where water user associations are well established, LGUs can consider whether those associations could assume a broader set of functions, and if so, assist this process. LGUs can incentivize and support agro-enterprises to collaborate more closely with farmer organizations, yet only where they have a proven track record.
- **Support agricultural cluster upgrading.** LGUs can apply best practice methods for assessing agricultural cluster potential and support needs. Initiatives would seek to combine spatial and value-chain interventions and to integrate social and environmental dimensions. These efforts should initially focus on clusters that have already developed organically and matured but face critical productivity and sustainability challenges.
- **Develop and implement multifaceted urban and peri-urban food system initiatives to realize important synergies among interventions.** Cities should be proactive and use multiple instruments to protect peri-urban agricultural land. In some circumstances, they might use city programs that advocate healthy and safe eating (including through institutional procurement programs) to promote local farmers. A broad menu of possible entry points and instruments available to cities has recently been documented by the World Bank (Acharya et al. 2021).

Research and training institutes can support the F2C2 clustering and consolidation agenda in a number of roles:

- **Adapt and facilitate the application of various methodological tools,** including those used to undertake spatial analyses of agricultural systems and performance, to apply multiple criteria in prioritizing problems and solutions, to assess the potential for and possible constraints/risks associated with agricultural diversification and new forms of specialization, and others.
- **Develop and assist in the application of monitoring and evaluation tools for the F2C2 initiative.** This activity would likely include development of a set of indicators and regularized reporting systems, together with periodic surveys and case studies to drill down deeper into emerging patterns and perceptions and extract lessons from various interventions or examples to inform policy and program revisions in the future. Programs and projects need to be evaluated using high-quality economic analysis of costs and benefits, not just against uni-dimensional indicators such as production, numbers of participants or beneficiaries, or income targets.
- **Develop training curricula and train trainers,** which will have a wide outreach in support of local-level initiatives.

Particularly in a country as diverse as the Philippines, it is useful to look at regional variations through a “spatial lens” to help customize strategies to account for local conditions. The simple static analysis performed for this report first classifies each region according to its phase of agricultural development and then according to its potential for transformation. The elements of the diagnostic tool are grouped

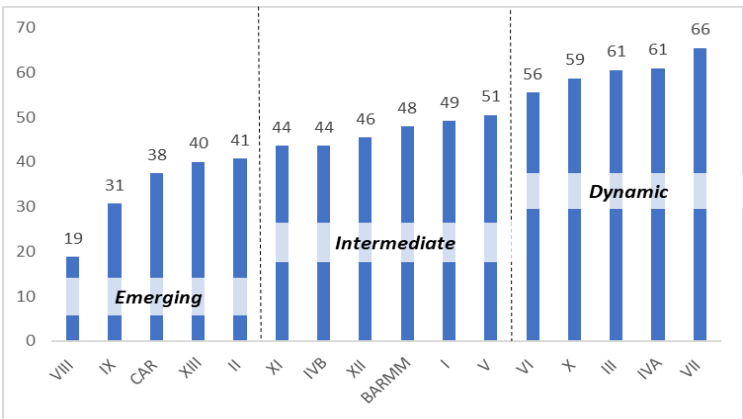
under the headings: (1) State of agriculture; (2) Physical environment and natural resource base; (3) Demographic features; and (4) Level of infrastructure development; the table below lists the characteristics of each one.

Elements of the diagnostic tool

State of agriculture	Physical environment	Demographic factors	Infrastructure development
<ul style="list-style-type: none"> •Economic structure •Growth, productivity •Diversification 	<ul style="list-style-type: none"> •Land resources •Water resources •Aquatic resources •Climate 	<ul style="list-style-type: none"> •Population density •Urbanization •Human resources •Organization 	<ul style="list-style-type: none"> •Access •Water •Power •Telecoms

The analysis finds substantial variation among the regions in their potential for agricultural transformation. While this kind of analysis should not be used as the sole basis for policy, the results (depicted in the figure below) suggest useful lines of consideration for the future. For example, in regions identified as “Emerging,” agricultural growth has less potential to be a strong driver of development. These regions may do well to consider a rural development strategy that focuses less on agricultural development and more on facilitating a gradual shift of resources out of agriculture into other sectors and non-farm activities. This conclusion does not imply that such regions cannot benefit from agricultural development, but rather that the sector is not as likely to be the forceful, primary driver of growth and poverty reduction that it is elsewhere. The results of the spatial diagnostic also suggest that convergence in agricultural development across regions may not always happen. Instead, regions with more advanced agricultural economies will also tend to have greater potential for further transformation. Agriculture in the “Dynamic” regions tends to be located near populous metropolitan centers—Regions IVA and III are near Metro Manila, Region VII is near Cebu, and Region X is near Cagayan de Oro. These centers also have large international ports for shipping agricultural products, thus widening the scope of the market. Investments and regulatory policies in these areas could be directed more toward increasing connectivity, strengthening support services, and raising the quality of output and production processes. These regions may also use land-use zoning to support agro-industries—for example, by establishing biosecurity and environmental zoning for swine production, designating agribusiness corridors, or encouraging peri-urban horticulture.

Expected pace of agricultural transformation in the medium term, by region



1 Introduction



Chapter 1. Introduction

Context

Philippine agriculture has weathered the impact of the COVID-19 pandemic better than the overall national economy. In 2020, the national economy slipped into its first recession since the 1998 Asian financial crisis, registering a GDP decline of 9.5%. During the year, the country's fiscal deficit grew sharply as additional COVID-related public expenditures coincided with a large drop in public revenues. The agricultural sector was not spared, yet it registered only a marginal decline of 0.2%. This resilience was somewhat surprising, given the extent to which the sector has been affected by other shocks, such as African Swine Fever and damaging typhoons. Part of this resilience stems from the pro-active measures taken by the Department of Agriculture (DA) to keep domestic and international food supply lines open, ensure that farmers could still obtain inputs and services to prepare for the next harvest, and prevent primary producers and workers all along agricultural value chains from devastating income losses.

From a longer-term perspective the picture is less encouraging, revealing that agriculture has not performed as well in the Philippines as it has in many other countries in the region. The data in Table 1 and Table 2 show the lagging performance of Philippine agriculture in terms of overall sectoral growth and per capita production of different categories of agricultural products. Regional comparisons also show the Philippines lagging peers in terms of multiple indicators of agricultural productivity. For example, over the past quarter-century, the Philippines' agricultural total factor productivity has increased by 32%, a pace which has lagged considerably behind that of Indonesia (50%), Thailand (67%), Vietnam (73%), and China (130%) (Figure 1). Perhaps more concerning, the pace of total factor productivity growth in the Philippines has been steadily declining over time (Figure 2). This is not a sustainable trajectory for a country with ample but not unlimited natural resources and a rapidly ageing cadre of farmers.

Not only has the performance of Philippine agriculture lagged, but the sector has experienced a much slower pace of structural transformation compared to many regional peers. Many indicators point to this trend, including those related to changes in average farm size, the pace of agricultural mechanization, the absorption of surplus agricultural labor in the rest of the economy, changes in agricultural land use, the development of institutions for collective action, and others. The agricultural sector is also much less diversified in the Philippines than in several of its regional peers, not only in terms of crops but in terms of the importance of livestock, aquaculture, and forestry. Growing domestic and regional demand for animal products and other high value foods has generally not been met by a requisite supply response in the Philippines, although certainly some outlier success stories can be cited. Major elements of this "glass half full" story were summarized recently in "Transforming Philippine Agriculture: During COVID-19 and Beyond."⁶

⁶ World Bank (2020), "Transforming Philippine Agriculture: During Covid-19 and Beyond."

Table 1: Annual Growth Rate of Agricultural Value Added (%)

		1990 – 99	2000 – 09	2010 – 16
EAST ASIA	China	4.3	3.9	4.0
	Japan	-0.2	-1.1	-3.5
	Korea	1.6	2.0	-0.5
SOUTHEAST ASIA	Indonesia	2.2	3.4	3.9
	Malaysia	0.2	2.3	3.2
	Philippines	1.8	3.2	1.0
	Thailand	1.2	2.9	0.5
	Viet Nam	3.9	3.9	2.5
SOUTH ASIA	Bangladesh	3.2	4.4	3.8
	India	3.2	2.5	3.7
	Pakistan	4.2	3.2	1.9

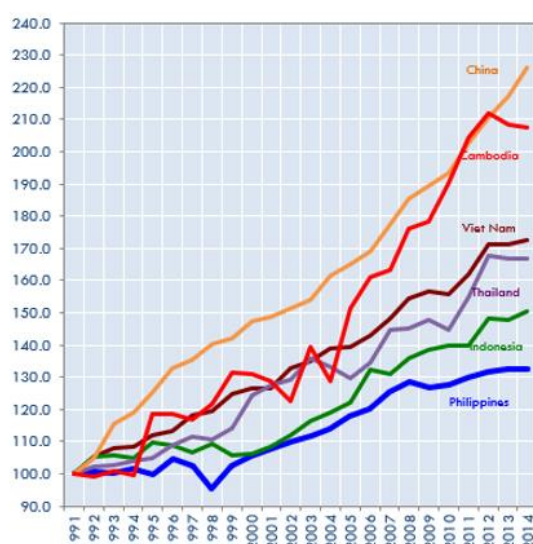
Source: WDI.

Table 2: Comparative growth in net per capita production (2000–2016)

Country	Crops	Livestock	Food	Non-food	Cereals
China	2.8%	2.2%	2.6%	2.0%	1.3%
Indonesia	2.5%	2.9%	2.6%	2.0%	1.4%
Malaysia	0.7%	2.0%	1.4%	-3.9%	-1.5%
Philippines	-0.3%	0.8%	0.0%	-0.5%	0.6%
Thailand	1.0%	1.5%	0.8%	3.3%	-0.7%
Viet Nam	2.3%	4.1%	2.6%	4.2%	1.0%

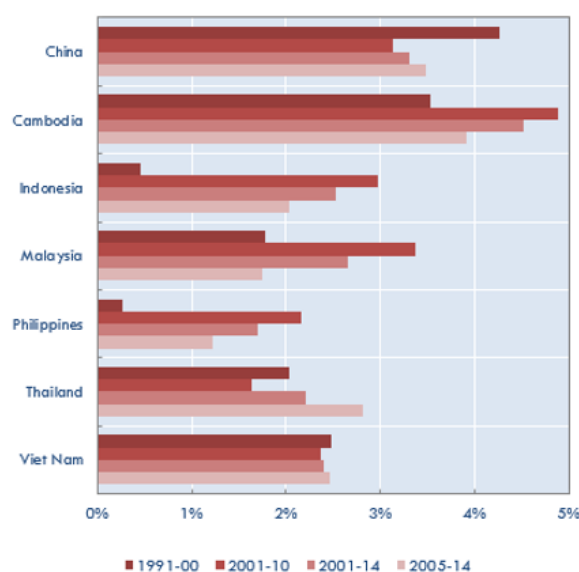
Source: WDI.

Figure 1: Change in Total Factor Productivity in Southeast Asian countries and China (index; 1991 = 100)



Source: USDA.

Figure 2: Total Factor Productivity growth rate (average annual growth)



Source: USDA.

In parts of East and Southeast Asia, economic development has been accompanied by a shift in the agricultural product mix and the emergence of new, competitive products. In many countries, food staples have become less dominant, giving way to a more diverse array of agricultural products as animal products and higher-value food and industrial crops have increased in importance. Notable examples include the steady expansion of China's fruit and vegetable subsector, Thailand's poultry industry, Vietnam's aquaculture subsector, and the oil palm product industries of Indonesia and Malaysia. The Philippines has not experienced a similar shift in the composition of agricultural production and, unlike its peers, has not experienced the emergence of any major new internationally competitive subsectors.

The limited diversification of Philippine agriculture derives partly, if not substantially, from a sustained and rigorous emphasis on rice production that has deviated little since the 1970s. Both policy and government spending have favored rice production at the expense of other aspects of agricultural development that might have provided much greater benefits to the sector and to society at large.⁷ All of this support concentrates on a crop that comprises only about 18% of the value of production and represents a rapidly declining share of food expenditures for all but the poorest segments of the Philippine population. Major elements of this support reflect relatively “old thinking” in agriculture, harking back to the 1970s and 1980s with their emphasis on protections for growers (subsidized inputs, high import tariffs). Experience has shown that these mechanisms are generally not an efficient means of supporting farmers or promoting sectoral competitiveness. World Bank (2020) contrasts some of the longstanding approaches used to support agriculture in the Philippines with a variety of policy shifts and approaches to institutional development and strengthening applied by other middle-income countries that also seek to accelerate the growth and transformation of their agricultural sectors.

The Philippine government recognizes that agriculture must take a new direction and be supported differently in the future. The government’s “New Thinking” for agriculture envisions major changes in the foci and organization of primary agricultural production as well as in the links between primary production and the broader economy, spurred by increased investment in agri-food clusters, logistics, processing, and trade. The New Thinking recognizes that agricultural transformation is a long-term process, involving fundamental changes in what is produced and how, in how crops and animals (and their derived products) are aggregated and marketed, in how services are provided (and by whom), and in how performance is measured. The pursuit of agricultural transformation raises new questions for the Philippines and calls for a mix of multisectoral solutions that differ from the approach that has long dominated national agri-food policy.

Recent government reports highlight the difficulty of modernizing Philippine agriculture under circumstances in which farmland is continuously fragmented, institutional arrangements for farm-to-market coordination and distribution are underdeveloped, and large parts of the food economy experience significant logistical bottlenecks and costs. In response, the DA issued Administrative Order 27 (AO27) in August 2020 establishing a Farm and Fisheries Clustering and Consolidation (F2C2) Program. While changes in the overall agrarian structure are expected to be modest and incremental, the program’s underlying strategy is to facilitate greater efficiencies and innovation in farming, value chains, and service delivery (including irrigation) by focusing policy attention and public support in and around spatially-defined agricultural clusters and on producers who have been organized into groups and linked formally to markets. Depending upon the available resources, the F2C2 Program could potentially involve a very broad set of support services, incentive schemes, and areas of public investment. Implementation is still at an early stage. Much needs to be learned as interventions are tested, and much can also be learned from the experiences of other countries that have faced similar challenges and opportunities.

The challenge for the Philippines is not only to determine *what types* of approaches or interventions might be suitable but to understand *where* different approaches might work best and *when* they can

⁷ Under the DA’s FY2020 budget, the rice program received 48% of the budget appropriated for production support services; 53% of extension support, education, and training services; 35% of the budget for provision of agricultural equipment and facilities; 49% of the budget for research and development; and 88% of the budget for irrigation services. In addition, the vast majority of the budget of the National Irrigation Agency is devoted to single-crop rice production schemes. Meanwhile, the budgets for some categories of expenditure on public goods that will be important to attain the policy goals of the “New Thinking”—such as research, market development (other than roads), and extension—seem to be relatively low and declining.

be applied. The F2C2 Program introduces the spatial dimension (the “where”) at a meso level—the farmer cluster in a village or groups of villages. Yet spatial considerations also matter at a macro level, where the landscape (or seascape) factors into decision-making. The Philippines is not a homogeneous country. Across its regions, provinces, and smaller localities, primary agriculture and the more extended agri-food system exhibit wide differences stemming from the country’s unique geography, its diverse agro-ecological, demographic, and socio-economic conditions, as well as its varied historical experiences. Different locales in the Philippines will likely experience transformative agricultural changes at different paces, face a different blend or hierarchy of constraints, and have access to different levels and types of human, institutional, and financial resources. All of these variables will influence the suitability and feasibility of different policies and program instruments.

The central thesis of the F2C2 Program is that accelerated clustering and consolidation of farming and agribusiness activity are necessary (although certainly not sufficient) means for re-invigorating Philippine agriculture and fisheries and increasing their contributions to the wider economy and society. This report picks up on this thesis and aims to provide practical guidance on how the DA and Local Government Units (LGUs) can operationalize the F2C2 Administrative Order. This guidance takes into account the diverse settings for Philippine agriculture, the country’s prior experience with undertaking multiple interventions in targeted locations, and experiences and lessons from other countries, especially Asian countries, in promoting agricultural consolidation and clustering as vehicles for improved sectoral performance and sustainability.

This report combines results from three activities undertaken from mid-2020 to the first months of 2021. One activity was to develop a framework to operationalize the government’s proposed framework for clustering and consolidation, laid out in AO27. This work was based on a consultative process that drew upon the collective knowledge of DA staff and inventoried the stock of experiences from implementing agricultural and rural development projects in the Philippines and internationally.⁸ The second activity used a spatial lens to examine the structure, performance, and enabling (natural, infrastructural, and institutional) conditions for agriculture. This spatial diagnostic used data on the enormous diversity of prevailing conditions to identify areas that appeared more or less likely to benefit in the near term from the types of support envisioned under the F2C2 Program. The third activity was a review of international experience in accelerating the clustering and/or consolidation of agricultural production and agro-enterprise development. The review focused heavily on developments and interventions in other countries, especially Asian countries with a legacy agrarian structure similar to that of the Philippines. The review drew on a range of academic and country studies as well as reports and projects prepared/co-financed by the Food and Agriculture Organization of the United Nations (FAO) and the World Bank Group.⁹

⁸ As originally designed, some of the research for this report would consist of case studies in as many as six local areas where agriculture is deemed to have medium to high transformative potential. The case studies would have looked at patterns and approaches related to agricultural consolidation or clustering as well as the efficacy of efforts to strengthen connectivity between producers and markets and to improve coordination among government programs. The Covid19 pandemic and restrictions on travel and in-person meetings prevented the fieldwork and consultation required for those case studies.

⁹ Parallel work was undertaken to examine public expenditures on farm-to-market roads in the Philippines; the results appear in a separate forthcoming report.

Structure of the Report

This report has five chapters. Chapter 2 reviews recent policy developments and some current priorities of the DA. Chapter 3 describes the spatial analysis, highlighting the differences in agriculture's transformative potential in different regions of the country. Given that spatial strategies are a relatively new departure in Philippine agriculture, Chapter 4 draws on experience at the national and subnational levels of other Asian countries (and sometimes beyond) to derive positive (and sometimes cautionary) lessons for implementing them in the Philippines. The chapter covers a broad range of topics under three headings: (1) consolidating smallholder-based agriculture, (2) formalizing linkages between smallholders and markets, and (3) supporting agricultural, peri-urban, and agro-industrial clusters. Chapter 5 provides recommendations focusing on different timeframes and on actions at different levels of organization—the DA and LGUs. It sketches out an Operational Framework based on six strategies to help guide, coordinate, and manage the use of spatial strategies to accelerate transformation in the agriculture and fisheries sectors. The framework builds upon the broad strategic approach recently outlined by the Secretary of Agriculture and on a number of initiatives that the DA is already pursuing in collaboration with LGUs and other service providers.

2

Toward a Sustainable Agri-Food System: Operational Priorities and Approaches



Chapter 2. Toward a Sustainable Agri-Food System: Operational Priorities and Approaches

Key Messages

Passage of the Rice Tariffication Law in 2019 overturned decades of policies and programs that pursued self-sufficiency in rice. These reforms paved the way for government to address the long-overdue transformation and accelerated growth needed in the agriculture and fisheries sectors, underpinned by more efficient and diversified production systems.

At the same time, the reforms and increased competition brought lower prices that threaten the viability of many small-scale rice farms. Many producers and fishers operating at marginally viable levels could achieve greater efficiencies, however, by coming together to participate in larger, more modern, business-oriented operations.

The need for more clustering, consolidation, and vertical integration of farming and fishery systems was embedded in the 1997 Agriculture and Fisheries Modernization Act, yet only now is a “whole of government” concerted approach being proposed. It will be coordinated through an overarching Clustering and Consolidation Framework designed to provide a holistic and sustainable policy approach for transforming the Philippine agri-food system.

Strategic Operational Policy Priorities

With passage of the Rice Tariffication Law (Republic Act 11023) in February 2019 and the DA-NEDA-DBM Joint Memorandum Circular No. 01-2019, the Government of the Philippines liberalized the rice import market. The law removed quantitative restrictions on rice imports in favor of a minimum customs tariff of 35% and allowed private rice traders to import rice. This action removed the National Food Authority monopoly on rice imports and its loss-making business model, which subsidized rice for consumers. At the same time, the new import tariff regime is generating more revenue for the government through import taxes. After initial fluctuations, rice prices have stabilized, and the availability of different types of rice has reportedly expanded in local markets. Rice supplies have remained stable throughout the pandemic, despite widespread logistical and other disruptions. The move away from rice self-sufficiency to a more open and competitive market environment has also paved the way for the government to address the long-overdue transformation and accelerated growth needed in Philippine agriculture by promoting the emergence of more efficient and diversified production systems.

The Rice Tariffication Law has created the foundation for a transformative new dynamic in Philippine agriculture, but it has also exposed the vulnerability of many small-scale rice farmers, whose operations are not sufficiently productive to compete in this new environment. Increased rice imports inevitably reduced rice producer prices, undermining the viability of many small-scale rice farms, particularly on land with an insecure water supply or in upland areas where rice yields are low.

To compensate rice farmers for the immediate impact of the Rice Tariffication Law, the government is implementing targeted assistance packages. It has provided 600,000 rice farmers with cash assistance of PHP 5,000 per farmer and extended subsidized credit of up to PHP 15,000 per hectare (ha) to approximately 140,400 rice farmers. A Rice Competitiveness Enhancement Fund (PHP 10 billion per year,

to be allocated over six years) is designed to finance farmer assistance for farm mechanization (PHP 5 billion), hybrid seed (PHP 3 billion), subsidized credit (PHP 1 billion), and training (PHP 1 billion). Financial assistance is further enhanced by the National Rice Program (a DA banner program supporting rice production, amounting to about PHP 7 billion per year over 2014–21) and Rice Resiliency Program (PHP 8.5 billion to distribute seed and fertilizer in response to the pandemic).¹⁰ Collectively, these rice-focused funds and the SURE Aid lending program¹¹ for rice producers constitute about 52% of the 2020 DA budget.¹² The government is also completing the Registry System for Basic Sectors in Agriculture (which serves, among other things, to deliver targeted assistance to producers), a Philippine Rice Industry Roadmap, and a study to determine appropriate National Food Authority buffer stock levels.

Beyond the immediate needs of small-scale rice producers, flagging productivity and competitiveness are longstanding issues for the full spectrum of small-scale farmers and fishers. Underlying factors stem largely from the structure of production in Philippine agriculture and fisheries, which is dominated by small-scale farmers and fishers who operate independently and for the most part use traditional production practices. Vulnerability to adverse weather—increasingly frequent and violent typhoons, floods, and droughts—complicates the choice of crops and farm and fishery practices. Average farm size declined from 3 ha per family per holding in the 1980s to only 0.9 ha per family per holding in 2012. These increasingly smaller farms are often split into more fragmented blocks. The country has some 5.56 million farms, totaling 7.2 million hectares, of which more than half (57%) are 1 ha or less, 32% are 1–3 ha, 9% are 3–7 ha, and only 2% are 7 ha or larger. The uptake of technology, including mechanization, has been limited, although much technology is readily available. Similarly, the vast majority of fishers have small boats and use traditional methods that limit their activities to calm and partially calm waters within municipal boundaries. Farming is not attracting young people who have other options. A DA survey found that the average age of farmers declined from the mid-40s during the 1980s to around 60 years in 2017.

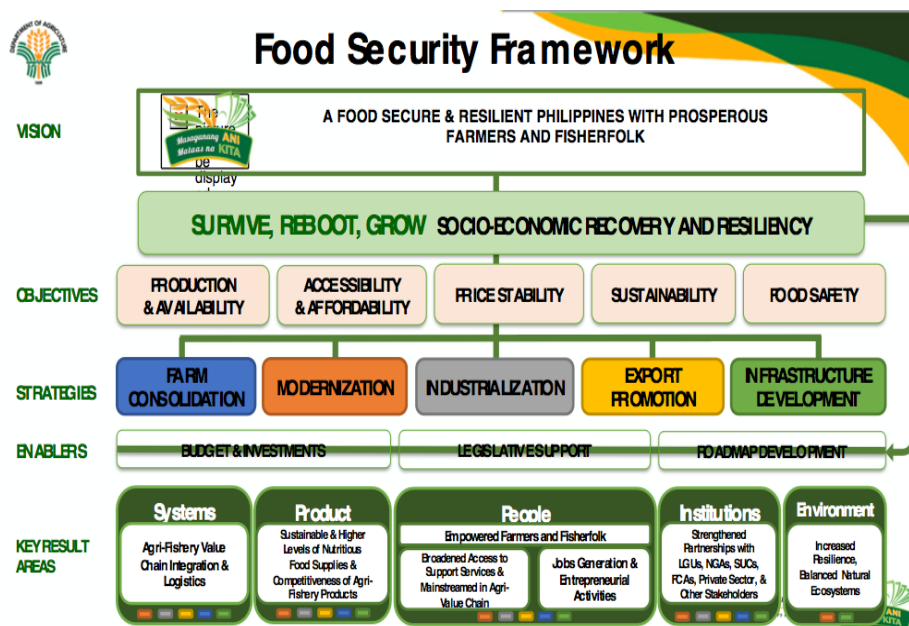
Against this background, and with the renewed imperative to achieve a secure, sustainable agri-fishery food system following the pandemic, the DA has embarked on new initiatives to transform Philippine agriculture and fisheries into dynamic, high-growth sectors. Leaving the commodity and supply-driven efforts of the past behind, the new initiatives focus on food production, accessibility, affordability, and safety. Legacy policies that promoted rice-self-sufficiency are being reoriented to promote food security through more efficient use of scarce resources, more focused interventions in the rice sector, and diversification into high-value crops, especially in marginal rice lands. This holistic and demand-driven orientation, illustrated in Figure 3, emphasizes **farm clustering** (to achieve economies of scale in production), **modernization** (adopting updated technologies and diversifying production), **industrialization** (taking a “whole of supply chain” approach), **export promotion**, and **infrastructure development** to improve productivity and market connectivity.

¹⁰ The Covid-19 stimulus package was used to procure and distribute fertilizer to rice farmers.

¹¹ The SURE Aid Program assists rice farmers whose incomes were affected by the drop in the farm-gate price of palay (paddy) through a one-time loan of PHP 15,000 for rice farmers with 1 ha or less at 0% interest rate payable over eight years. A PHP 1.5 billion fund has been provided by the DA Agricultural Credit Policy Council and is administered by the LANDBANK.

¹² Fermin D. Adriano, Lourdes S. Adriano, and Karlo S. Adriano (2021), “Philippine Rice Tariffication Law—A year and a half later: Challenges and Opportunities.

Figure 3: Holistic and demand-driven approach to food security



Source: DA.

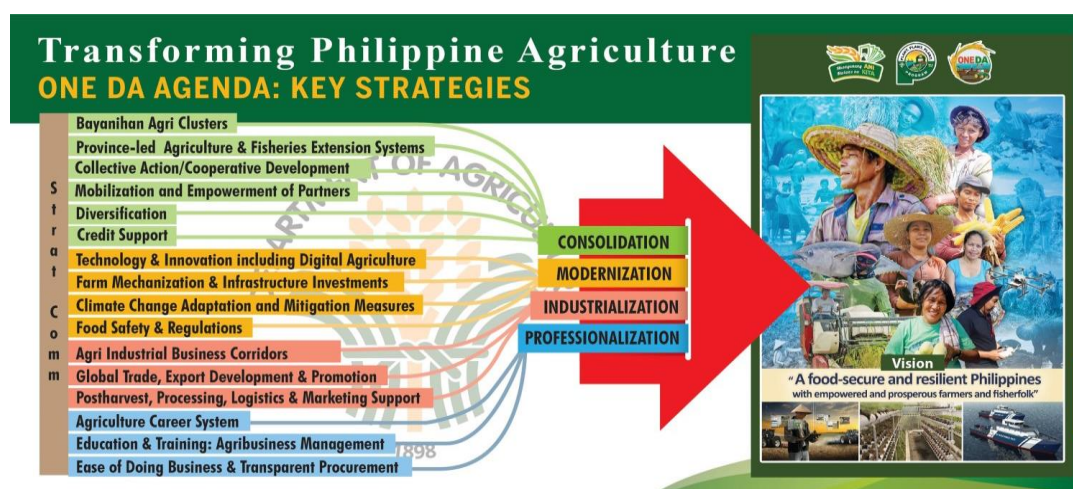
An initial step in this reorientation is the **F2C2 (Farm and Fisheries Clustering and Consolidation) Program**. As discussed in Chapter 1, F2C2 is the government’s proposed framework for Clustering and Consolidation, laid out in AO27. This program also known as the Bayanihan Agri Cluster (BAC) program, provides the mechanism—the proposed Clustering and Consolidation Framework—for implementing strategies and processes that will lead to economies of scale and cost-efficient production, harvest, processing, and marketing operations; raise the incomes of producers; and transform agriculture and fisheries into dynamic, high-growth sectors. While the F2C2/BAC Program specifically addresses the issues faced by rice farmers, it also seeks to address structural weaknesses that have constrained the modernization and industrial transformation of agriculture and fisheries more generally.

The next step is to fully develop a framework for operationalizing the proposed Clustering and Consolidation Framework in a coordinated, focused way. Figure 4 shows the approaches that the DA is pursuing to accelerate transformation: farmer clustering and empowerment; technological, climate-proofing, and regulatory enhancements; value-chain strengthening and market linkages; and the longer-term goals of professionalizing agribusiness management and career development. What is lacking is an overarching framework to guide and channel these multiple approaches and functions in a coordinated and manageable way, with medium- and long-terms targets, incentives, and accountabilities clearly defined.

The World Bank has supported these steps toward transformational change. A World Bank Development Policy Loan (DPL) (Report No. PGD96) includes a trigger requiring that “government adopts an operational framework for encouraging rice farmers to diversify to higher-value commodities.” The World Bank has provided technical assistance to develop an Operational Framework for clustering farmers and consolidating production to build economies of scale, along with diversification into higher-value commodities. This report is the outcome of a collaborative effort by the World Bank and DA to provide DA Management with a suggested way forward: a holistic, operationally implementable framework to

bring about a more secure and resilient national food supply system. Ultimately the framework is to be formalized and operationalized through the issuance of a follow-on Administrative Order on “The Integration of the “One DA Agenda” Key Strategies toward transformative agriculture and fishery sector”. This new AO is being designed to guide and sustain the transformation process across government administrations at all levels, while also meeting the DPL requirements.

Figure 4: DA approaches and initiatives to bring about the modernization and industrialization of the agriculture and fisheries sectors



Source: DA

Operational Approaches, Lessons, and Options

At the outset, it should be recognized that the F2C2/BAC goal of clustering farmers and fishers is not new for the Philippines. The 1997 Agriculture and Fisheries Modernization Act (AFMA- RA8435) called for “the horizontal and vertical integration, consolidation, and expansion of agriculture and fisheries activities, groups, functions and other services through the organization of cooperatives, associations, corporations, nucleus estates, and consolidated farms to benefit from economies of scale.” Clustering and consolidation have not been a central focus of government programs, although many examples of clustering farmers and consolidating production exist in the Philippines. Individual initiatives have established farmer clusters, associations, and cooperatives, in addition to forming larger enterprises involving associations, cooperatives, and contract farming (in Mindanao for pineapple and banana, for example).

A notable exception to these smaller, individual initiatives is the Philippine Rural Development Project (PRDP), which focuses specifically on clustering farmers into enterprises and promoting a business-oriented approach to farming and fishing. The project also provides infrastructure to support these objectives, such as farm-to-market roads and post-harvest facilities (cold storage). The DA, especially the DA Regional Field Offices (DA-RFOs) and LGUs, have gained considerable experience and capacity through implementing the project country-wide since 2014. With PRDP support, some 432 enterprise subprojects have been completed, while another 203 are in process. To this point, these subprojects have benefited

76,857 proponent group members and have included support to start or expand micro, small, and medium-scale enterprises. Subproject investments span a wide array of entrepreneurial activities related to agriculture, livestock, and fisheries, ranging from production (fish, shellfish, seaweed, milk, onions, coconuts, and others) to machinery hire and intermediate processing (abaca fiber, seaweed, cacao, coffee) and the end-product segments of the value chain (geo-nets, coconut coir matting, dried/smoked fish, cheese, other preserved products, chocolate). Real household income of subproject participants increased by an average of 113%. Box 1 describes how a small farmer cooperative transformed its technological and entrepreneurial capabilities, expanded its activities and membership, and realized significantly more income through PRDP support.¹³

Box 1: Multiservice cooperative diversifying from corn to peanut production

Starting in 2016, 92 of the 510 farmers belonging to the Buenavista Multi-Purpose Cooperative in Isabela, Philippines decided to begin growing peanuts. After a year of operation, the cooperative collectively decided to reduce its corn production area and increase its peanut production area from 50 ha to 140 ha. Peanuts had proven to be more profitable due to expanding markets and greater resilience to climate risks and natural disasters. With plans for further expansion, the cooperative sought the assistance of DA/PRDP to upgrade its peanut production and marketing enterprise. The cooperative received mechanization and equipment upgrades; input, procurement, marketing, and post-production support; and infrastructure upgrades. These interventions transformed the group's peanut farmers into agri-entrepreneurs with improved business sense. The group saw their farm input costs lowered by bulk buying. Cooperative membership jumped from 510 to 700 and counting. With multiple equipment upgrades and expanded mechanization, the cooperative also realized new income streams by offering hauling and mechanized land preparation services to non-members. The expanding enterprise opened employment opportunities for qualified cooperative members. Based on the success of their expanded peanut production through PRDP, the cooperative believes that it is viable to establish its own processing center to further expand services offered to local farmers.

Though PRDP, the DA has institutionalized a process to support connectivity and leverage resources (convergence) between programs of different government agencies, LGUs, and the private sector. The PRDP supported the development of Provincial Commodity Investment Plans (PCIPs). This process, now mainstreamed across all provinces, involves collaborative DA-LGU planning for programming, technical, and investment support. These provincial investment plans provide a solid collaborative and technical underpinning for enterprise clustering and consolidation to transform agriculture and fisheries. They also provide a platform for supporting key infrastructure investments to catalyze further development in the agriculture and fisheries sectors, such as farm-to-market roads, post-harvest facilities, fish landings, or private sector investment in Agri-Business Centers/Corridors (ABCs). The process of developing PCIPs involves the prioritization of technical services, clustering/enterprise development, and investments to support the commodities that have been shown to be most suited to the region/province. A “commodity system” approach is promoted to encompass all segments of a commodity value chain, taking account of opportunities for clustering and consolidation through ABCs (building, for example, on the Clark City Agro-Industrial Business Center model, or the Agro-Industrial Hub for Freshwater Aquaculture and Urban Farming in Taguig City). The PCIP process also uses a series of tools to assess the suitability and enhance the targeting of interventions: climate and other risk assessment, integrated spatial development planning, biodiversity assessment, and early social and environmental safeguards screening. The PCIPs

¹³ The recent Interim Implementation Completion Report for PRDP (Report No. ICR5496) highlights the need to further analyze the factors contributing to productivity increases realized through the project.

are updated on a three-year rolling basis and are the starting point for planning and budgeting the programs of all DA bureaus and units. Under recently enhanced PCIP planning processes, Regional Commodity Investment Plans will also be formulated to provide for connectivity between PCIPs. These regional plans will in turn be used to inform the National Agriculture and Fisheries Modernization and Industrialization Planning process.

Two other DA initiatives are also important and reinforce the “learning-through-doing” approach that will be needed to underpin and sustain the transformation process. The first initiative involves the Bureau of Fisheries and Aquatic Resources (BFAR), which is shifting away from the management of fishing grounds and moving toward an ecosystem approach to managing fisheries and other aquatic resources in 12 designated natural Fishery Management Areas.¹⁴ This significant reorientation of BFAR, coupled with an increased emphasis on transformative processes in aquaculture development in the Philippines (see Box 2 for an example of business-oriented consolidation), will require greater involvement of LGUs and stakeholders and the provision of technical services in line with the proposed Clustering and Consolidation Framework.

Box 2: Expanding tilapia enterprise through productive alliances

The RAMCOR Farmers Multi-Purpose Cooperative from Isabela, Philippines, established in 2012, is an experienced cooperative implementing agriculture and fishery-based projects. Under a subproject supported by DA-PRDP, the cooperative established a tilapia production and marketing enterprise in 2018. Through formal supply agreements, the enterprise bought and consolidated live tilapia from members and non-members at competitive prices and then sold the fish through marketing agreements with established markets—a business model found to be sustainable for all parties. In this way, small-scale tilapia producers tapped into opportunities to reach larger consumer markets. The supply agreements included practical incentives such as “grow now, pay later” arrangements for fish production and free hauling services to boost enterprise support. The enterprise received production (fingerlings and aquaculture kits), procurement and marketing (hauling trucks and transport equipment), and infrastructure (warehouse) support from PRDP. At the start of the enterprise, the cooperative had 757 members, which grew to 876 after implementation. The enterprise was recognized throughout the area for promoting sustainable production practices and supporting local aquaculture. It was also credited with creating jobs, broadening marketing opportunities for tilapia, and increasing the income of participating farmers. Beneficiaries reported positive social impacts as well. With increased incomes, families were able to send children to school and experience better living standards. Armed with a proven profitable business model and enhanced technical and financial knowledge, the cooperative is encouraged to expand yet again by establishing its own feed mill for tilapia and venturing into tilapia processing.

A second important initiative is the establishment of the Provincial Agricultural and Fishery Extension Service (PAFES). Through PAFES, the long-overdue development and provision of integrated, coordinated agriculture and fishery extension services at the provincial LGU level should become a reality. Local delivery of these services was mandated in the Local Government Code (1991) and reiterated in the 1997 Agriculture and Fisheries Modernization Act, but LGUs previously lacked resources to deliver them. Beginning in 2021, each DA-RFO is piloting the establishment of PAFES in one province; the selection of that province is based on capacity, interest, and governance, as well as the presence of a State University or College (SUC) with a strong program in agriculture or fisheries. PAFES is seen as the precursor to

¹⁴ Fisheries Administrative Order No. 263; Series of 2019 FAO 263 provides for the implementation by DA-BFAR of Republic Act 10654 -1989 (Amended Fisheries Code). This order requires fisheries and aquatic resources to be managed in accordance with an ecosystem approach to fishery and integrated coastal area management in specific natural Fishery Management Areas.

Collaborative Agriculture and Fisheries Extension Programs (CAFEPs) which are to be rolled out country-wide from 2022, enabled through the provision of additional resources to LGUs as a result of the 2019 Mandanas ruling of the Supreme Court.¹⁵ PAFES is being rolled out following a learning-through-doing approach, with the goal of integrating, coordinating, and strengthening the various service delivery systems now operating, albeit with each agency currently pursuing its own mandates and extension delivery programs for farmers and fisherfolk.

Department of Agriculture’s Proposed Clustering and Consolidation Framework

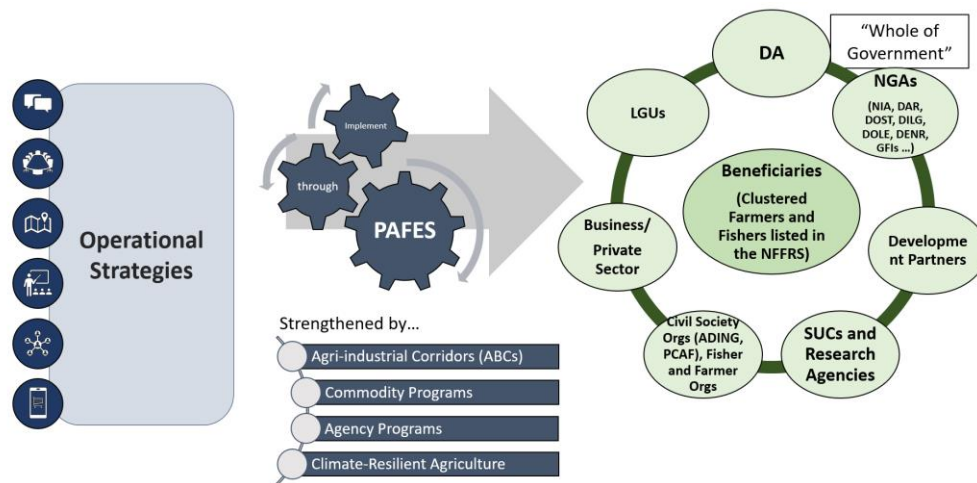
AO27 defines the following goals that must be achieved to transform the Philippine agriculture and fisheries sectors: (1) bring about economies of scale; (2) achieve better access to markets, financing, and investments for agriculture, livestock, and fisheries producers and business ventures; (3) strengthen farmers’ and fishers’ contributions to the national economy; and (4) accelerate agricultural growth and rural development.

The DA’s proposed Clustering and Consolidation Framework builds on this vision. It embodies multiple, mutually reinforcing approaches described in the literature to support farmers and fishers in rethinking and reconfiguring their individual farming and fishery operations to enhance efficiencies and economies of scale in the face of increased competition: (1) consolidating farming and farmers; (2) clustering for specialized production and agri-aqua-processing; (3) enhancing connectivity to overcome logistical and other bottlenecks preventing effective links between production and markets; and (4) improving the coordination and targeted delivery of public agricultural services. The proposed AO defining the “One DA Agenda” currently under preparation is being designed to reinforce these approaches.

The Clustering and Consolidation Framework will be implemented through a “whole of government” approach. As shown in Figure 5, apart from the DA, which will spearhead implementation of the framework through PAFES/ CAFEPs, other key partners include various national government agencies, LGUs, SUCs, research institutions, private sector interests, and civil society. As PAFES evolves and CAFEPs become established, it will increasingly become the main vehicle for providing the technical support required to establish viable, sustainable enterprises at the scale needed to meet the AO27 goals.

¹⁵ Subnational governments filed a motion with the court asserting that the national government had not correctly calculated their share of national tax revenue allocated to LGUs (Internal Revenue Allotment). In 2019, the court ruled in favor of the LGUs, and the new basis for calculating IRA will take effect in 2022.

Figure 5: Implementation of the Clustering and Consolidation Framework through PAFES/ CAFEPs



Critical steps remain to be taken to build sustained momentum for transformation across government administrations and programs. Experience with the Mindanao Rural Development Program (MRPDI &II), which laid the groundwork for the PRDP, demonstrates that institutionalization and support for “new ways of doing business” work best when those at the operational level are convinced of the benefits. Accordingly, one critical next step is the institutionalization of the Clustering and Consolidation Framework. The Clustering and Consolidation Framework must be underpinned by guidelines and key strategies (such as those suggested in Chapter 5) for delivering consistent and synergistic support across programs and levels of government. Issuance of the proposed AO defining the “One DA Agenda” and accompanying strategies will be important steps in consolidating and sustaining the transformation processes for the agriculture and fishery sectors, while also serving as a trigger for disbursement of the DPL. A second critical step is “proof of concept” demonstrations of the benefits of clustering at the field level. This step will require active follow-up and dissemination of the results of Secretary Dar’s instruction to each DA-RFO to “to identify at least two F2C2 clusters, and show that it can be done successfully and profitably.” It would be useful to draw upon findings in Chapter 3 on the considerable spatial variability of the Philippines, with a view to having RFOs identify a range of clustering approaches and opportunities suited to their areas, to further inform the operational strategies of the Clustering and Consolidation Framework.

Summary

Reforms introduced with the Rice Tariffication Law in 2019 have paved the way for government to address the long-overdue transformation and accelerated growth needed in the agriculture and fisheries sectors through more efficient and diversified production systems. AO27, establishing the Farmer and Fisher Clustering and Consolidation Framework, provides the basis for expanding and accelerating this process. The long overdue Provincial Agricultural and Fishery Extension Service (PAFES) is also being established, while the fisheries sector is placing much greater emphasis on expanding more business-oriented and technically intensive aquaculture to address declining fish stocks in municipal waters. The DA and LGUs have also accumulated substantial experience with clustering and consolidation through their support for enterprise development. This experience is a solid base from which to build more wide-scale and larger clustering and consolidation initiatives.

To guide the overall process, there is a need for a clearly enunciated, overarching Clustering and Consolidation Framework, underpinned by a formal instrument that provides the guidelines and key strategies for delivering consistent and synergistic support across programs and levels of government. Issuance of the proposed AO defining the “One DA Agenda” is seen as an important step in consolidating and sustaining this transformative process.

National Spatial Diagnostic of the Potential for Transformative Agricultural Change



Chapter 3. National Spatial Diagnostic of the Potential for Transformative Agricultural Change

Key Messages

The spatial diagnostic identifies the phase of agricultural development for each region of the Philippines, placing it at the *Beginning*, *Rising Surplus*, *Integrating*, or *Industrialized* agriculture phase. The diagnostic also evaluates whether a region's pace of transformation (its movement toward the next phase of development) is *Emerging*, *Intermediate*, or *Dynamic* (relatively high). The spatial diagnostic is based on indicators related to the current state of agriculture, physical environment and natural resource base, demographic factors, and level of infrastructure development. Results of this analysis provide input into policies to promote more regionally tailored strategic approaches to agricultural development. The main findings include:

- **Development phase.** The agricultural regions that are at the *Beginning* phase are BARMM and Cagayan Valley. In the *Rising Surplus* phase are the Cordillera Administrative Region (CAR), Zamboanga Peninsula, SOCCSKSARGEN, Eastern Visayas, and Central Visayas. At the *Integrating* phase are Caraga, Northern Mindanao, Davao Region, MIMAROPA, Bicol Region, Western Visayas, Southern Tagalog, Ilocos Region, and Central Luzon.
- **Transformation pace and potential.** The *Dynamic* regions are Regions X, VI, IVA, III, and VII. The *Emerging* regions are Regions II, CAR, IX, VIII. Regions XIII, I, BARMM, XI, IVB, XII, and V are categorized as *Intermediate* in terms of their potential for transformation.

The diagnostic suggests the need for a flexible approach to agricultural development. For Emerging regions, measures that will allow and even accelerate structural change in the economy and the shift of labor into industry and services may be the fastest way to raise incomes. These low potential areas tend to suffer from inherent disadvantages owing to environmental factors (for example, such as vulnerability to typhoons), implying that natural endowments are still a key determinant for transformation potential. Geographic advantage is however no guarantee of reaching a high potential for agricultural development.

Notably, the regions with more advanced agricultural economies are the same ones with greater potential for further transformation. Agriculture in the high-potential regions tends to be near populous metropolitan centers. The prevalence of agro-industrial linkages in high-potential regions suggests that vertical and horizontal coordination are key to a dynamic agriculture.

Framework and Scope of the Assessment

Economic specialization in the agri-food system is driven by spatial characteristics on both the supply and demand sides. At the meso level, farming areas may reconfigure into supply and service clusters to realize advantages from horizontal and vertical coordination. At the macro level, geographic specialization can be explained by natural and historical endowments of different national and subnational regions. Aside from endowments, endogenous differentiation into urban centers and rural peripheries is the foundation of development of an agri-food system. In this system, the periphery becomes a supplier of land-intensive products (for example, food) catering to both domestic urban demand as well as export demand. The entire agri-food system is tied together by a logistics network whose efficiency strongly

affects the smooth functioning of the system. This framework provides a conceptual underpinning for the subsequent discussion of macro-level programming in this chapter (for details, see Annex 1).

The national spatial diagnostic of the potential for transformative agricultural change involves the analysis of spatially disaggregated data highlighting the current organization, recent performance, future vulnerability, and future transformative potential for Philippine agriculture. Drawing on existing datasets and spatial analysis, the diagnostic looks at patterns and evolution of the country's farm and agrarian structure, agricultural productivity, land use, competition of agriculture for land and other resources, development of specialized production zones, risks and vulnerability from natural hazards and climate change, demographic and labor market developments, investments in agri-food processing and agricultural market infrastructure, additional factors related to agri-food logistics, changing dietary and food expenditure patterns, and a variety of institutional and regulatory matters pertaining to Clustering, Consolidation, Connectivity, and Coordination.

In addition to providing a spatially disaggregated picture of important aspects of the Philippine agri-food system, the physical, institutional, and socio-economic data are used to classify different areas within the country by their potential for transformative agricultural change. This classification differs from the common classification of agricultural areas based on the potential productivity of individual crops or animals and prevailing agro-ecological conditions, such as soil quality, weather patterns, and climate. Instead, it is based on a more holistic approach that encompasses physical, socio-economic, institutional, and other factors and considers the multidimensional nature of agricultural transformation.

A scoring method is developed to define and rank the overall transformative potential of each geographic location based on an assessment of its strengths and weaknesses with respect to a set of selected characteristics, such as agroclimatic conditions, logistical "distance" from major markets, the business enabling environment, security, and presence of institutions for collective action. The framework makes it possible to identify the regions classified as having "high," "medium," or "low" potential for transformative agricultural change. The last part of this chapter draws out the policy implications of these results for public expenditure programs, land use zoning, and physical infrastructure planning.

Temporal and Spatial Dimensions of Agricultural Transformation

The wider context of agricultural transformation is *structural change*, characterized by a rising share of industry and services in both economic output and employment as the share of agriculture declines.

As discussed previously in World Bank (2020), the first element of agricultural transformation relates agriculture to the other economic sectors, namely industry and services. Well-known explanations of structural change draw on dual economy-type models which divide an economy into a traditional and modern sector, with the development process being driven by interactions between the two sectors (Lewis 1954). In the Ranis-Fei (1961) version, the traditional sector is associated with agricultural activity, low dependence on capital, and employment of considerable quantities of surplus labor, that is, labor that can be withdrawn out of agriculture with negligible losses in agricultural output. The modern sector is associated with industrial activity, capital accumulation, and scarce labor. Development involves a process of capital accumulation in industry and its accompanying absorption of surplus labor and food from agriculture.

Transformation of agriculture is inextricably linked to agriculture's interactions with other sectors. The transfer of labor by itself raises labor productivity in agriculture. Technical progress in agriculture is an additional, arguably an essential driver of agricultural transformation, facilitating industrial development by making food more affordable. Empirically, economic historians have pointed out that the Industrial Revolution was itself accompanied (or even preceded) by transformation of agriculture itself (Chambers and Mingay 1966). Productivity growth in agriculture is caused not only by a simple reallocation of labor; it is typically driven as well by technical progress and diversification, that is, from traditional subsistence activities to higher-value commercial activities (Briones and Felipe 2013).

Based on these interactions, agricultural transformation proceeds over a succession of phases as described in Timmer (1988). At the **Beginning** phase, agriculture is characterized overall by low productivity, low surplus, and a subsistence orientation. Agriculture tends to be a dominant share of the economy and employment. Next is the **Rising surplus** stage, where agriculture becomes increasingly commercialized, and more agricultural activity emerges as a result of geographic factors, for example, the presence of resources or proximity to the urban zone. Agriculture's share in output and employment declines. The **Integrating phase** intensifies market linkages developed in the Rising surplus stage; agriculture becomes more evidently transformed as it diversifies out of traditional staples and expands the adoption of modern technologies, even as the sector itself becomes a minor contributor of output and even employment. As the Integrating phase reaches maturity, agriculture is fully **Industrialized** and behaves just like other manufacturing or service sectors of the economy.

As for the *pace* of transformation (Emerging, Intermediate, or Dynamic), agriculture may linger in the Beginning phase, but the pace may pick up as it transitions to the Rising surplus and Integrating phase. These next two phases may be characterized by a more rapid rate of transformation. The Industrialized phase resumes the more static pace. Note however that the Rising and Integrating phases are not necessarily dynamic, nor does agriculture need to remain forever trapped at the Beginning phase. The dynamic impetus of agriculture depends on the pace at which new investments are being made in the sector and at which new technologies are being adopted.

Whereas Timmer applies these phases to agriculture as a whole, it is certainly not the case that each agricultural region of a country develops uniformly; development is rather uneven, with some regions at more advanced phases, or transforming at a faster pace, compared to other regions. Two key clarifications are needed to contextualize the spatial diagnostic presented here. First, the classification of an agricultural region as *Emerging* or Low potential is not a once-for-all designation but rather an outlook for the short to medium term. Second, the classification of a region as Intermediate does not imply absence of overall structural change of the regional economy. As discussed later, structural change in that region may proceed by simple transfer of surplus labor from agricultural to non-agricultural activities. Non-agricultural labor need not depend on increased productivity of local agriculture, as this groups of workers can obtain food from agricultural supply produced outside the region. Eventually labor productivity of agriculture in the region may rise through sheer structural change, rather than the internal transformation of agriculture.

The Spatial Diagnostic Tool

Unit and scope of assessment

Owing to limitations of data, and to keep the discussion manageable, the basic unit of assessment of the spatial diagnostic is the *region*; as data permits, the diagnostic for the region may be further elaborated at the subregional level (that is, selected provinces). The scope of the assessment is to identify both the nature of potential transformation (along the phase trajectory) as well as the likelihood of transformation (in terms of whether the likelihood of a Dynamic pace is Low, Medium, or High). Note that throughout the assessment, the National Capital Region (NCR) is omitted outright, although NCR data may be included in the assessment for the purpose of analysis.

Elements of the diagnostic tool

Elements of the diagnostic tool are grouped under four headings (Table 3): State of agriculture, Physical environment and natural resource base, Demographic factors, and 4) Level of infrastructure development.

Table 3: Elements of the diagnostic tool

State of agriculture	Physical environment	Demographic factors	Infrastructure development
<ul style="list-style-type: none">•Economic structure•Growth, productivity•Diversification	<ul style="list-style-type: none">•Land•Water•Aquatic•Climate	<ul style="list-style-type: none">•Population density•Urbanization•Human resources• Organization	<ul style="list-style-type: none">•Access•Water•Power•Telecoms

Under **State of agriculture**, elements cover economic structure, growth and productivity, as well as agricultural diversity.

- **Economic structure** is an indicator of the degree of overall transformation: indicators of structural change are the following: (1)share of agricultural gross value added (GVA) in gross regional domestic product (GRDP); change in share over time; and (2) share of agriculture in employment; change in share over time.
- **Growth** is measured by changes over time in agricultural GVA, while the measure of **productivity** is agricultural GVA per agricultural worker. Assessment will be based on trends in productivity, and comparison of agricultural productivity to GRDP per worker at the regional level.
- **Diversification** is the trend in composition of agricultural output, as measured by shares of major commodities or commodity groups, in value of agricultural output. The index of diversification is explained in Box 4.

Under **Physical environment**, elements cover land resources, coastal or marine resources, and climate conditions.

- **Land resources** are measured not only by area but also by terrain. In the Philippines, only land below 18 degrees slope may be declared as alienable and disposable (A&D) land, according to PD 705;

hence a region with a smaller share of A&D land in total area will tend to have a greater share of upland area or fairly rough terrain.

- **Water resources** are primarily in the form of freshwater, for which estimates at the regional level are available. Regions with abundant freshwater resources typically have large river basins and/or lakes.
- More generally, **aquatic resources** refer to living things in both marine and freshwater environments, such as fish, seafood, seaweeds, as well as the associated ecosystem services of the aquatic environment. As data on length of the regional coastline are not readily available, coastal resources can be inferred from the quantity of municipal fisheries production.
- A **climate** that is suitable for tropical agriculture generally involves fairly even rainfall and temperature year-round. In the Philippines, suitability for tropical agriculture requires another criterion: low vulnerability to weather extremes, namely typhoons, floods, and droughts.

Under **Demographic factors**, the relevant indicators are:

- **Population density**—greater population density tends to negatively affect an agricultural economy.
- **Urbanization**—a greater share of urban population in total population increases market size and promotes agricultural transformation.
- **Human resources**—pertain to socio-economic indicators. This analysis uses net enrollment rate and percentage of barangays with cooperatives/farmer organizations that offer trainings (“index of organizations” for short).

Under **State of infrastructure**, in general the better the state of infrastructure, the more conducive to structural transformation.

- **Access infrastructure**—relevant indicators are road density and number of seaports. Unfortunately, road density data are available only for national roads as identified by Department of Public Works and Highways, which excludes FMRs. In fact, there is currently no comprehensive nationwide inventory of FMRs, although one is being developed by the DA Bureau of Agriculture and Fishery Engineering (Box 3). Ideally, once the inventory is completed, FMR density could also be included as an indicator of access infrastructure in future spatial analyses of this kind. In the meantime, a rapid diagnostic review of public expenditure on FMRs was carried to derive lessons for the future, in the context of the devolution of responsibilities for FMR development as a result of the Mandanas ruling of the Supreme Court.¹⁶
- **Water infrastructure**—is assessed using size of irrigated service area.
- **Power infrastructure**—the energization rate is used as the indicator.
- **Telecoms**—is measured by the number of information economy establishments.

¹⁶ World Bank (2021), “Mandanas Ruling and Potential Implications for Farm-to-Market Road Development Program: A Public Expenditure Review.”

Box 3: FMRs are an integral part of the strategy to improve connectivity

FMRs provide the “last kilometer” connectivity for bringing inputs to farmers and taking their production to distant markets. The quality and quantity of these roads has a big impact on transport costs for farmers; good roads close to farms lower production costs and raise the prices that farmers get for their products. As part of the government’s “Build, Build, Build” initiative, the DA has accorded FMRs high priority in its strategy to enhance accessibility and trigger economic activity in remote agricultural areas. FMR projects received almost half of all budgeted resources allocated to service programs in FY2020. From 2014 to 2017 (the last year for which data are available), PHP 44.27 billion was allocated for FMRs under the DA program. FMR construction is also a component of special projects. For instance, under locally-funded projects, total constructed FMRs as of 2017 have reached 391.70 kilometers, while foreign-assisted projects have built an estimated 2,072 kilometers as of December 2017.

In a parallel and complementary exercise to this report, the World Bank was requested to conduct a rapid Public Expenditure Review focusing on the Farm-to-Market Road Development Program of the DA (see Annex 2 for key outcomes). While this exercise would be useful under any circumstances, it is especially timely in view of the Mandanas ruling of the Supreme Court, ordering the central government to increase the share of government tax revenue going to the LGUs (the Internal Revenue Allotment) starting in 2022. Since it will be sharing more revenue with the LGUs, the government intends to devolve more responsibilities to them for administering and funding projects and programs. Exactly how devolution might affect FMR development is yet to be precisely defined, and the Public Expenditure Review is intended to help plan this process.

Classification by phase of agricultural transformation

The first step of applying the assessment tool is to identify the current phase of transformation of a regional agricultural economy. Based on the average scores, regions are ranked from lowest to highest and then arranged into three clusters, corresponding to the Beginning, Rising Surplus, and Integrating phases (the Industrialized phase is omitted).

To arrive at average scores, regions were rated based on the following indicators:

- Normalized employment share of agriculture (negative).
- Normalized labor productivity of agriculture (positive).
- Normalized index of diversification of agriculture (positive).

Additionally:

- The expression in parenthesis pertains to the direction of tendency of the indicator toward a more advanced stage of transformation. Normalization involves taking the ratio to the maximum for each indicator (multiplied by 100); for an indicator positively associated with an advanced stage of transformation, the score is this normalized ratio; for one that is negatively associated, the score is 100 less this ratio.
- In the foregoing, “relative labor productivity” refers to the agricultural GVA per worker as a ratio to GRDP per worker; the closer it is to unity, the more similar is worker productivity within agriculture compared to outside agriculture. (The figure may be obtained by dividing output share of agriculture to employment share of agriculture.)
- Note that the indicators proposed are related to degree of structural change, and internal composition of agriculture. Other indicators related to resources, demography, and infrastructure relate rather to the potential for further agricultural transformation.

Classification by near-term potential for agricultural transformation

To classify the potential for transformation as **Low, Medium, and High**, scoring is first done at the level of the major groupings of elements (namely State of agriculture, Natural resources, Demographic factors, and Infrastructure).

State of agriculture—simple average of the following:

- Normalized growth of agricultural GVA (positive).
- Normalized relative agricultural GVA per worker (positive).
- Normalized growth of agricultural GVA per worker (positive).

Natural resources—simple average of the following:

- Normalized share of A&D land in total area score (positive).
- Average of normalized water resources and normalized quantity of municipal fisheries catch (positive).
- Normalized climate suitability index (positive).

Demographic factors:

- Normalized population density (negative).
- Normalized urbanization rate (positive).
- Normalized net enrollment rate (positive).
- Normalized index of farmers' organization.

Infrastructure—simple average of the following:

- Average of normalized road density and distance index (see Box 4; positive).
- Average of normalized irrigated area share of potential (positive).
- Normalized energization rate (positive).
- Normalized number of information economy establishments (positive).

Box 4: Diversification index and indices for the spatial diagnostic

Diversification index. The value of agricultural output is categorized into the four traditional crops (rice, corn, coconut, sugarcane); other crops; livestock; poultry; and fisheries. (Banana is usually classified with “traditional crops,” but export-oriented banana does not fit this rubric, hence the reclassification adopted here.) Shares of traditional, other crops, and non-crops are computed as s_T, s_O, s_N , respectively. The Simpson index equals

$1 - \left[(1 - s_T)^2 + (1 - s_O)^2 + (1 - s_N)^2 \right]$. In general, the closer the value of the Simpson index to unity, the more diversified the composition of agriculture. However, the Simpson index does not incorporate the idea of diversification out of traditional staples. Hence the index of diversification is simply the average of the Simpson index and one less the value shares of rice and corn.

Indices from International Center for Tropical Agriculture (CIAT) study. The climate suitability index is constructed from a study by CIAT, as a simple average of normalized indices for the following: flood risk based on normalized values of DENR-Mines and Geosciences Bureau data on classified flooding risk in each LGU in the country; typhoon incidence based on analysis of typhoon tracks for 40 years; and drought trend based on time series analysis of Palmer Drought Severity Index for the past 30 years.

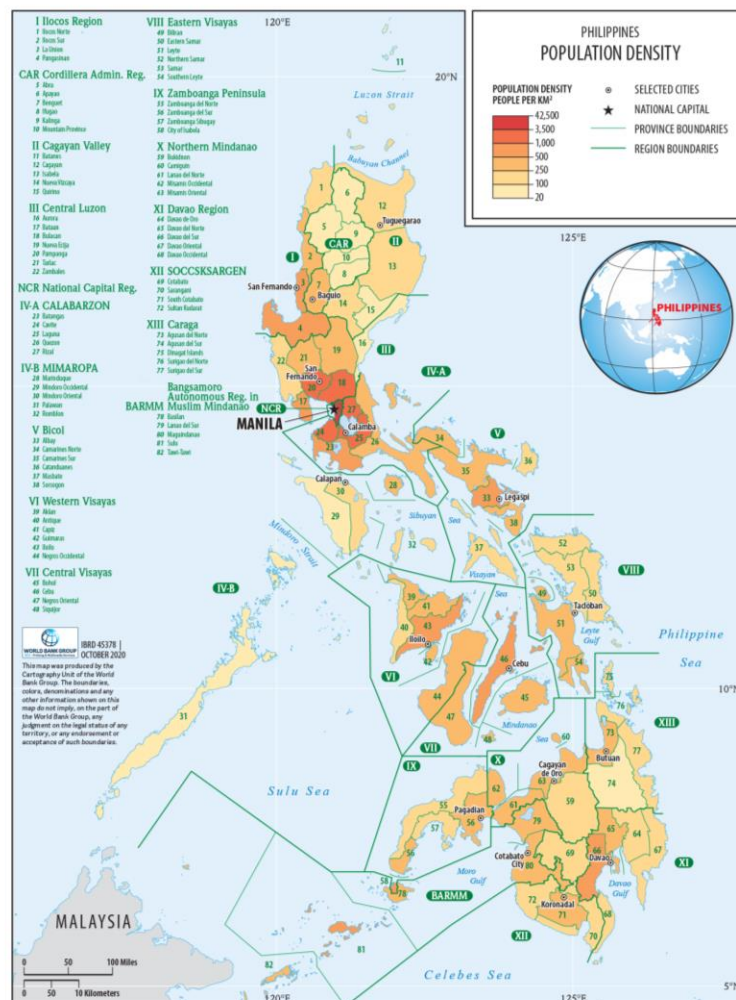
The distance index is the average of LGU travel time to nearest port/city, weighted by population.

The averaging admittedly obscures suspected trade-offs among some of the indicators. The number of information economy establishments is likely related to the degree of structural change in a region (that is, the more service-based a region, the greater the number of information economy establishments). Similarly, greater population density may decrease availability of suitable agricultural land (reducing transformation potential), but it may also be correlated positively with urbanization (increasing urbanization potential). Note though that the correlation is far from perfect, hence the combined indicators will hopefully pick up these opposing influences to transformation.

Results of the Spatial Diagnostic

The Philippines is divided into administrative regions, each of which is divided into provinces (except for NCR). There are 17 regions and 81 provinces in total (Map 1).

Map 1: Administrative regions, provinces, and population density, Philippines



State of agriculture. Based on the share of agriculture in GRDP and employment, every region of the country has been undergoing structural change from 2009 to 2018 (Table 4). The fastest percentage point changes have occurred in Regions XIII, IX, and II. In terms of relative decline (that is, annualized percentage change in percentage share), the changes are even sharper, with Regions XI, IX, and VIII dropping the most. The least relative decline is observed for Regions IV-B and the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM), which have above-average agricultural output shares (with BARMM by far the highest among the regions). In several regions, output has actually fallen in absolute terms, namely CAR, IV-B, VIII, and IX. On the other hand, despite declining share, agricultural output has been increasing, with fastest growth observed in Regions III, X, and IV-A.

Table 4: Share of agricultural GVA in GRDP, current prices, 2009–18 (%)

	2009	2018	Percentage point change	Annualized relative decline	Growth of agriculture GVA, 2000 prices
Philippines	13.1	9.3	-3.8	-5.1	1.3
NCR	0.6	0.2	-0.4	-8.5	-7.9
CAR	12.2	8.6	-3.5	-3.2	-1.1
I	26.6	19.2	-7.4	-5.3	2.0
II	43.9	33.4	-10.5	-3.9	1.4
III	19.5	14.4	-5.1	-2.7	3.4
IV-A	6.8	5.3	-1.5	-4.2	2.1
IV-B	27.4	24.6	-2.8	-0.6	-0.6
V	27.6	21.4	-6.2	-3.5	2.1
VI	29.4	20.2	-9.2	-5.4	0.8
VII	9.5	6.3	-3.1	-4.7	1.5
VIII	22.3	15.9	-6.5	-6.0	-2.0
IX	30.8	19.6	-11.2	-7.7	-1.5
X	28.9	22.6	-6.3	-4.7	2.6
XI	24.3	14.8	-9.4	-8.9	0.2
XII	35.3	25.6	-9.7	-6.8	1.5
XIII	31.4	19.2	-12.2	-4.8	0.8
BARMM	65.5	58.9	-6.6	-2.1	1.4

Source: PSA (2020).

Table 5 examines structural changes based on the indicator of employment share. As with output share, all regions have been undergoing structural change based on employment shares. In fact, the decline has been faster than the output share, as the country's regions have experienced an *absolute* decline in the number of agricultural workers across the board, except for Regions VIII and XIII. Consistent with this finding is the faster annualized relative decline in employment share compared with output share (although Table 4 and Table 5 are not exactly comparable owing to different time periods).

Table 6 examines patterns and trends in agricultural labor productivity, measured by agricultural GVA per worker (in real terms) from 2015 to 2018. Labor productivity in 2018 was lowest in Regions CAR, VIII, and XIII; it has been highest (after NCR) in Regions III, IVA, and X. There is no clear relationship between labor productivity and agricultural growth; if anything, there is a mild tendency for the more productive regions to experience even faster agricultural growth.

Table 5: Share of agricultural workers in total workers, 2015–19 (%)

	2015	2019	Percentage point change	Annualized relative decline	Growth of agricultural employment
Philippines	29.2	22.9	-6.3	-5.9	-3.7
NCR	0.5	0.5	0	0.0	-1.0
CAR	48.1	39.6	-8.5	-4.7	-4.2
I	31.5	25.4	-6.1	-5.2	-4.4
II	54.4	45.9	-8.5	-4.2	-4.6
III	18.2	12.9	-5.3	-8.2	-5.8
IV-A	12.8	7.6	-5.2	-12.2	-7.6
IV-B	44.6	33.5	-11.1	-6.9	-7.9
V	36.7	29.4	-7.3	-5.4	-5.0
VI	36.7	27.9	-8.8	-6.6	-7.1
VII	27.9	20.5	-7.4	-7.4	-7.5
VIII	43.7	32.5	-11.2	-7.1	8.0
IX	44.4	38.6	-5.8	-3.4	-2.1
X	38.2	34.8	-3.4	-2.3	0.6
XI	33.3	29.0	-4.3	-3.4	-1.7
XII	46.1	40.5	-5.6	-3.2	-0.3
XIII	35.3	34.7	-0.6	-0.4	0.8
BARMM	69.4	57.8	-11.6	-4.5	-5.5

Source: PSA (2019)

Table 6: Agricultural GVA per worker, 2015–18 (2000 prices)

	2015	2018	Relative labor productivity, 2018	Growth of agricultural GVA per worker
Philippines	63,728	74,668	0.38	5.4
NCR	198,213	205,412	0.34	1.2
CAR	34,681	38,052	0.21	3.1
I	82,683	95,818	0.72	5.0
II	59,468	66,242	0.70	3.7
III	153,563	192,378	0.99	7.8
IV-A	111,147	141,922	0.60	8.5
IV-B	48,147	62,595	0.69	9.1
V	37,900	47,100	0.69	7.5
VI	51,993	66,265	0.66	8.4
VII	31,715	47,060	0.30	14.1
VIII	57,433	41,373	0.47	-10.4
IX	50,568	50,075	0.46	-0.3
X	85,878	93,848	0.64	3.0
XI	64,376	67,315	0.47	1.5
XII	66,547	70,056	0.62	1.7
XIII	42,729	42,760	0.56	0.0
BARMM	33,684	50,309	0.97	14.3

Source: PSA (2019)

Labor productivity has been rising across the regions over the period (2015–18), except for Regions VIII and Region IX. Labor productivity has increased most rapidly in BARMM, which has undergone the largest percentage point change in agricultural work force among the regions. Other regions with rapid increases in labor productivity are VI, IVB, and IVA.

Table 6 also shows relative labor productivity. Although agricultural labor productivity is highest by far in NCR, that productivity is two-thirds lower than average labor productivity in NCR. Similarly, high disparities are observed in Regions CAR and VII; agricultural labor productivity is less than half that of the average worker in Regions VIII, IX, and XI. Regions III and BARMM have the least divergence between agricultural productivity and average productivity, but for very contrasting reasons; in the former, average productivity is high and agricultural workers are close to the average; in the latter, average productivity is low and agricultural workers are also close to this low average.

Diversification. Table 7 first presents trends in commodity composition of agriculture nationwide (by value of production) from 2010 to 2018. It is concerning that shares of major staples (rice and corn) have been increasing, and likewise sugarcane, a traditional temporary crop. However, shares of coconut, bananas, and “other crops” have been falling. The share of livestock has been rising while the share of fisheries has declined, owing to the decline of marine capture fisheries. The largest relative decline has occurred for fisheries, followed by coconut; the largest relative increase has occurred in poultry and sugarcane.

Table 7: Share in value of production of agriculture by commodity type, 2010–18 (%)

Commodity	2010	2014	2018	Percentage point change
Palay (PAL)	18.1	20.1	19.6	8
Corn (COR)	5.8	6.5	6.3	10
Coconut (COC)	4.3	3.8	3.7	-15
Sugarcane (SUG)	1.9	2.5	2.4	23
Bananas (BAN)	5.3	4.8	4.9	-8
Other crops (OTHC)	14.3	13.8	13.1	-9
Livestock (LV)	16.4	16.2	17.6	7
Poultry (POUL)	13.8	14.6	16.8	22
Fisheries (FISH)	20.0	17.7	15.7	-21

Source: PSA (2019)

Table 8 looks at the regional breakdown of output in 2018. Among the regions, the share of rice in value of output is largest in Region II; animal commodities account for only one-quarter of output in this region, compared to the 43% average for all regions. Only CAR has a lower share of animal products in total output, while that of BARMM is slightly higher. The regions that do have a large share of animal products in total are Regions III, IVA, and VII. Remarkably, in Region III, known as the country’s “rice bowl,” the share of poultry in output far exceeds that of rice. The share of “other crops” is largest for CAR, followed by Region I; nonetheless these two regions have significant shares of rice in total output. If bananas were classified under “other crops,” however, the largest share of “other crops” would be in Davao Region, owing to the role of Cavendish banana for export in the agriculture of the region.

Table 9 presents the percentage point changes in these value shares since 2010. Highlighted in the table are regional changes with a sign that went contrary to the national average. For rice, all regional shares have risen, except Region III and Region XII. The same has occurred for corn, although the exceptions are Regions VII and X. For sugarcane, most of the value shares (where the crop is widely planted) have been

declining, except for Region VI, which suggests increasing specialization in that crop. The value share of bananas has been rising substantially, contrary to the national average, in BARMM and Region XII. Value share for livestock has taken a contrary direction in CAR, Regions II, V, VI, XII, XIII, and BARMM, in favor of Regions III, IVA, and VII.

Table 8: Shares in value of output by commodity type and region, 2018 (%)

Region	PAL	CORN	COC	SUG	BAN	OTHC	LV	POUL	FISH
CAR	24.8	11.3	0.0	0.2	0.8	40.5	14.8	5.7	1.8
I	27.2	7.5	0.4	0.0	0.6	21.5	13.6	10.7	18.3
II	40.0	21.3	0.5	0.6	3.0	9.4	11.0	9.8	4.3
III	23.3	1.4	0.4	0.4	0.2	4.7	21.9	32.3	15.4
IVA	4.5	0.6	4.0	1.6	0.8	8.1	29.5	31.8	19.1
IVB	34.6	2.7	6.4	-	7.7	26.0	3.2	6.8	1.5
V	26.6	4.9	4.7	0.5	1.1	9.4	20.3	9.8	22.7
VI	26.3	2.7	1.6	16.1	1.7	7.8	14.8	11.7	17.2
VII	7.2	2.9	3.5	5.6	2.0	10.9	32.1	24.2	11.7
VIII	26.4	1.7	15.0	0.9	3.0	7.0	17.8	12.1	16.1
IX	18.5	5.9	13.4	0.0	2.2	11.7	13.8	7.8	26.8
X	8.0	10.4	4.6	3.1	12.1	20.2	15.3	15.2	11.2
XI	8.6	4.3	6.3	0.6	35.4	12.0	16.7	12.0	4.1
XII	19.4	13.9	5.4	0.8	8.6	18.1	10.3	8.5	15.1
XIII	25.7	5.6	9.7	-	6.1	16.3	12.7	7.7	16.2
BARMM	14.8	15.7	12.0	0.2	4.3	25.3	3.9	1.5	22.2

Source: PSA (2019)

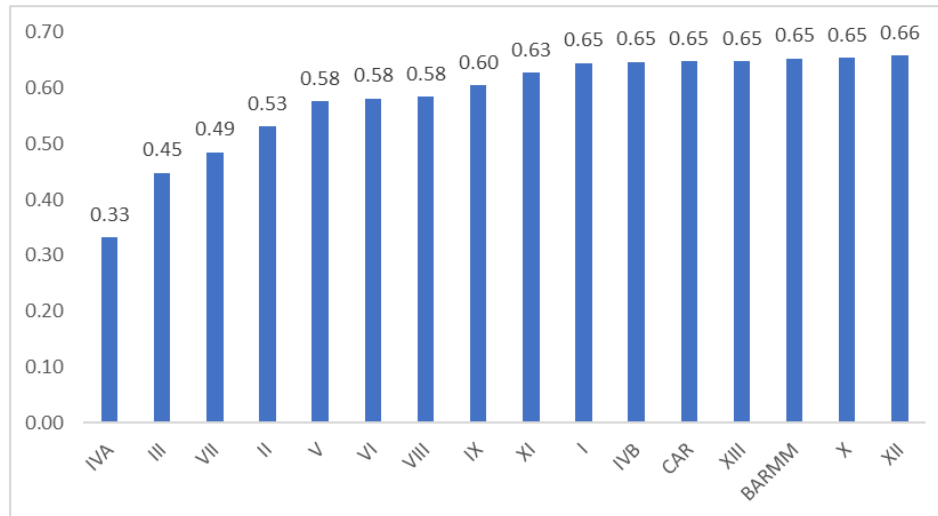
Table 9: Percentage point changes in value shares by commodity type and region, 2010–18

Region	PAL	CORN	COC	SUG	BAN	OTHC	LV	POUL	FISH
CAR	1.3	2.6	0.0	0.1	-0.1	-1.8	-3.3	0.6	0.5
I	0.3	2.3	0.0	0.0	0.0	-5.5	1.0	0.3	1.6
II	3.5	0.7	-0.1	0.3	-1.0	0.0	-2.4	1.3	-2.5
III	-1.5	0.1	-0.5	-0.2	-0.1	-1.2	3.6	2.8	-2.9
IVA	-0.2	0.1	0.3	-0.2	0.0	-2.5	5.1	3.2	-5.9
IVB	9.9	1.3	0.9	0.0	-0.7	2.0	0.6	-12.4	-1.6
V	2.8	1.5	-0.9	-0.1	-0.1	-0.2	-0.2	2.3	-5.1
VI	2.6	0.3	-0.1	4.1	-0.4	-0.6	-1.0	1.8	-6.6
VII	0.2	-1.6	-0.2	1.8	0.1	-3.6	4.2	5.3	-6.1
VIII	5.7	0.1	-3.6	0.1	0.3	0.0	0.3	4.6	-7.5
IX	5.8	1.9	1.7	0.0	0.2	2.0	-0.4	2.6	-13.7
X	0.1	-1.5	-1.0	-0.2	-1.4	2.1	0.9	1.1	0.0
XI	1.5	1.1	-2.3	0.2	-2.4	-1.3	2.6	2.3	-1.8
XII	-0.1	0.2	0.7	0.0	0.2	-1.1	-1.9	3.5	-1.7
XIII	6.6	1.9	-1.4	0.0	2.0	-7.5	-1.8	3.1	-2.8
BARMM	-0.4	0.0	0.1	0.1	1.3	0.5	-1.1	-0.5	0.0

Figure 6 combines all of these shares into the Simpson index of diversification. Using this index, the least diversified regions are IVA and III – not because of lack of movement out of traditional staples, but rather their strong engagement in non-staple activities, namely livestock, poultry, and fish. The most diversified regions are in Mindanao, namely XIII, BARMM, X, and XII; except for Region XIII, the shares of palay in these regions are lower than the national average. However, these are regions for which labor productivity

is lower than average, except for Region X. Close to the level of diversification of these regions are I, IVB, and CAR (all in Luzon); for these Luzon regions, the palay share is higher than average. Meanwhile the labor productivity of these regions is lower than average, except for Region I.

Figure 6: Diversification index by region, 2018

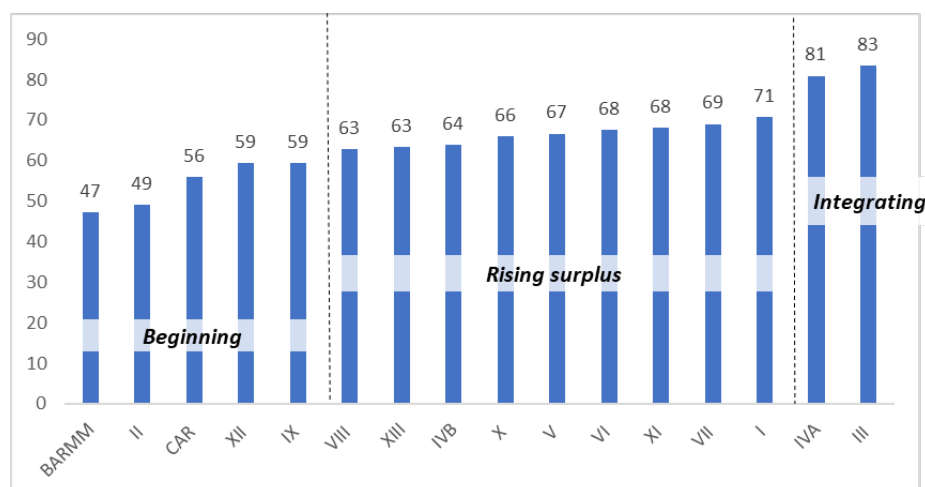


Source of basic data: PSA.

Phase of agricultural transformation

Figure 7 presents the agricultural transformation scores for each region. The first group, with scores of 59 and below, consists of BARMM, Region II, CAR, XII, and IX. They fall under the Beginning phase of transformation. In these regions, agricultural productivity and degree of structural change of the economy are low. At the opposite extreme are the Integrating agricultural economies—only Regions IVA and III; in this category, regions exhibit high levels of structural change and agricultural productivity. A broad swathe of regions falls in the Rising surplus phase, namely Regions VIII, XIII, IVB, X, V, VI, XI, VII, and I; these are regions with intermediate levels of structural change and agricultural productivity.

Figure 7: Level of agricultural transformation by region



Source: Author's calculation.

Natural resources and demographic factors

Table 10 summarizes data on the natural and human resource basis for potential agricultural transformation. The regions with highest shares of A&D lands in total were VI, V, and IVA, that is, these regions tend to have lower shares of uplands in total land area. The lowest are CAR, XIII, and IV-B, suggesting that these regions have significant upland area. Water resources are largest in Region X, followed by Region XII and BARMM, as well as Regions XI and XIII. Water resources are most limited in Regions I, VII, and V. Municipal fisheries are largest for Regions IVB, V, and IX.

After NCR, population is most dense in Region IVA, far ahead of the next region (Region III) and then Region VII (Table 11). The urbanization rate is highest for Region IVA, followed closely by Regions XI and III. Net enrollment rate is highest for Regions I, III, and IVA, which have higher per capita incomes. The lowest rate is for BARMM; and the next lowest is Region IX. Lastly, for the organization index, the highest values are for Mindanao Regions, namely Regions XII, XI, BARMM, and X; compared with the rest of Mindanao, Caraga and Zamboanga Peninsula have rather low values of the organization index. Regions in Luzon are also in the low range of the organization index (except MIMAROPA), and likewise Visayas (except Eastern Visayas).

Table 10: Land and water resource indicators by region

National/ regional	Total area (ha)	Share of A&D lands (%)	Water resources (million m ³)	Municipal fisheries catch (t)	Climate suitability index
Philippines	30,000,000	47.3	145,990	941,871	
NCR	63,600	75.8	-	8,207	40
CAR	1,829,368	18.7	(in Region II)	.	64
I	1,284,019	63.2	4,498	24,236	42
II	2,687,517	36.2	11,335	19,694	48
III	2,147,036	56.1	9,611	38,112	43
IVA	1,622,861	64.8	7,780	33,337	59
IVB	2,745,601	36.4	(In Region IVA)	124,906	68
V	1,763,249	69.3	4,145	122,077	40
VI	2,022,311	70.1	15,344	103,635	45
VII	1,489,077	64.7	2,939	63,669	62
VIII	2,143,169	47.8	11,907	69,551	57
IX	1,467,011	46.1	13,182	116,123	65
X	1,714,803	47.7	31,116	40,243	69
XI	1,967,183	37.5	13,675	22,877	82
XII	1,874,946	39.0	20,458	11,548	65
XIII	1,884,697	28.9	(In Region XI)	47,178	76
BARMM	1,293,552	48.6	(In Region XII)	96,479	66

Source: DENR (2020); NWRB (2003); CIAT (2021).

Table 11: Demographic indicators by region, 2018

National/regional	Population density (persons per km ²)	Urbanization rate (%)	Net enrollment rate (%)	Organization index
Philippines	106.6	45	51	59
NCR	20,511	100	69	5
CAR	103	26	54	53
I	415	13	64	64
II	136	12	56	50
III	540	52	60	55
IVA	920	60	58	53
IVB	119	22	48	75
V	362	15	46	53
VI	397	35	50	55
VII	525	44	53	78
VIII	224	9	43	46
IX	270	34	36	69
X	288	41	42	82
XI	267	59	46	81
XII	260	47	42	88
XIII	153	27	44	46
BARMM	309	14	11	83

Source: PSA (2019)

Infrastructure

Indicators of access infrastructure are shown in Table 12. Below NCR, road density is highest in Region IVA, followed closely by VII and VI. The lowest road densities are found in BARMM, which is at an incredible disadvantage from the next lowest, which is Region II. Another indicator is average travel time from municipalities (LGUs) to the nearest city/port. The highest travel times are in Regions XI, XIII, and IVB, suggesting that the enormous disadvantage presented by rough terrain in these areas is not sufficiently overcome by the state of their infrastructure. Lastly is the number of seaports, which is dominated by Region VI, followed Mindanao Regions XIII and X. Apart from landlocked CAR (no seaport), the lowest number of seaports is in Region II, followed by XII; Region IX has a surprisingly low number of seaports considering its vast coastline.

Other key infrastructure indicators are shown in Table 13. Energization rate has reached at least nine-tenths for a number of regions, most of which are in Luzon (Regions I, II, III, IVA); outside Luzon, only Regions VII and XIII have reached this standard. The lowest energization rate is BARMM, which is a very low 33% in relation to the next lowest (Region IX at 69%). The ratio of irrigated area to potential irrigated area (irrigation development) is highest for Regions VII and VIII, located in Visayas where farms are relatively small but irrigation development is extensive. The lowest level of irrigation development is in BARMM, followed by other regions in Mindanao such as Davao Region and SOCCSKSARGEN.

The final infrastructure indicator is information economy establishments, which is unlike other infrastructure indicators in that it is mostly a domain of private sector investment. The standard of course is NCR, with the largest number of establishments, followed by Regions IVA, VII, and XI (a distant fourth). The regions with the fewest establishments are BARMM, with Region XIII a distant second-to-last, followed by Region IVB.

Table 12: Access infrastructure indicators, 2018

National/regional	Road density (km per km ²)	Average LGU travel time to city/port, hours	Number of seaports
Philippines	10.59		326
NCR	188.39	0.1	3
CAR	11.39	3.3	0
I	12.86	1.5	4
II	6.65	3.7	1
III	10.7	1.2	14
IVA	15.34	1.1	27
IVB	7.76	5.2	27
V	13.19	1.9	21
VI	14.58	2.0	47
VII	14.59	1.8	32
VIII	11.02	4.6	20
IX	9.77	4.2	9
X	9.58	3.9	39
XI	8.26	5.5	21
XII	6.83	3.9	4
XIII	7.2	5.5	41
BARMM	0.03	2.9	16

Source: PSA.

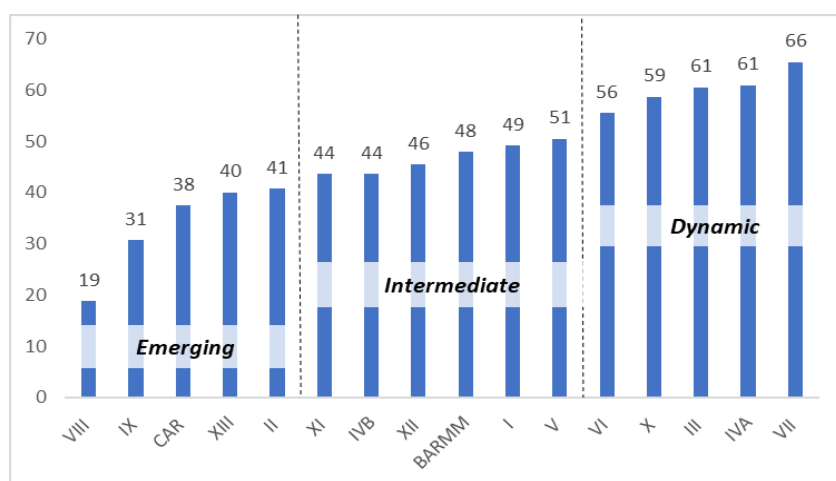
Table 13: Other infrastructure indicators, 2018

National/regional	Energization rate (%)	Irrigation development (%)	Number of information economy establishments
NCR	-	-	1,709
CAR	89	88.9	49
I	95	73.82	100
II	90	65.06	69
III	96	67.96	177
IVA	92	72.88	409
IVB	81	70.25	38
V	81	59.52	112
VI	87	65.49	166
VII	90	95.91	350
VIII	86	81.27	61
IX	69	54.78	59
X	88	58.85	99
XI	72	40.84	141
XII	72	42.81	69
XIII	96	44.83	34
BARMM	33	31.28	6

Assessment of Potential for Agricultural Transformation

Figure 8 synthesizes all of these indicators to arrive at the rating of potential for agricultural transformation, in terms of advancing through or transitioning from the current phase of agricultural development. Regions with High potential for transformation are Regions VI, X, III, IVA, and VII; this group includes those in the Integrating phase (IVA and III) as well as those in the Rising surplus phase. The highest score, attained by Region VII, is due to its excellent agricultural performance, favorable demographics (high urbanization rate), and relatively advanced state of infrastructure; the same is true for Regions III and IVA, with the next-highest scores. Region X scores high in demographic factors (highly urbanized, high net enrollment rate, and high organizational index), and Region VI scores high in infrastructure but not in agricultural performance. Note that the favorable outlook applies to underlying trends in the agri-food system, rather than to its current configuration. Sugarcane, for instance, appears to be receding in importance in Southern Tagalog and Central Luzon, whereas the future of poultry appears favorable.

Figure 8: Regions rated by near-term potential for further agricultural transformation



The regions classified as Low potential are Regions VIII, IX, CAR, XIII, and II. They include the two regions at the Beginning phase of transformation (II and CAR), as well as three regions with poor agricultural performance based on growth of agricultural GVA (VII, IX, and CAR). Region II has better agricultural performance than other Low-potential regions but still scores low for infrastructure and environment, pulled down by low share of A&D lands, low municipal fisheries catch, and unfavorable climate.

In the middle are Regions XIII, I, BARMM, XI, IVB, XII, and V. Of the Mindanao regions, agricultural performance is quite weak in XI, XIII, and XII; their scores are pulled up by demographic factors, followed by environmental factors. Interestingly, BARMM's agricultural performance score is its strong suit, together with environmental factors, countering its low scores in demographics and infrastructure. BARMM is also at the Beginning stage of transformation. Meanwhile the Luzon and Visayas regions in the Medium potential category have intermediate scores for the various assessment indicators.

The Low potential ratings for Eastern Visayas, Zamboanga Peninsula, Cordilleras, Caraga, and Cagayan Valley suggest a forthcoming development trajectory based on structural change and the departure of resources from agriculture and into other sectors. Cagayan Valley remains highly dependent on agriculture and lies within the typhoon belt; CAR is disadvantaged by harsh terrain and landlocked status.

Environmental factors reduced the rating of Bicol to Medium potential despite decent ratings elsewhere. In areas where agriculture has already reached a relatively high level of development, further expansion of the agri-food system appears likely, especially in Southern Tagalog and Central Luzon, to build on excellent infrastructure, access to large markets, and a track record of agricultural performance. *In other words, divergence in agricultural performance is more likely than convergence.*

Implications of the Spatial Diagnostic

In Emerging areas, development is more likely to be successful through a path of structural change—that is, a gradual shift of resources out of agriculture and into other sectors and non-farm activities—rather than through reliance on agricultural growth. A public agricultural program that seeks to accelerate the pace of agricultural transformation, may not have as good an outlook for success in the Emerging regions identified earlier, compared with the Dynamic and Intermediate potential regions. While promotion of new technology and land productivity may still be pursued, gains from such investments may be small relative to similar programs in Medium and High potential regions. Rather, the largest gains in agricultural labor productivity are likely to be realized by facilitating the departure of labor out of agriculture, with better utilization of existing labor taking up the slack.

Low-potential areas tend to suffer from inherent disadvantages owing to environmental factors. A significant threat to agricultural development in several regions is the occurrence of typhoons, with their accompanying floods, unruly seas, and storm surges. Such vulnerability erodes incentives to invest in perennial crops—hence export banana and pineapple production are well established in Mindanao relative to Luzon and Visayas. In typhoon-prone regions, the planted perennials are those resilient to storms, such as coconut. Temporary crops may be popular in these regions, but their prospects for relative gains in production and yield seem lower than those of better-endowed regions. Note though that some environmental factors are influenced by human activity; for instance, the contraction of fish production in Zamboanga Peninsula (and elsewhere in the country) was due in part to years of mismanaged fisheries.

The converse need not be true: geographic advantage is no guarantee of High potential for agricultural development. The region with the highest environment score is BARMM, yet decades of conflict have laid waste to its farms and fisheries, creating a huge development backlog. On the other hand, Davao Region is an example of a regional economy where the agri-food system is relatively advanced, being the most diversified among the regions, while maintaining its global status as a major banana exporter.

Public investment should be directed toward addressing public infrastructure gaps; in areas with Low potential, infrastructure investment should be motivated by the objective of accelerating structural change out of agriculture. Logistics and connectivity (including communications) between supply sources and demand centers remain weak throughout the country and require huge and long-term investments to bridge gaps, even relative to neighboring countries in Asia. In Medium and High-potential regions, some justification may still be found in the production boost to farm incomes in these areas. For Low potential areas, the role of productivity or farm income gains may be a less important rationale for public infrastructure investment compared with accelerating non-farm growth, inasmuch as connectivity infrastructure has been found to promote non-farm activities in rural areas (Balisacan et al. 2011).

Public investments and policy in Integrating regions are still warranted; programs and policies should support movement toward increasingly sophisticated agri-food systems. The diagnostic suggests that agricultural convergence across regions need not materialize; rather, regions with more advanced

agricultural economies also have greater potential for further transformation. Agriculture in the High-potential regions tends to be near populous metropolitan centers—Regions IVA and III near Metro Manila, Region VII near Cebu, and Region X near Cagayan de Oro. These centers also have large international ports for shipping agricultural products, which widens the scope of the market. Investments and regulatory policies should be directed toward increasing connectivity, strengthening support services, and promoting higher-quality outputs and production processes. Land-use zoning may also be devised to support agro-industries, such as biosecurity and environmental zoning of swine production, the designation of agribusiness corridors, zoning for peri-urban horticulture, and so on.

More data needs to be collected to gauge the current performance and potential of producer organizations and supply networks. The prevalence of agro-industrial linkages in high potential regions suggests that vertical and horizontal coordination are key to a dynamic agriculture. Unfortunately, data on clustering and formation of farmer and fisherfolk enterprises are inadequate; likewise, subnational indicators on private agribusiness investment are mostly unavailable. The spatial diagnostic suffers from a dearth of indicators related to current status of clustering and supply networks between subnational units. Future efforts in data gathering and research should be directed to address this gap.

Across regions, policies should be oriented towards enabling private investments and response to market incentives. The foregoing recommendation on agro-industrial linkages emphasizes the role of agribusiness investors and farm enterprises in feeding the population and addressing rural poverty. Despite lack of data on private sector performance, it is safe to infer that, across regions, it will be private action of agribusiness and agricultural workers that will determine success in structural change and agricultural transformation. The Philippines ranks 42nd out of 101 countries in terms of Enabling the Business of Agriculture index (World Bank, 2019) – an impressive score, which nonetheless suggests much scope for action in catalyzing agro-industrial transformation across the regions.

Inclusive Agricultural Consolidation and Clustering: Insights from International Experience



Chapter 4. Inclusive Agricultural Consolidation and Clustering: Insights from International Experience

Key Messages

A successful strategy for transforming the agricultural sector comprises many elements of reform. This chapter undertakes an in-depth analysis of how to take advantage of economies of scale and agglomeration by consolidating farms and clustering activities. Like the Philippines, several other Asian countries have embarked on ambitious agricultural transformation journeys, while building on an agrarian structure dominated by very small farms. Over recent decades, they too have been testing and supporting various approaches. Some important lessons include:

- While a national vision and strategy are needed, most of the action happens at the subnational and local levels. Success or failure is strongly influenced by the strengths and weaknesses of subnational entities in prioritizing interventions and facilitating private investment and new value-chain relationships.
- Top-down, one-size-fits-all approaches have a very low success rate, given the enormous variations in conditions in local economies and administrations and the different needs/opportunities associated with different agri-food commodities. Differentiated strategies and flexible policy instruments are needed.
- There are no silver-bullet solutions and few shortcuts or quick “wins” in the restructuring of agricultural production and/or value chains. Important synergies can be realized by combining different instruments and pursuing several goals in tandem. Typically, much experimentation and learning are needed to figure out what works, under what conditions, and what can be scaled or replicated. Some initiatives have to be undertaken in a stepwise fashion, strengthening core capacities and incentives before building more complex relationships and programs.

Roadmap

The agrarian structure and physical geography of the Philippines create significant challenges for transforming the country’s agriculture. Very small landholdings, an ageing cadre of farmers, and a fragmented structure of production and value chains make it difficult for Philippine farm households to earn adequate incomes. These same factors inhibit the sector’s diversification and modernization while giving rise to major logistical challenges and high transaction costs, which are exacerbated by the country’s physical geography and underdeveloped rural infrastructure. These circumstances are one motivation for the New Thinking in agriculture and the search for solutions to accelerate innovation and structural change within the sector.

This chapter highlights strategies and institutional arrangements for overcoming the prevailing structural constraints, with examples of their application in Asia and beyond. It draws lessons from these experiences, including the roles that government appears best suited to play in accelerating structural change. There are many potential approaches, and this discussion is not meant to be comprehensive. The operating assumption is that radical changes in the Philippine agrarian structure are not being contemplated for the near term, and the search for solutions needs to focus primarily on better options for organizing, incentivizing, linking, and supporting the smaller farming units that will remain the

backbone of the sector for years to come, even if investments on a larger scale are to be encouraged in some areas.

This chapter reviews international experience under three main headings: (1) consolidating smallholder-based agriculture, (2) formalizing smallholders' institutional linkages with markets, and (3) promoting rural, peri-urban, and industrial agri-clusters. These experiences are bound together by three notions: first, that it is typically best to combine spatial and value-chain approaches; second, that solutions need to be tailored or adapted to local conditions and capacities; and third, that structural changes need to be fostered with the “triple win”—economic, social, and environmental gains—in mind. Space does not permit detailed descriptions and analyses of particular cases or interventions, although many sources for this summary provide such details, and interested readers are encouraged to examine them.

Consolidating Smallholder-based Agriculture

Agrarian structures differ widely across the world as a result of differing natural resource endowments, population densities, and various historical, political, and other factors. Across most of East and Southeast Asia, the agrarian structure is dominated by very small farms, and in most countries, average farm size has been declining for an extended period. Only Japan and China have seen recent increases in average farm size, but they are very small—just a fraction of typical farm sizes in Europe, North America, or Australia/New Zealand (Yamauchi et al. 2020).

While the Philippines has experience in developing large plantations (for banana and pineapple production, for instance), the assumption here is that most future measures to support agricultural transformation will need to be based upon modernizing and consolidating the productive efforts of small farms and smallholder farmers. Updated figures are not available, although in 2012 some 88% of farms in the Philippines were smaller than 3 ha and 57% were smaller than 1 ha. With rural population growth and the subdivision of holdings, average farm size fell by more than half between 1980 (2.84 ha.) and 2012 (1.29 ha.).

Yet the demographic tide has been turning, and soon the Philippines may face a shortage rather than a surplus of able-bodied farmers. As mentioned in Chapter 2, a 2017 survey by the DA found that the average age of Philippine farmers was 60, compared to the mid-40s in the 1980s. The situation in Malaysia is similar. Japan and South Korea expect their farmer cadre to decline by one-third or more in the coming five years.¹⁷ In seeking to modernize smallholder agriculture, the Philippines will inevitably have to address who will own and manage farms as well as how farming will be organized, and on what scale, given the challenges posed by the fragmentation of land and production.

Consolidating land

Land consolidation is one strategy to address agricultural fragmentation. While the government cannot create new arable land, it can pursue policies to support, consolidate, and intensify farming operations on

¹⁷ What is the concern about having an ageing farm cadre? The concern, with some empirical basis, is that ageing farmers become increasingly less productive than younger ones because they are less likely to embrace modern technologies, shift into higher-value commodities, join cooperatives, or participate in contract farming. Ageing-in-place may prevent the emergence of larger, more efficient, and productive farms, inhibiting the entry of new, younger farmers and entrepreneurs. See Rigg et al (2019) for a review of these issues in Thailand. Recent studies in Indonesia found most of the farmers entering into fruit and vegetable production to be less than 40 years old.

the land that is still available. Drawing upon regional examples, three basic approaches are discussed here: (1) consolidation to increase the average size of farms into viable commercial units, through sale or lease; (2) consolidation to reduce fragmentation of smallholder plots; and (3) cooperative farming, where farmers retain ownership of their land but farm it jointly or cede its management to a commercial entity on the basis of some compensation. In the future, if the government considers efforts to promote larger-scale farm investments, a variety of social and environmental issues will also come into play. Guidelines are available for promoting socially and environmentally responsible land-based investments.¹⁸

Several Asian countries have been actively promoting consolidation through sale or lease. Although leasing can be done on an informal basis, formal sale and leasing arrangements required a legally recognized land title. Many countries struggle to provide appropriate land registration systems. Despite continued emphasis on smallholders by governments and international agencies, there is a growing view that farmers should be assisted to “move up or move out” of farming. China has been particularly active in promoting consolidation, and evidence suggests that this strategy has both led to increased investment for agricultural production and facilitated temporary or permanent migration to urban areas by people who no longer wish to remain on the land. Prior to reforms that made it possible to obtain a land certificate that confirmed a person’s entitlement to land, farmers were reluctant to migrate for fear that expropriation would deprive them of their access to land. The new system permits sale and lease of land rights. Around 25% of rural households have rented out their cultivated land. Compared with past practices of renting only to friends and relatives, recent transfers have included leases to professional farmer cooperatives as well as private companies (Box 5).

Box 5: Recent land consolidation in China

From the 1980s to the mid-2000s, China experienced a decline in the average farmland holding size as a result of rural population growth and the conversion of a considerable amount of farmland to urban and industrial uses. Since then, land consolidation has occurred in several parts of the country. This process has been driven by rising labor costs and outmigration and facilitated by: (1) the emergence of local government land transfer services (providing information, contract design, and dispute settlement services); (2) policy support in the form of loan guarantees and subsidies for larger farm investments; and (3) the emergence of an active market in mechanization services.

Huang and Ding (2015) report that in 2013, some 53 million rural households (23% of the total) had rented out some agricultural land. Their survey in Northeast and Northern China points to a remarkable increase in the average farm holding from 1.03 ha in 2008 to 1.73 ha in 2013. In parallel with this expansion in the size of household farms, a growing number of land cooperatives and company-run farms have emerged. These operations have an average of around 200 ha and 100 ha respectively and accounted for an estimated 20% of the total agricultural land area in these regions in 2013, up from a negligible share only six years earlier.

To facilitate land transfer and consolidation in China, local governments have set up land transfer service centers. Most of these service centers or platforms have been established at the township level, and in some cases a larger networking platform to pool rental information across townships has also been set up. The main responsibilities of these centers are to: (1) collect information on who is looking to lease out; (2) provide potential clients with information on location, area, major land characteristics, and suggested price of land to be leased out; (3) prepare a formal land contract; and (4) mediate contract

¹⁸ See USAID (2015), <https://land-links.org/tool-resource/operational-guidelines-for-responsible-land-based-investment//>.

disputes. In recent years, farmland rental agreements have been facilitated via the internet both by private companies and local government agencies (Huang 2017).¹⁹

South Korea has implemented multiple programs to address the dual challenges of a fragmented production base and ageing cadre of farmers. The various programs, involving government-facilitated purchases, leases, and sales of land, have sought to increase the size of many rice farms and fruit orchards and transfer farm ownership or management from retiring or other “non-professional” farmers to younger and more entrepreneurial farmers. Under one program, the government simply provides a lump sum payment to an older farmer (more than 65 years old) to lease the farm to someone else. Under another longstanding program, the Farm Successor Program, the government has sought to establish one or more new entrepreneurial farmers in each village. The program provides long-term, low-interest loans to the new farmers, together with training and mentorship. Over a 20-year period, it supported some 130,000 successor farmers, who now account for about one-tenth of all Korean farmers. Japan has similarly been implementing multiple programs to increase the average size of farms and incentivize younger, entrepreneurial people to enter the sector. Where it has proven difficult to attract young entrepreneurs, LGUs have encouraged companies to enter into specialized farm production. Following a 2009 reform in the law which had previously prevented non-agricultural companies from using farmland, corporate involvement in Japanese agriculture surged.²⁰

In Vietnam, a model called “big tenant, small landlord” (BTSL) has been developed to consolidate small pieces of land into large fields. Farmers with small amounts of land lease their land use rights to other farmers, cooperatives, or commercial enterprises so that they can manage larger land areas. Lease arrangements can be anywhere from 1 to 20 years, and the consolidated fields typically range in size from 5 ha to 20 ha. Advantages of the BTSL model include the fact that many younger members of farm families have migrated to urban areas. By leasing out their land, elderly farmers can earn a reliable rental income. If younger people do stay, they often receive priority for employment on the consolidated farm.

Similar developments, on a wider scale, have occurred in China. There, part of the process of consolidating farmland has been to form land-shareholding cooperatives in which families use their land-use rights as their share of investment in a cooperative, and the cooperative then consolidates the land and manages it. These arrangements have helped to reduce the idling of land while enabling those remaining in the village to cultivate larger tracts, achieve economies of scale, and apply standardized management practices to ensure product quality. Land-shareholding cooperatives have also created opportunities to consolidate contiguous plots, mechanize cultivation, and engage in livestock production at scale, thereby increasing the returns per unit of land. At the end of 2014, China had some 78,000 land-shareholding cooperatives with a total membership of 4.28 million, managing 2.3 million hectares (Zhao and Zachernik 2016).

¹⁹ India has long restricted the leasing of agricultural land, ostensibly to prevent large landholding inequities and/or the types of abuses that occurred in sharecropping systems in the past. Over time, major inefficiencies have emerged in agricultural land use, including a rising proportion of high-quality land that remains fallow. Farmers willing and technically able to expand and/or diversify their farms have been blocked by restrictive laws and regulations. During the past five years, multiple states in India have reformed land laws to allow land leasing on both a short- and longer-term basis. These provisions are helping to incentivize tenants to make improvements and allow them to access institutionalized sources of credit and insurance.

²⁰ A recent conference examined the challenges and opportunities for attracting youth into farming and included perspectives from Korea, Japan, Malaysia, Myanmar, Indonesia, Vietnam, and the Philippines. The conference agenda and country perspectives can be found at <https://www.fftc.org.tw/zh/activities/detail/90>.

Inevitably some problems remain to be resolved. First, there is often a lack of trust between farmers and commercial enterprises leasing the land, and there is no clear arrangement for arbitrating disputes. The short-term leases resulting from this lack of trust mean that the party leasing the land will be reluctant to make improvements. Second, land that has been leased and improved (by constructing a farm building, for example) cannot be used as collateral for bank loans. Third, official limits are often placed on the amount of land that can be accumulated in this way. Finally, the land is often fragmented into many small plots, increasing the costs of consolidation. Investors have to negotiate with a large number of households to accumulate a significant area. If a few farmers refuse to collaborate, the whole venture is jeopardized, as tractors and combines have to work around individual holdings in the middle of a larger farm.²¹

Another approach is to restructure land holdings while ensuring that farmers retain the same amount of land. In Uttar Pradesh in India, a government program straightened field boundaries and reshaped holdings in rectangular form to the extent possible. This intervention improved ease of cultivation, particularly plowing, and lessened disputes arising from unclear border demarcations and encroachment. Unnecessary field boundaries were eliminated, increasing the total area available for farming and reducing the time that farmers spent in moving from one holding to another. The Dinh Hoa Commune of Vietnam, working with the local government and smallholders, similarly consolidated land to reduce the number of plots owned by individual households, thereby increasing the average size of a plot without changing the total area farmed by each. This intervention has reduced labor costs, increased mechanization, and also permitted some restructuring of irrigation systems. A similar approach is used in many Chinese villages to improve, straighten, and consolidate land configurations.

Joint farming

In many instances, farmers have decided to carry out farming on a cooperative basis. Rice seems to be particularly suitable for collaboration among farmers. It normally grows in standing water, and farmers in a village traditionally share the same water reserves, which creates a need for cooperation in managing the common resource and maintaining the irrigation system. In addition, paddy farming requires a large amount of labor. To address labor shortages during planting and harvesting, farmers in rice villages in Indonesia sometimes form cooperative labor exchanges, working on one farm one day and another the next.

Joint farming can be done informally, by producer organizations, or through a government initiative. An example of informal coordination by smallholders comes from southern Cambodia. A decade ago, with the rapid increase in the use of combine harvesters for paddy, in some areas combines had trouble accessing fields. Farmers had planted different varieties at different times, and to harvest one farmer's field, a combine would have been forced to drive over the growing crop of another. To overcome this problem, farmers agreed to plant the same variety at the same time. Their joint action not only facilitated harvesting but led to greater aggregation and the possibility of selling in bulk to buyers. This approach may have been inspired by the Small Farmers, Large Field (SFLF) initiative in neighboring Vietnam, which buys significant quantities of Cambodia's paddy.

²¹ In China, there are many cases in which land is consolidated and contracted out to be managed by entrepreneurs from the village. In other instances, the land is contracted out to an enterprise, often a dragon-head enterprise, which then manages production and owns the product. Internationally, such land-leasing arrangements would generally not be called cooperatives, as they do not provide services to patron members, do not involve them in any decision making or management, and do not provide them with distribution of surplus residual claim rights.

Under Vietnam's SFLF initiative, farmers integrate their small rice areas into one large field. Benefits are said to include greater bargaining power with buyers and input suppliers, an increased use of on-farm and post-harvest mechanization, an aggregated supply of just one rice variety, and improved storage. In some areas, program membership has become essential for farmers wishing to become involved in contract farming. Under SFLF, participating farmers organize themselves into groups, usually with assistance from the local authorities. They synchronize their operations by adopting a single rice variety to plant, typically on an area of 50–300 ha. Instead of operating their own nurseries, they establish a group nursery. By transplanting around the same time, producers essentially convert their small plots into one large field. This practice makes it possible to harvest everyone's crop at the same time and creates favorable conditions to use improved technologies such as combine harvesters and to improve irrigation facilities. SFLF arrangements can be formalized (farmers set up a company structure and become shareholders) or can simply involve informal coordination of activities. Invariably, however, they involve aggregation of the paddy for sale to one buyer, with or without contractual arrangements, as well as group purchase of fertilizer and pesticides. Occasionally the enterprise purchasing the paddy supplies seeds.

Studies indicate that SFLF farmers have been more efficient than individual small farms and that farmers achieve higher levels of productivity, but with time it has also become clear that there are limits on how widely and rapidly SFLF can be applied. Many households are reluctant to cede control of their land to others, even if it enables them to earn a higher income in conjunction with non-farm wage work and/or business activity. After some years of ticking upward, the area under SFLF in Vietnam seems to have levelled off recently. According to the 2016 Agricultural Census, some 2,250 SFLF arrangements were in place nationwide, covering 579,000 ha. To illustrate the adoption level in a more specific context, in 2018 slightly more than 10% of the area planted to rice in Vietnam's Mekong Delta region was managed under the SFLF model.²²

Variants of this model have been applied or piloted elsewhere. The Nepal Agricultural Cooperative Central Federation, which groups over 800 agricultural cooperatives, has launched several joint-farming initiatives, whereby farmers pool their resources, including land, under a central management unit. Neighboring farmers lease their land to the federation for 15 years and keep working on the joint plot (about 70 ha). They are paid according to their work, and also receive income from leasing the land. The Philippines has had at least one experience with this model. It introduced Sugar Cane Block Farming in 2011 to encourage farmers with contiguous areas to form a producer organization so that their land preparation, planting, fertilizer and chemical application, weeding, and harvesting could be consolidated to attain economies of scale. SFLF models are currently being piloted in parts of India and Indonesia.

Mechanizing farming and outsourcing production functions

Where different approaches to consolidating land (ownership or management) are not feasible, support for the mechanization of farming and post-harvest operations may be an alternative or complementary strategy for smallholder-based systems to increase land, input, and labor productivity, both on and off the farm. State-led mechanization programs in many countries have failed, especially programs involving large-scale machinery imports and government agency delivery of services. The typical outcome has been rapid depreciation of the equipment and poorly timed and targeted service delivery. A more effective and

²² Based upon provincial reports submitted to the Ministry of Agriculture and Rural Development.

sustainable approach has been to create a conducive business environment for private service delivery companies and entrepreneurs to develop and operate (Sims and Kienzle 2017).

Throughout East Asia, agricultural mechanization has been a joint product of structural transformation and direct public sector support. Mechanization has generally accelerated where the pull of industrial and urban employment has led farm labor to dwindle. Rising labor costs make farm machinery more financially attractive. Outmigration can aid mechanization by increasing rural incomes and the size of farming operations, thus expanding farmers' ability to invest in and recoup the costs of machinery—though empirical evidence of this relationship is mixed (Luo and Escalante 2015). In South Korea, mechanization took off in the 1970s, even as rapid industrialization drew manpower away from farms. In China, the use of tractors and other machinery rose rapidly in the 1980s and 1990s, possibly in response to farm-labor constraints thought to have preceded the outright decline in rural population that started in the mid-1990s (Yang et al. 2013). In Japan, cultivators became prevalent in the late 1950s, when post-war industrialization drove up agricultural wages (Pingali 2007).

Mechanization has rarely been purely spontaneous; governments have generally promoted it directly, often in the name of modernization and competitiveness, but also food security. Notwithstanding national differences, a recurrent motive has been the perceived need to compensate for labor shortages in order to prevent food production from declining. Mechanization has also meant confronting a range of challenges classically associated with technology diffusion—challenges related to risk aversion, information asymmetries, and coordination failures. In East Asia, governments have used a combination of supply- and demand-side interventions to address these (Box 6 describes Korea's approach). The first have sought to stimulate the domestic production, absorption, distribution, and servicing of agricultural machinery (that is, supply), while the second have been geared to stimulating the adoption and use of machinery by agricultural producers (that is, demand).

On the supply side, even if a country can rely primarily on imported equipment, mechanization cannot progress without investing in national capacity to adapt machinery to local needs and conditions, as well as to operate and service equipment over its useful life. East Asian governments accordingly resorted to a range of measures to develop a domestic machinery industry. Examples include training a class of specialized engineers and technicians; shielding national firms from competition (for example, through restricted market entry, fiscal advantages, subsidized debt, guaranteed sales); and courting foreign technology transfer through various arrangements. China is notable for a policy known as “exchange of market for technology,” which facilitates the entry of foreign-owned firms (relaxing restriction on foreign investment, offering fiscal advantages) involved in domestically beneficial joint ventures (Wang 2013). China now possesses a healthy machinery industry that caters both to home and export markets.

On the demand side, one impediment that is specific and central to the adoption of agricultural machinery—everywhere but particularly in East Asia—lies in its high fixed costs. Although machines come in different sizes and levels of sophistication, their indivisibility can represent a barrier to the adoption of costly equipment. Machinery costs are particularly problematic in regions such as East Asia, where landholdings or farming operations have remained small, limiting individual farmers' ability to recoup a large investment. One approach to this dilemma has been to help farmers purchase equipment directly, using instruments such as price subsidies, concessional credit, and extension services, while simultaneously fostering the development of machinery adapted to small farms and their environment. Even with assistance, farmers may still be reluctant to invest. In China, for example, short-listed machinery

has been eligible for subsidies since 2004, yet very few farmers have actually taken advantage of this support to buy their own machinery. The opening of land rental markets in China has given rise to larger farming operations that can take advantage of machine services (Wang et al. 2014).²³

Box 6: Korea's Agricultural Mechanization Plan: Combining supply- and demand-side components

Korea's first Five-year Agricultural Mechanization Plan, dating to 1970, illustrates how supply and demand components can be combined to encourage farm mechanization. Focused on promoting the uptake of small-scale machinery (such as power tillers) in rice farming, the plan supported research and development to adapt equipment to Korean conditions, favored Korean-made machines, and strengthened machinery inspection and quality control services. It also required manufacturers to develop far-reaching sales networks and after-sale services, and to collaborate with public extension services that were put in place to train farms in the use of machines. The National Agricultural Cooperative Federation, present across the country, also took part in promotional efforts. Meanwhile, farmers were given access to concessional credit to purchase machinery or lease equipment purchased by a joint-use organization put in place for this purpose. By the 1990s, and several plans later, the mechanization of Korea's rice sector could be considered complete, and Korea had become an exporter of agricultural machinery to developed countries. Subsequently the government's focus shifted to the uptake of machinery to support value-addition (Yun Jin Ha and Kim Kyeong Uk 2013; Kang jung-il 2006).

A complementary and potentially more effective approach has been to promote equipment-sharing arrangements such as joint ownership, leasing, and farming services. The Chinese government aided the development of now widely used combine service enterprise clusters by subsidizing the price of machines and warehouse space; exonerating service enterprises from road tolls while improving roads; and offering them market intelligence (for example, harvest calendars) that helped them to develop viable service areas spanning multiple provinces (across which they can spread high fixed costs). The government also helped these entrepreneurs develop cooperative relationships that enable them to share the costs of maintenance and coordinate their service areas—for instance, the government paid for their cell phone communications for a time (Yang et al. 2013). The services provided by these companies have been increasingly vital in a context of rural outmigration, shortages of young agricultural workers, and rising overall labor costs.

Malaysia is another country where the outsourcing of agricultural production services is common and has become the norm in rice-growing areas. Small farm sizes, capital constraints, and the narrow windows for many rice production tasks have constrained or deterred farmers from purchasing their own equipment, especially costly items like tractors. One recent survey (Poonythe and Suntharalingam, forthcoming) finds that the vast majority of Malaysian rice producers now outsource land preparation (88%), water management (59%), and harvesting (98%), although outsourcing is less common for fertilization and weed/pest control. Older farmers (>50 years) were somewhat more inclined to use outsourced services. Many service providers have found it easier to operate in areas with functioning farmer cooperatives with which they can negotiate service terms and scheduling to cover a significant area. In the Philippines, the demographic and structural features of rice production would seem to be a highly conducive setting for measures to promote the outsourcing of agricultural production services to individuals or small companies.

²³ Agricultural mechanization is advancing in Africa as well. The Malabo Montpellier Panel (2019) draw attention to seven African countries where policy reforms and (mostly public-private) programs are resulting in increased access to and quality of mechanization services.

In Myanmar, private entrepreneurs established successful mechanization services after government-managed services met with little success. Earlier strategies in Myanmar centered on acquiring a fleet of (imported) tractors and other equipment and deploying equipment out of government centers. The results were poor. Since the early 2010s, mechanization rates have surged, not due to increased farmer ownership but due to the emergence of a dynamic market in equipment rentals and mechanization service delivery by local entrepreneurs, small companies, or companies also involved in rice milling or other downstream industries (Belton 2017).

Four pathways for land consolidation and agricultural development

The consolidation of land and organization of producers will need to take more creative paths to allow commercial agriculture at scale. Four possible pathways are presented here and illustrated in Figure 9.

Pathway 1: Agribusiness managers. The cooperative is owned by the farmers, who contribute their shares individually in proportion to their land holdings in the group customary estate. The cooperative employs a commercial agribusiness management company (or individuals) and farms the estate as a single enterprise under one or more commodity crops. The owners would be able to provide paid labor services on the farm if they have the relevant skills. They would be paid a dividend or profit share according to their respective shareholding.

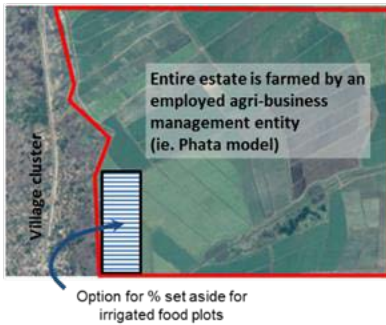
Pathway 2: Smallholder agribusiness. The cooperative devolves individual land ownership/use rights to specific plots, with individual ownership based on percentage shareholding. The cooperative oversees a water user association comprising land-holding members within the block. Here, individuals do not rent but farm their own plots, with the specific expectation that a natural process of farm consolidation into larger business units will follow, as less-interested or less-successful farmers exit voluntarily (through rental or transfer). The cooperative administers land-exchange.

Pathway 3: Leased farms (mixed model). The cooperative acts as a facilitator/enabler and leases portions of the customary estate to members, outside individuals, and/or agribusiness companies to generate revenue. It also facilitates the formation of a water user association within the farm area, where it provides land administration and irrigation water services. The cooperative owners receive payment of net revenue pro-rata to their shareholding.

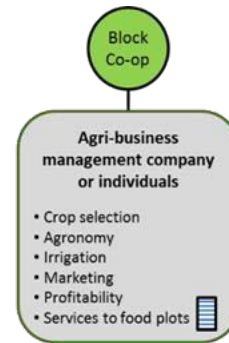
Pathway 4: Joint venture enterprises. The cooperative establishes a contract-partnership arrangement (typically a joint venture) with an agribusiness entity that covers all farm production for the supply of commodity or industrial crops. The cooperative owners receive payment of net revenue from the joint venture pro-rata to their shareholding.

Figure 9: Four pathways for land consolidation and agricultural development

Pathway 1: Agri-business Managers



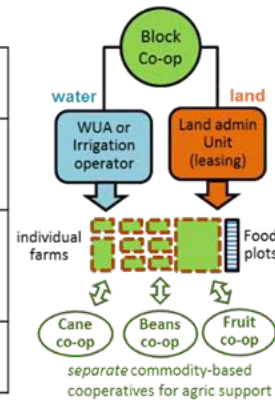
Management model	Cooperative employs a commercial agribusiness company (eg. Phata), or individual agricultural managers.
Farm enterprise types	Entire estate farmed as a single agricultural enterprise (excepting food plots).
Irrigation technology	<ul style="list-style-type: none"> Pivots likely preferred for operational simplicity but limits flexibility for Pathway 2 in future. Surface irrigation also practical.
Food plots	Option for individual allocations of irrigated food plots, serviced by the co-operative estate (0.04-0.2 ha)



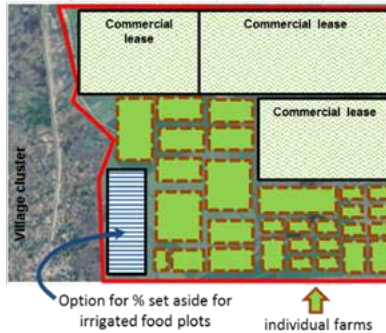
Pathway 2: Smallholder agri-business



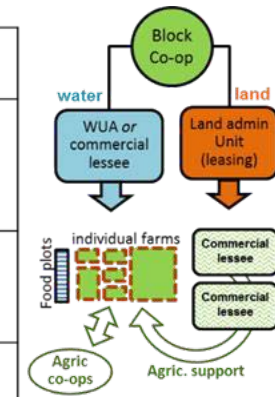
Management model	Cooperative is a facilitative organisation ensuring effective land-leasing and water-service provision.
Farm enterprise types	Many individual agric enterprises with farm size expansion & economy of scale through internal leasing as needed (2-10ha business farms)
Irrigation technology	<ul style="list-style-type: none"> Surface irrigation with individual upgrade (sprinkler/drip) in future. Pivots unsuited as will force group collaboration, and not allow individual enterprises.
Food plots	Option for individual allocations of irrigated food plots, serviced by the co-operative estate (0.04-0.2 ha)



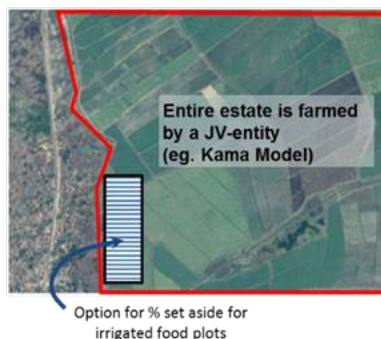
Pathway 3: Leased farms (mixed model)



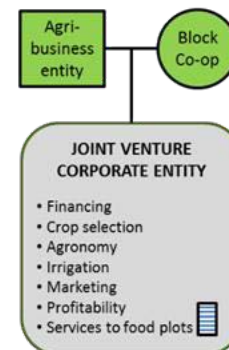
Management model	Cooperative is a facilitative organisation ensuring effective land-leasing and water-service provision.
Farm enterprise types	<ul style="list-style-type: none"> Block leases to commercial agri-business entities as 'anchor' tenants/possible service providers. Individual agric enterprises with farm expansion & economy of scale through leasing (2-10ha farms)
Irrigation technology	<ul style="list-style-type: none"> Surface irrigation for individual farms (can upgrade later). Pivots well suited for block leases, but will limit reversal to individual farms.
Food plots	Option for individual allocations of irrigated food plots, serviced by the co-operative estate (0.04-0.2 ha)



Pathway 4: Joint-Venture Enterprise



Management model	Cooperative (land & water equity) forms a JV with a commercial agribusiness company (cash & processing/marketing equity)
Farm enterprise types	Entire estate farmed by the JV company as a single agricultural enterprise (excepting food plots).
Irrigation technology	<ul style="list-style-type: none"> Pivots likely preferred for operational simplicity but limits flexibility for Pathway 2 in future. Surface irrigation also practical.
Food plots	Option for individual allocations of irrigated food plots, serviced by the co-operative estate (0.04-0.2 ha)



Formalizing Smallholders' Institutional Linkages with Markets

Part of the “small farm problem” relates to linkages with markets (on both the input and output sides) and the ease of reaching individual farmers with advisory or other technical services. Smartphones and the internet can help to address all kinds of information problems, yet they provide little assistance in relation to logistics (either to or from farmers), managing the aggregation of smallholder output, or enhancing the bargaining power of farmers. This section briefly reviews the rationale for and experiences with several types of institutional arrangements that organize farmers to connect to markets.²⁴ These arrangements involve different types of horizontal and vertical coordination, which in practice are typically paired together.

Producer organizations

Producer organizations (POs), including cooperatives and self-help groups, are collective institutions aiming to support member interests. They can assist members to access markets, credit, and advisory and technical services. Some perform a wide range of services; others have a narrower focus. Some are stand-alone entities, although POs are more commonly part of larger networks, associations, or federations of similar entities, often with either a commodity or thematic focus. This discussion will focus primarily on POs as localized aggregators of supply and intermediaries with other market players.

The aggregation of smallholders into POs has a number of potential benefits. For example, an organized group of smallholders can supply a larger quantity of produce than an individual smallholder. While processors and other buyers are looking for farmers who can reliably deliver sufficient quantities of produce at the right time and with the quality required, they do not want to have to deal with hundreds or thousands of individual farmers. POs offer a central point of contact that reduces transaction costs for buyers and can also provide intermediate activities, such as transport, storage, quality control, and first-stage processing (for example, paddy drying). This type of aggregation can also improve logistics and reduce transport costs. Harvests can be scheduled so that losses are not incurred while harvested produce waits for transport to arrive. Similar improvements can be made for the timely supply of inputs.

A large number of studies conclude that POs have delivered a range of benefits to their members. A recently completed scoping review—spanning 239 studies focused on Africa and South Asia—found a very large numbers of cases in which POs reportedly contributed to improvements in members' incomes by providing marketing information, marketing services, and/or technical services (Bizikova et al. 2020). The studies under review often referred to the assistance of POs in improving productivity and product quality and reducing transaction costs. Some studies found the role of cooperatives in conducting transactions to be less important than their role in increasing members' specialization in producing remunerative commodities. It was less common for the studies reviewed to indicate that POs had contributed to social empowerment or improved food security. They frequently reported that marginalized groups, including female-headed farm households and people living far from markets and collection centers, participated in and benefitted from POs to a lesser extent, although many studies did not analyze farm or farmer characteristics that may have increased or decreased the likelihood of cooperative membership and the significance of the associated benefits.

²⁴ This discussion draws, in part, from Will/GIZ (2013), World Bank (2016, 2017), and Shepherd (2019).

Despite the many reported positive impacts of membership, why is it that worldwide, no more than 20% of farmers are PO members? The obvious answer seems to be that studies of impacts on cooperative members cover only part of the story; studies usually examine cooperatives that are still in operation and that provide commercial services that would be expected to generate economic benefits. The other part of the story is that POs are generally small businesses, and like all small businesses, they have a high failure rate. Many have difficulty weathering any significant market or financial shock. Many are poorly managed and struggle to provide valuable services to members even in stable market settings. At some time or another, many farmers have had negative experiences with cooperatives, either for the reasons just cited, or because of political interference or the diversion of the organization from its intended purpose. In one country after another, perennial efforts to revive, revitalize, and professionalize the cooperative subsector suggest that fairly broad and deep-seated problems have emerged with these organizations over the years.

In much of the developing world, POs have generally formed or expanded as a result of external promotion by governments and/or donors. In much of Asia, for extended periods of time, POs have served as tools for government policy and oversight as much as they have acted in the service of their members. Legal reforms and technical assistance programs in many countries have sought to give greater functional autonomy to cooperatives and to improve their governance arrangements and performance, yet this is work in progress. The landscape in many countries is filled with discontinued or poorly performing cooperatives and a residue of political interference and mistrust in collective action that is often difficult for new initiatives to overcome. For example, China and Vietnam have spent much of the past decade or more trying to nurture “model” or “new style” cooperatives that are run as businesses but also adhere to core principles of effective governance and cooperation. Somewhat optimistic estimates point to perhaps 10–15% of existing cooperatives meeting these qualitative standards.

Throughout the developing world, more attention is being given to professionalizing POs by improving their governance, management, and delivery of services. Diagnostic tools have been developed to benchmark the capacity of POs or screen their loan applications for joint investments. A program worth exploring for its applicability to Philippine circumstances is the International Finance Cooperation’s Agribusiness Leadership Program, which integrates PO diagnostics, training, and coaching. The ISO Guideline (ISO/IWA 29: 2019) on PO professionalization is another useful contribution, covering such topics as business and financial management, human resources, community and stakeholder engagement, and delivery of member services. Numerous interventions have supported PO professionalization, yet the circumstances have varied so greatly (different countries, different commodities) that it is difficult to extract generic lessons from these efforts, aside from the cautionary advice that considerable time and reinforcement are needed to build effective capacity in POs.

Reviewing the landscape of agricultural cooperatives in Southeast Asia, Shepherd (2019) draws attention to several factors that have undercut their performance and sustainability:

- **Excessive external support.** Too much external support can undermine ownership, profitability, and sustainability. Planning for sustainability is difficult because POs usually have little idea of the true cost of external technical support. The availability of government funds may cause smallholders to join a PO more out of a desire to access the funds (through subsidies) than to benefit from improved production and marketing. Keen to produce successful results, agencies supporting POs may carry out marketing activities directly, but experience shows that projects ignoring traditional

intermediaries have generally had poor results. Similarly, direct provision of credit or inputs on credit should be avoided in favor of developing farmers' linkages with financial institutions.

- **Contradictory PO aims.** The most sustainable business-oriented POs tend to function more like the private sector. They have a closed membership consisting only of farmers with a viable farm size who are able to meet buyers' quality requirements. It becomes difficult to run a business-oriented cooperative if all members have a say in its business activities, even if they are not producing the products marketed. Some cooperatives carry out activities that, while worthy, are not commercially focused. Such activities absorb resources and management effort, and they distract POs from maintaining the necessary commercial focus.
- **Management skills.** Like any private business, POs may lack sufficient management and commercial skills to operate in complex agricultural markets, or they may be unable to mobilize resources to supply the buyers they have identified. But POs also face problems that the private sector does not normally encounter. Those problems are linked to the organizational complexity of POs and the fact that members usually have a significant say in decision-making. For example, farmers may pressure management to pay dividends rather than to make investments. As POs become more commercial, they can reduce these organizational risks by employing managers who are authorized to take business decisions without prior consultation. The PO must have a sizeable turnover to justify employing an experienced manager, however.

While studies often show that farmers marketing produce through POs achieve higher returns than farmers marketing individually, it is not clear whether the PO model is inherently better or whether gains to farmers result primarily from the heavy subsidies and technical assistance that POs often receive. Nevertheless, the theoretical reasons for forming POs hold true: the potential for exploiting economies of scale in production and management, overcoming barriers to market-entry, and reducing transaction costs. POs are playing an increasing role in vertically coordinated chains and seem essential if contract farming and other forms of vertical coordination are to expand. This thought is doubly sobering. Viable POs take many years to mature, yet viable POs may be necessary for clusters of farmers to enter into successful longer-term relationships with agribusiness companies.

Contract farming

Contract farming is a transaction-based approach to coordination in agri-food value chains. Though contract farming is centuries old and its track record is mixed, there is rising interest in its potential to address traditional as well as emerging challenges related to agri-food production and marketing. These include increasing demand for quality, sustainability, traceability, and certification, and growing competition for agricultural land and labor. On the most basic level, contract farming offers a potential means to reduce the transaction costs involved in sourcing agricultural products, and conversely, getting products to market. Though there is no single contract farming model, the arrangement generally involves a formal agreement—often between a multiplicity of producers and at least one buyer such as a processor or trader—to buy/sell agricultural products on terms established in advance. In addition, it is common for contract farming agreements to address market failures surrounding the provision of agricultural inputs,

technology, and services such as finance, extension, training, transportation, and logistics—by involving buyers or third parties in delivering these to farmers.²⁵

Contract farming has also become a strategy for processing and trading firms to overcome an array of constraints on growth. Examples include tightening land, labor, or other resource constraints, as well as increasing pressure to meet more rigorous or restrictive environmental, labor, social, land-use, food safety, quality, and traceability standards. In some contexts, smallholders can become a source of competitive advantage by providing access to ever scarcer land and labor, as well as to local farming knowledge. And comprehensive, forward-looking arrangements with such producers can help lower the costs and increase the feasibility of meeting higher standards. Buyer involvement ranges from providing or dictating the use of certain inputs (for example, specific varieties), to controlling or investing in most aspects of production from land preparation to harvesting (for example, land, machines, staff, management). Buyers often seek to control production when large volumes of a commodity need to be of uniform quality for processing (for example, sugarcane, cotton, coffee, tea, dairy, and poultry), and when they source from their own estates as well as contract farmers (for example, outgrower schemes involving perennials).²⁶

While contract farming is led primarily by the private sector, government support for contract farming arrangements is not uncommon on the grounds that they can contribute to meeting broader policy objectives such as inclusive growth, food security, or the protection of natural resources. Besides improving the enabling environment (for example, the rule of law, the quality of infrastructure, health, and education, political stability, financial markets, and so forth), government can encourage contract farming by facilitating interactions and brokering transactions among potential counterparts, establishing a legal framework for farming contracts, putting economic incentives in place, building technical and institutional capacity, and educating counterparts about potential benefits and risks. India, Vietnam, Morocco, Thailand, and other countries have developed formal policies aimed at promoting it.

Contract farming works better for some farmers and companies than others. Not all farmers are good candidates for contracting, whether they work directly with companies or through POs. In choosing farmers, companies are first likely to consider factors such as agronomic suitability of the land; climate, pests, and diseases; the location of the farm; and suitability of infrastructure such as roads, electricity, and communications.²⁷ Companies should also meet certain criteria, and smallholder representatives or governments should carry out “due diligence” to minimize risks of signing contracts with unsuitable

²⁵ Contract farming can involve various levels of intensity. Market-specification agreements just relate to the forward selling of a commodity to a company. Resource-providing agreements would combine forward selling and the provision of inputs, perhaps on credit. Management-sharing arrangements combine all of the previous elements and involve the buyer (potentially deeply) in broader farm management decisions. In nucleus estate models, companies run a central farm run and then issue contracts, usually of an intensive nature, to nearby farmers.

²⁶ When it goes well, contract farming can offer buyers greater consistency in terms of quality and volumes, a better alignment of supplies and customer requirements, and lower operating risks and costs. For smallholders, central benefits of successful contract farming include enhanced access to markets along with higher and more stable incomes. Under some arrangements, producers negotiate an equity stake (that is, become joint owners) of productive assets such as land and processing facilities.

²⁷ Having selected the locations where they want to work, they will then carry out a further selection of smallholders, using criteria such as farmers’ assets and access to finance (for example, to pay laborers), their capacity to meet market requirements (for example, their ability to follow cultivation instructions), and the amount of land they have available. However, as the best land is usually densely populated, companies will inevitably end up working with farmers with small land areas, even if that is not their preference. There appears to be much fluidity in smallholder involvement in contracts, at least for seasonal crops, with farmers working for one company in one year and another the next.

buyers. While it is unrealistic to require all companies to have had previous contract farming experience, it is desirable that some of their employees have had such experience, as poor managers can jeopardize success. Research suggests that the main factors leading to successful operations were the prior strength and capabilities of lead firms. When these firms were well managed, had ample finance, and had a competitive position within domestic or international markets, it was possible to have reasonable success with upgrading smallholder production.

Contract farming works better for some crops than others. Generally it is more common for crops that are of high value, difficult to grow, perishable, require prompt processing (for example, oil palm, tea, sugarcane, tobacco), or subject to strict standards. Contract farming is common in poultry value chains but less so for other animal products. It also seems to work better when there are few alternative markets for the smallholders, thus limiting the chances of side selling. In the case of vegetables, contract farming is usually less risky for a company when it is working with farmers on crops for which there is little local demand or on specialized products such as organic crops, for which the company is able to pay a premium.

Experience to date suggests that rice and other staples are not highly suitable for contract farming. Because they can obtain these staples from multiple sources, companies have limited incentives to try to introduce contracts for standard varieties with no quality specifications and multiple prospective buyers. For their part, farmers may decide to eat the crop or sell it to one of many other buyers who are waving cash at them or ready to pay a spot price above the agreed contracted price. The main examples of contract farming for rice relate to varieties that command a premium on national or international markets, such as aromatic varieties and organic rice. A number of contract farming schemes for these types of rice are ongoing, including in Vietnam, Cambodia, Laos, and India.

Vietnam has been trying to spur contract farming in rice since at least 2002, when it issued a government “decision” on the subject. But early efforts failed to take hold, and a decade later, no more than 4% of rice was produced under contract. With most of the market consisting of ordinary rice varieties of average quality rice, there was little incentive for companies to engage in contract farming. Farmers also saw little benefit in participating and regularly engaged in side-selling. Since 2010 this situation has changed considerably in parts of the Mekong Delta, where there has been a push toward higher-quality and specialty varieties and greater interest in promoting more sustainable production practices. In some parts of the Mekong Delta, upward of 20% of rice production is now grown under contract (Ngoc 2018; Ba et al. 2019; Nguyen et al. 2019). Important platforms for much of this contracting have been (1) the reorganization of production under the SFLF model and (2) the strengthening of cooperatives in those same areas. The clustering of production, as well as the need to source higher-quality rice, have induced more companies to want to contract farmers/production, while the stronger cooperatives have made it more manageable to negotiate, implement, and resolve problems in contractual relationships. As will be elaborated below, much of this institutional change has occurred in some core districts that now constitute the most competitive clusters of rice production in the delta and in Vietnam in general.

Productive alliances

Productive alliances involve three core actors: a group of organized smallholder producers, one or more agro-enterprise buyers, and the public sector. The approach aims to promote horizontal alliances among the producers as well as a vertical alliance between the producers and the buyer(s). Typically, a *business agreement* is signed between the agency in charge of the program or project (usually a government ministry or project management unit), the commercial partner, a service provider, and a producer

organization. The agreement specifies product characteristics, such as varieties to be grown; the quantity to be purchased; production methods; logistical arrangements, such as how and when the product will be delivered; and the mechanisms for setting the price and paying producers. The agreement also indicates any contributions for which the buyer is responsible, such as input provision and technical assistance. Most programs provide grant resources, usually to assist with technical issues and build the relationship between alliance partners. Sometimes grant resources are provided to co-finance infrastructure and equipment (such as irrigation or commodity storage facilities) vital to the business objectives of the alliance.

Productive alliances are designed to include smallholders with some capacity to engage in modern markets. A program usually supports to 100–300 alliances in a given country and may build alliances either for a few selected commodities or across a wide set of value chains. Participating farmer groups tend to have 50–100 members. As in contract farming arrangements, the poorest smallholders are not ideal candidates for productive alliances. Programs generally concentrate on “transitional smallholder producers” who lack well-established linkages to buyers and markets but have the willingness and capacity to engage in modern markets. They must already be engaged in market-oriented production and have the potential to generate income and jobs. The participating companies that agree to purchase produce from the POs are generally small and medium enterprises that process food and other agricultural products, pack produce, sell seed, and export commodities, although in some instances larger companies are also involved.

Productive alliance programs typically mobilize potential participants, screen proposals, refine the most promising proposals into business plans, and help to establish and support the alliances. The cycle begins with an awareness campaign to inform POs and companies about the program and its opportunities. A call for proposals follows, often issued by the agriculture ministry. POs prepare basic proposals for a business alliance, specifying the intended commercial partner. The program evaluates proposals against strict, predefined eligibility criteria designed to minimize the risk of political interference. The selected proposals are developed into detailed business plans by the POs, usually with technical assistance from a business development service. Plans approved for funding are consolidated under formal productive alliance business agreements between POs and their commercial partners. The grant awarded to support the alliance must be matched by predetermined contributions from the PO (in cash or sometimes in kind), the buyer (in the form of technical assistance and inputs), and possibly funding from public institutions or commercial bank loans, depending on the program and the alliance partners. Grant funds are transferred to POs in instalments, which are paid on receipt of evidence that the previous instalment was used as intended.

Even when proposals are screened effectively and alliance partners receive timely assistance, alliances do not always succeed. Upwards of one-third have broken down during or after program support. In some cases, the farmers have been unable to comply with the stringent quality requirements of the buyers. In others, weaknesses in the PO cause the alliance to falter, including failure to communicate with PO members, poor management, inability to resolve conflicts, or a lack of social cohesion within the organization. A lack of management skills is perhaps inevitable when producer groups are relatively small. Only much larger POs can afford to employ full-time managers. At other times, alliances dissolve because of adverse developments in the overall commodity market or other commercial or financial problems experienced by the partner company.

Program success involves more than disbursing money. The capacities of the prospective PO and company partners must be assessed in detail. The quality of available business development services must also be checked and, ideally, strengthened. Emerging problems need to be managed. Where programs are implemented in multiple locations, the performance and maintenance of alliances will often vary, pointing to the importance of good facilitative skills and arrangements at the local government level, and perhaps also reflecting differences in the wider business environment and rural infrastructure.

Points of caution for government and donors

Government and donors can be of considerable assistance in facilitating linkages between companies and farmers through contract farming or productive alliances. When a contracting arrangement or broader alliance is in the planning stages, government and donors usually assume active roles in coordinating farmers and matching buyers and producers. They can also play a conflict resolution role.

Government and donors should exercise caution on several points, however. For example, because external support may provide the chosen companies with an unfair competitive advantage over others, support should be relatively limited, concentrate on aspects of relationship-building such as group organization and trust development, and avoid direct subsidies to company operations. The sustainability of interventions and outcomes must be considered with care. Collaboration with government and donors makes sense for the private sector when it has modest costs to bear, but assuming a greater share of the costs once a program ends may not represent a sustainable business model. The long-term sustainability of many contract farming arrangements and productive alliances often depends upon how well programs link the participants with mainstream financial institutions, as grant resources are short-lived.

A final cautionary note is that successful commercial relationships between farmer groups and agribusinesses take time to emerge and mature. Time is needed to develop mutual trust and enable the relationship to weather the inevitable storms unleashed on agricultural enterprises by volatile markets, an increasingly unpredictable climate, and natural disasters. Commodity- and area-specific programs may speed the development of stronger links between smallholders and agribusiness, but huge overall shifts at the sectoral level cannot be expected to occur within a short period of time. For much of the past decade, the Vietnamese government has implemented programs to incentivize and support different types of alliances and contractual relationships between farmer groups and agribusiness. Progress has been incremental. The most recent estimate—for 2018—is that just below 13% of the value of agricultural production (all commodities combined) is coordinated under such arrangements. When larger commercial farms are involved, the proportion is considerably higher.

Cluster Development

Support for industrial clusters has been a centerpiece of industrial policy for decades in many developing countries. The rationale has been relatively simple: bring together similar and interconnected companies and affiliated institutions to operate in close geographical proximity and realize external economies of scale, otherwise known as agglomeration economies. Just like the economic rationale for cities, industrial clusters are expected to spur innovation through accelerated learning, to create efficiencies by sharing infrastructure and external services, and to benefit from attracting and pooling needed talent and labor. Competitive advantages emerge: well-known examples include information technology (California's Silicon Valley and Bangalore, India), carpets (in parts of Iran), fashion and

footwear (northern Italy), health services and technology (the greater Boston area), electronics assembly (northern Vietnam), and many more.

As part of the strategy for implementing the New Thinking in agriculture, the Philippines has mapped out an ambitious plan to develop agricultural clusters that would confer similar advantages. The following review of international experience in developing agricultural clusters—commodity-based clusters, agro-industrial parks, and peri-urban clusters—affirms the value of the concept yet raises questions about the merits, at this stage, of having a national strategy for cluster development with a precise model, menu of government support measures, and very ambitious timeline. The review also brings out the possible limits in applying the concept, the limits in how much government can do to engineer cluster development, and some of the risks involved when specialized commodity production is concentrated in geographic clusters. The most successful efforts seem to combine spatial and value-chain perspectives and interventions.

Agricultural commodity clusters

At the smallest level, a cluster approach informs the “one village, one product” concept, where villages or local areas are encouraged to concentrate on one value-added and local product, with support for product development and marketing assistance. The products are then sold nationally and internationally. This approach (said to originate from a rural development strategy in Japan’s Oita Prefecture) is built around the principles of a local yet global orientation, self-reliance and creativity, and human resource development. Dozens of countries (many in Asia) have attempted to replicate this model, sometimes at scale. Despite some localized success, most attempts to apply this model nationally and in a top-down fashion have failed.²⁸ Where the “one product” is an agricultural commodity, the approach is vulnerable to covariant risks, as entire members of a community are subject to the same production shocks and/or price variability.

At a higher level, two main types of agro-based clusters can be distinguished: agricultural clusters and agro-industrial clusters. In the former, primary agricultural production is concentrated in a particular area, yet little or no further treatment is done locally. The output may be sold fresh locally or marketed (or transformed) elsewhere. In agro-industrial clusters, industrial transformation occurs in close proximity to primary production. Clusters of either sort can be organized in relation to food and beverage products or non-food manufactured products (such as wood products).

Ulimwengu and Jenane (2019) describe the virtuous properties and potential of agro-based clusters:²⁹

Clustering seems to ignite a virtuous circle of development. It can further the industrialization process and facilitate the dissemination of innovations and the upgrading of agribusiness firms. Clusters attract foreign

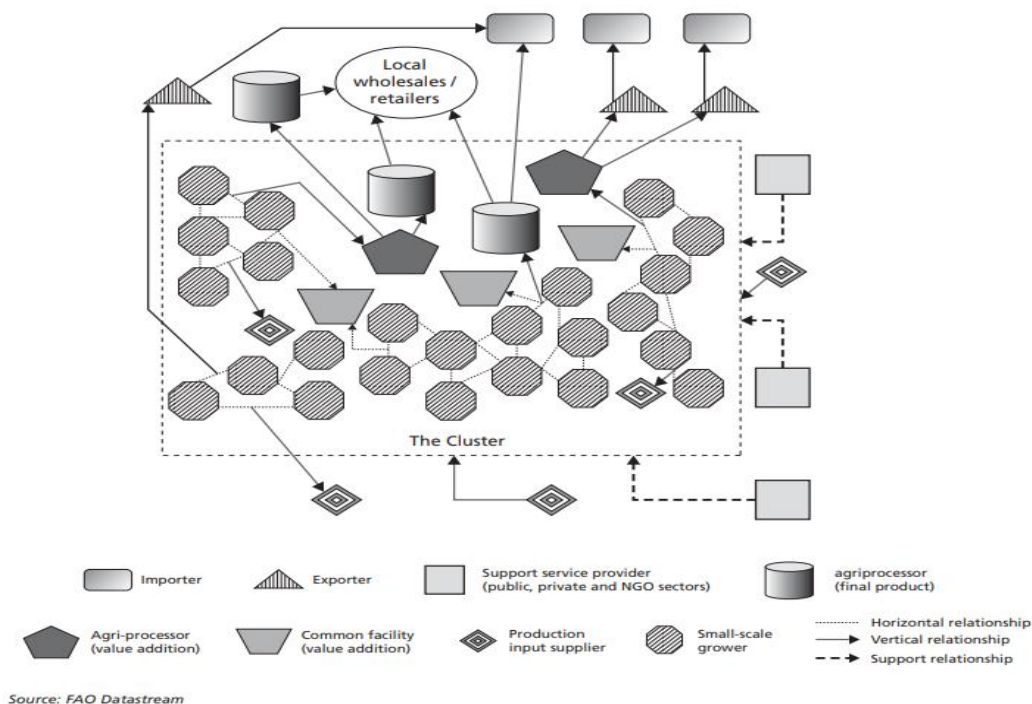
²⁸ Claymore (2011) reviews the experiences of Thailand and Indonesia.

²⁹ Galvez-Nogales (2010) also signals the great potential of agricultural cluster initiatives: “The promotion or inducement of such clusters has various advantages relative to other approaches. In particular, cluster approaches recognize that all the actors in the agricultural value chain are often more innovative and successful when they interact with supporting institutions and other actors in the supply chain. By promoting vertical and horizontal links between local agricultural enterprises, as well as supporting relationships between them and facilitating organizations (for example, local governments, research institutes and universities), cluster policies promote the diffusion of innovation, as well as the use and generation of important local externalities. ACs can also enhance access to markets and information. Cluster policies are argued to be crucial for small-scale farmers and agribusiness, as they enable them to engage in higher productivity, and more market-oriented and higher value-added production. Accordingly, central and local governments have discovered that cluster promotion is a valuable tool to support agricultural enterprises in their territory and help them link to global agricultural value chains in a more efficient and sustainable manner.”

investors, who in their turn bring with them new business and technological skills that contribute to upgrading cluster stakeholders. In addition, clustering promotes an active dialogue between the private and public sectors fostering new agricultural policies and support institutions. Moreover, governments frequently find that organizing their support activities around clusters is easier and more focused and effective than other strategies to support the development of the agricultural sector.

Agricultural clusters are more than areas of concentrated production and industrial activity; they are bound and defined by social relationships. They also involve a network of service providers, shared facilities (that is, aggregation centers, warehouses), and regularized horizontal and vertical commercial relationships. Referring to Figure 10, what makes the cluster is not so much what is inside the boxes but the intensity of the links between the boxes. Clusters are not just clumps of co-located farmers and enterprises. When functional, their true essence comprises social infrastructure, relationships, trust, and co-optation—a blend of competition and cooperation (Ffowcs-Williams 2014).

Figure 10: Agricultural clusters as a mix of players and their relationships



An extensive review of agricultural cluster development in developing countries offers valuable insights and lessons for national strategy and policy. Galvez-Nogales (2010) cites several dozen examples and synthesizes the experiences of many individual clusters, provides cross-cutting insights into the approaches and elements that appear to constitute good/best practice, and summarizes the most effective roles for government agencies, universities and research institutes, and private companies or consortia in the emergence and strengthening of agricultural clusters. The analysis of successful clusters yields several observations and conclusions that call for caution in applying a national strategy or plan to agricultural cluster development:

- **Most successful clusters have emerged and evolved over (many) decades.** Most seem to have emerged spontaneously, matured over time, experienced ups and downs, and gradually adopted various forms of collective action and gained government support. None of the featured examples

emerged on the basis of comprehensive national cluster strategies/plans, although a few did arise from strategies to create more clusters for specific commodities in a pre-existing industry.³⁰ Most larger cluster initiatives, involving new programs and often featuring public-private collaboration, seem to have been geared toward *upgrading* rather than *forming* clusters,³¹ targeting mature clusters experiencing a technical, commercial, or other threat or presented with a significant opportunity.

- **Nearly all successful clusters have featured high-value, export-oriented agricultural products, and their production spurred the emergence of relatively strong incentives to cooperate in defraying costs, managing risks, and meeting regulatory or commercial standards.** For such products, competition within the cluster tends to be limited because of the large size of the external market. Agricultural clusters focused on local markets would be more challenging to form or sustain. The multiplicity of (typically small) players makes it more difficult to collaborate, while the incentives for larger players to cooperate are constrained by the likelihood that they are competing for the same pool of consumers. These circumstances suggest that either the scope of agricultural cluster initiatives should be carefully delimited, or that approaches for support should be differentiated, based on the characteristics of production, the market, the main players, and other relevant criteria.³²
- **The public sector on its own is not well suited to manage cluster development.** Galvez-Nogales concludes that “the government in general, and the public-sector organizations usually associated with agriculture development in particular, are not good at managing cluster initiatives.” The most significant public sector contributions in developing and upgrading clusters have come from specialized agencies charged with improving the productivity and quality of specific commodities/products or charged with managing plant or animal health risks. Many of the examples reviewed were led by the private sector, with strategic public investments and a variety of services complementing the private efforts. That is, one or another type of public-private partnership appears to have emerged over time to fit the needs and circumstances of the particular cluster. Even the Chilean government’s well-known Integrated Territorial Program entrusted each of the individual initiatives to a commodity/industry association to manage. Murphy (2017) cautions against government-mandated clusters because “clusters usually develop organically,” and “inducing them may create market distortions. Governments are rarely capable of understanding all the nuances of cluster development or of rapidly changing market and competitive conditions.”

³⁰ Ulimwengu and Jenane (2019) discuss the experience of one country that sought to implement a national agricultural cluster plan—the Democratic Republic of Congo (DRC). In 2014, DRC initiated an ambitious program to establish 22 agri-cluster parks on over 1.5 million hectares, aiming to boost agricultural production, encourage private and foreign capital investment, and increase agricultural exports. The concept for each cluster was based on a “hub farm,” which would be developed in partnership with the private sector and fast-track development of a modern commercial agricultural sector in DRC. The first major initiative involved a demonstration pilot on 80,000 ha. The government invested heavily in infrastructure, but conflicts emerged over how the government had acquired the land from local communities, and corporate investors were not attracted to the cluster. The national program was eventually discontinued.

³¹ Cluster initiatives have generally included a package of measures: infrastructure investments, schemes to spur innovation and promote technology adoption, awareness-raising and training of workers and managers, and the forming/strengthening of alliances/networks to foster coordination.

³² Although not discussed in Galvez-Nogales (2010), one major exception to this higher-value commodity pattern is Malaysia’s longstanding support for rice production clusters, which it calls “granaries.” Some date to the 1950s, although others are more recent. An enormous amount of resources have poured into these rice production clusters, yet the results have been quite mixed, raising questions about the continued merits and sustainability of the approach (World Bank 2020).

- **The diverse experiences reviewed by Galvez-Nogales caution against the adoption of a national “one size fits all” approach to developing and upgrading clusters.** The focal commodities, markets, and participating stakeholders may each present different technical and infrastructural needs, challenges related to natural resource management, scope for innovation and collaboration, and so on. The local conditions may also vary in important respects, such as agrarian structure, human capital, and the capabilities of local government entities. This variation points to the need for great flexibility in the types of investments and services that a government would consider supporting in different clusters, as well as the types of institutional arrangements that could prove suitable and effective.
- **Evidence on the distributional effects of cluster development is ambiguous, at least based on the examples cited in Galvez-Nogales.** The review mentions a few examples of cluster initiatives that directed support to small-scale farmers or advanced their productivity, yet it also mentions initiatives that increased the marginalization of small farmers and firms or adversely affected local communities (for example, through influxes of migrant workers, greater pressure on available land, and/or adverse environmental impacts). Imbalanced power relationships are very common in agriculture and agri-food systems. Whether they are magnified in cluster development or can be mitigated is not entirely clear. Murphy (2017) warns against the risk of narrow special interests successfully incorporating policies into cluster initiatives to favor manufacturers to the detriment of farmers, or to favor exporters to the detriment of entities serving the domestic market. Galvez-Nogales (2010) advocates for an inclusive approach, yet what this approach might mean in practice would likely depend upon the specific commodity and local context. Cluster initiatives can aggravate income and wealth inequalities in rural areas to the extent that they draw resources to locations with the best agro-ecological conditions, rural infrastructure, and levels of human capital. Rather than countering this tendency by promoting clusters in disadvantaged areas, it may be more appropriate and sustainable to consider other forms of support.
- **It is important to remember that agriculture has distinctive features that may limit the scope for concentrating specialized production in a particular location.** Most forms of agriculture are based upon natural conditions. Variable or adverse weather and other natural events, in combination with crop and animal production cycles, give rise to unpredictable or seasonal supplies. Covariant risks are an important reason for geographically spreading rather than concentrating agricultural production. Because agriculture draws upon the natural resources of a landscape, including its watersheds and other biophysical characteristics, the concentration or clustering of primary production (and agro-processing) may overwhelm the capacity of the resource base to sustain those activities. In agricultural areas, the actions of individual units can adversely affect others. Poor hygiene on one farm may spread an animal disease to a neighboring farm or lead to cross-contamination between livestock and vegetable production. Chemical drift from one farm to neighboring farms that have instituted organic practices may prevent them from meeting organic production standards. This interdependence heightens the need for collaboration and conformity and presents operational risks for cluster initiatives.

These last observations are important: they signal that the management of environmental, agricultural health, and food risks may be central to the competitiveness and sustainability of many agricultural clusters. Galvez-Nogales (2010) refers to these relationships only in passing, but they emerge more clearly in the literatures and case studies associated with emerging Asia’s agro-based exports and its clusters for

higher-value food commodities targeting domestic markets. In one case after another, a common pattern appears. Most of the early stages of cluster development have focused on growth, expanding the areas under production or the number of animals raised and promoting the adoption of technologies to increase productivity, in order to increase the volume of output so that the industry could increase its external market share, compete with and substitute for imports, or achieve other objectives. Most such cluster promotion initiatives had a missing element—the protection of the environment. Numerous stories of success involving increased growth in export/high-value agricultural output and market share have another side: significant if not devastating adverse impacts on the environment in the form of deforestation, biodiversity loss, water and air pollution, and soil degradation, among others.

Scherr et al. (2015) document how the heavy environmental footprint of expanded and/or intensified production in six commodity landscapes in East and Southeast Asia³³ affected local communities and limited the productivity and competitiveness of the pertinent clusters or industries. The case studies illustrate the enormous challenges involved in shifting incentives and behavior toward more sustainable practices once a commodity cluster has matured. Unless the producers and companies themselves are experiencing heavy losses from their environmental impacts, the motivations and politics for change may remain weak for long periods of time, while the environmental costs may escalate. In several cases, change has been induced from the outside, essentially from regulators or buyers abroad, oftentimes spurred by the advocacy campaigns of non-governmental organizations (NGO)s.

In the context of sustainable commodity landscapes, the study by Scherr and colleagues makes several points that are relevant to plans and ambitions for cluster development in the Philippines. The study emphasizes the important roles of government, the private sector, and civil society in fostering more sustainable commodity landscapes and provides a menu of policy instruments for government to move in this direction. A combination of instruments must be employed, given the limits on regulation, market-based incentives, technical support programs, or any other single instrument. Cluster development is more likely to have sustainable outcomes when initiatives *combine spatial and value-chain strategies and approaches*. In other words, initiatives should adopt an integrated landscape approach for natural resource management in the focal areas, while working through value chains to reinforce incentives (and controls) for engaging in sustainable practices and generating quality products. It is also advantageous to promote diversified land use, even if there is a lead commodity, because it will help to manage pest and disease risks, increase economic and social resilience, and enable the agricultural landscape to provide a fuller range of ecosystem services to the area's population.

This perspective is evident in a growing number of agricultural cluster initiatives that seek to increase productivity and value addition while taking steps to manage biosecurity, food safety, and environmental risks. Several examples from Asia are briefly discussed here, although it would be beneficial for Philippine policy makers and practitioners to examine these approaches and experiences in depth to better understand their potential in Philippine settings as well as the nuts and bolts of operationalizing them. The seven examples—three from Vietnam, two from China, and one each from India and Malaysia—all involve sizable upgrades of commodity clusters in pursuit of multiple objectives. Several have been supported under ongoing or recently completed projects co-financed by the World Bank.

³³ These are: (1) oil palm in Kalimantan, Indonesia, (2) coffee in Dak Lak, Vietnam, (3) shrimp aquaculture in Ca Mau, Vietnam, (4) tea in Yunnan, China, (5) bananas in Mindanao, Philippines, and (6) mixed farming in Mae Chaem Watershed, Thailand.

One major initiative has targeted the Vietnamese shrimp aquaculture cluster in parts of the Mekong Delta region. This subsector has experienced massive growth over the past two decades, transforming some of the local economies and generating billions of dollars of annual export earnings. At the same time, shrimp aquaculture has produced multiple adverse environmental impacts, including biosecurity risks from the inappropriate use of antibiotics, which have raised concerns over food safety and market access. A project to address these problems combined a spatial and value-chain approach in specific areas of concentrated production. Farmers were organized into groups, and some 50 “good aquaculture practice zones” were created, involving nearly 10,000 producers and nearly 13,000 ha of production. The good practice zones and producer groups enable a range of public (and private) services to be delivered more effectively, including improvements to infrastructure for biosecurity, the provision of veterinary and extension services, the provision of improved seedstock, testing and demonstrations of improved methods and/or technology, training and farmer schools, marketing assistance, and Good Aquaculture Practice (GAP) certification (and product promotion). Farmers adopted the improved GAP methods because of the services provided to GAP groups and zones and because of their demonstrated benefits (reduced losses, higher returns). The GAP groups were required to take active roles in early disease monitoring and reporting and to address water pollution and disease problems promptly when they occurred. Before the project, there was no concept of GAP groups or zones, and good practices were not systematically applied in small-scale aquaculture or in extensive fish farming systems. After several years of experimentation and success with this model, the GAP group-and-zone concept is being adopted in many other parts of Vietnam.

A second Vietnamese initiative also focuses on aquatic products and on a combination of spatial and value-chain interventions. This project operated in multiple locations with near-shore fisheries. These fisheries provide livelihoods for hundreds of thousands of households and contribute heavily to Vietnam’s external trade and domestic food supply. Their success led to the development of excess fishing capacity, which in conjunction with inappropriate (sometimes illegal) fishing methods and inadequate infrastructure, eventually depleted fish stocks and resulted in high physical product losses, causing the productivity of these fisheries to decline. The core solution was to develop and implement fishery “co-management plans” as a joint initiative between district-level fishery agencies and some 100 “co-management groups” comprising about 14,000 fishing households. Each of the plans demarcated boundaries; allocated fishing rights; and specified arrangements for participatory surveillance, control, and monitoring. The plans were accompanied by programs to develop additional livelihood options. Implementation was phased in, and the results were exemplary in reducing poor fishing practices and supporting the recovery of the resource base. Investments to upgrade nearby landing sites and fish marketing/storage facilities improved records of fish catches and sales and also considerably reduced physical and quality losses in the value chain. The combination of incentives and technical support, the reduction of after-catch losses, and measures to minimize encroachment by outsiders into the designated fishing zones, were all important. The interventions demonstrated that fisheries co-management in the local context could be feasible and effective. Success was also reflected in an amendment to the national Fisheries Law to recognize fisheries co-management and the allocation of fishery rights as valid and important instruments. Other coastal districts and communities are interested in adopting similar interventions.

A third Vietnamese example relates to rice. Vietnam has made notable long-term improvements in rice productivity, and its expanded rice output has contributed to high levels of domestic food security and

has propelled Vietnam into the top ranks of rice-exporting countries in terms of volume. Much of the increase in rice production was driven by more intensive use of inputs and natural resources and by past policy goals that emphasized volume over quality. Over time, these production patterns and orientations have limited the profitability of rice production, given rise to enormous environmental costs, and often have positioned Vietnamese rice toward the bottom of the price/quality segment of the market. For many years, government agencies, researchers, and NGOs have demonstrated and promoted one or another package of sustainable rice production practices. Most lacked any clear connection to the rice market, and their adoption tended to be short-lived. More recent interventions combine a focus on sustainable practices with a targeted spatial orientation and attention to the entire value chain. For example, the ongoing Vietnam–Sustainable Agriculture Transformation Project operates in several dozen leading rice-growing districts in the Mekong Delta. The project has created and/or strengthened some 300 POs to assume multiple functions. It also provided technical support for farmers to adopt a core set of demonstrated sustainable practices and monitored their adoption, while co-financing post-harvest equipment and processes that would enable POs to preserve quality and reduce physical losses in harvested paddy. A credit line was available for rice processors to upgrade their facilities to sell more high-quality or branded rice products. The project also instituted measures to build longer-term commercial linkages between POs and agribusiness. Many of these efforts were implemented in a stepwise fashion, reflecting differences in the initial “starting points” of POs and agribusiness companies and allowing incremental improvements to be made and trust to develop before more complex tasks and relationships were pursued. Within four years, certifiable sustainable practices were adopted on 160,000 ha (about 1/10 of the rice area in the Mekong Delta region). On about one-third of that area, rice was grown under sustained contract farming arrangements with companies. This model and package of interventions will be applied to a larger area with the ultimate goal of transforming the rice cluster in this region with regard to what is produced (a more diverse mix of better quality rice varieties), how it is produced, and how it is sold and positioned in domestic and international markets.

China has also combined spatial and value-chain approaches in agricultural cluster initiatives to deliver transformative changes and realize wider social benefits. For example, a package of new initiatives is targeting the value chains for pork, vegetables, and aquatic products in and around five municipalities in Guangdong Province. Efforts are geared toward modernizing these value chains, with a particular emphasis on greening production and improving the management of food safety risks. Aside from improving integrated One Health regulatory systems, interventions support investments by farmers and enterprises in better primary production, logistics, quality assurance, and waste management.³⁴ Another initiative, of longer standing, promotes high-quality, “ecologically produced” tea near Pu’er City in Yunnan Province. The area’s traditional “tea agro-forests” are recognized as a Globally Important Agricultural Heritage Site. A combination of advanced research and development, farmer training, subsidies, and product certification and traceability systems have contributed to a more sustainable production cluster that realizes premium prices in domestic and international markets (Havemann 2015).

India is pursuing other interesting agricultural cluster initiatives. For example, under the National Rural Development Program, the government has set a target to create 1,000 “organic clusters” to support national objectives related to sustainable agriculture, rural livelihoods, food safety, and farmer empowerment (particular women farmers). Producer groups are being created to form clusters across 5–7 adjoining villages over an area of 500–1,000 ha, with 25–50 groups per cluster. The targeted areas

³⁴ For details, see World Bank (2021), “China Food Safety Improvement Project.” Project Appraisal Document.

participated in prior work to promote agro-ecological practices and/or community-managed sustainable agriculture. The program involves national and local government agencies and consortia of universities, NGOs, and private entities. The consortia provide model cluster demonstrations, offer training, and help to ensure linkages to commercial markets. The government agencies provide other technical support or manage various funds to incentivize organic production practices. Producers receive support to become certified organic producers, or they may instead opt to become involved in the country's Participatory Guarantee System. After only two years, some 23,000 local groups have been formed; one-third are registered and receive support.

Malaysia has a history of area and regional development programs dating to the 1970s (World Bank 2019). One such program supports “agropolitan centers,” which are essentially clusters for producing tree crops and processing raw material; part of their purpose is to reduce rural poverty and create a viable and vibrant local economy. Most of these centers have focused on sustainable oil palm or rubber production and value addition. Between 2007 and 2018, about 12 agropolitan centers were implemented on 10,000 ha supporting just under 3,000 farm households. Although a comprehensive review of the full program has not been undertaken, reviews of several centers found that they improved both the income and living conditions of direct beneficiaries and the local population at large through the economic and social infrastructure financed through the program.

Agro-industrial parks

Industrial parks are used throughout the world to promote industrial growth and competitiveness. These parks are established in areas zoned and planned for industrial development, often with site and service infrastructure provided to tenants and incentives offered to investors to take up residence. Industrial parks have been set up across the developing world, with highly varied results. In recent years, increased emphasis has been placed on realizing environmental sustainability objectives in the operation of industrial parks through the promotion of “eco-industrial” parks. Here again, international experience is quite varied (van Beers et al. 2020).

Agro-industrial parks (agro-parks) are a small and comparatively recent subset of industrial parks. These industrial parks are dedicated to supporting agro-processing businesses, which may be a combination of food, feed, and non-food (wood-based, biofuel) products. While agricultural clusters tend to be in rural areas, to focus on one or very few closely related commodities, and generally arise organically, agro-industrial parks are planned, are owned and managed by an entity (either public, private, or combined), are situated on spatially demarcated land (often near cities), and tend to involve companies that produce a diverse array of products. Agro-parks usually provide infrastructure, logistics, and specialized facilities and services (for example, cold chain facilities and laboratory and certification services) to their “tenants”—the agro-processing companies. The core underlying premise of agro-industrial parks differs little from that of other industrial parks—achieving external economies of scale via shared infrastructure, services, and pools of human capital. But agro-industrial parks may be unique in their scope to benefit from greater synergies between companies producing different products, as the waste and byproducts from one company may in some cases be used as inputs for the products of another.

The promotion of dedicated agro-industrial parks probably dates to the 1980s, when India began to establish them as part of a wider national program of industrial park development. At a similar time, China did the same. In the early 2000s, agro-industrial parks emerged as a strategy for promoting increased competitiveness in conjunction with higher standards of environmental management in

Western Europe, including several agro-eco-industrial parks in Denmark and the Netherlands. More recently, ambitious plans have been laid out to develop many agro-industrial parks in the Middle East and Africa. For example, Ethiopia is developing four large agro-industrial parks, each with a different focus, depending upon the regions where they are located.

Galvez-Nogales and Isahakyan (2017) provide an outstanding overview of the concepts associated with agro-industrial parks and their application. They present a typology of agro-industrial parks (their objectives, ownership, and other features) and highlight factors that determine the circumstances in which they might be a suitable solution. Drawing upon international experience, they develop a “framework for model agro-industrial parks,” covering size and location, planning and financing, roles of developers/managers, infrastructure provisioning, marketing the park to prospective tenants, and ways to strengthen forward and backward linkages.

These authors also provide practical recommendations based on their survey of international experience. As with clusters, they caution against applying a one-size-fits-all approach to agro-parks when determining the appropriate mix of infrastructure, facilities, and services. These elements need to be tailored to local circumstances, including the location, industries, and characteristics of tenants. A second important recommendation relates to scalability. It is preferable to start with one or more pilot agro-park initiatives to learn from experience and test institutional capabilities (and perhaps alternative models). The temptation of launching large-scale national programs prior to such a pilot or incremental phase should be avoided. The review concludes that realizing the full (transformative) potential of agro-industrial parks requires very careful attention to the “three Ps”: (1) *people* (with an orientation toward inclusion and especially to involving small-scale companies and service providers); (2) *planet* (with a strong orientation to environmental protection and applying principles of the circular economy); and (3) *profit* (promoting efficiencies, avoiding distortions, and focusing support on industries that have a clear, demonstrable comparative advantage).

In their review, Ulimwengu and Jenane (2019) devote attention to the challenges commonly encountered in implementing agro-parks in the field, and to how well national programs to develop (multiple) agro-industrial parks are living up to their objectives and potential. For example, they note that of the 42 parks originally envisaged under India’s Mega Food Park program, only 16 have become operational. Common problems have included delays in approvals and implementation, constraints on the availability of capital and labor, and the lack of institutions to facilitate land acquisition. They cite an evaluation by the Ministry of Food Processing Industries that highlights common failings with Mega Food Parks, including the general lack of buy-in from state governments, the unrealistic timelines for implementation (none of the parks was operational within 30 months), and the inappropriately restricted business models permitted within the parks. Ulimwengu and Jenane also discuss Morocco’s attempt to create six agro-ecological parks between 2009 and 2015. Despite the large pool of resources allocated to the program, its implementation was delayed by five years and only two parks remain operational. Difficulties arose due to weak institutional capacities and limited consultation with local communities and value-chain actors.

The question of whether agro-industrial parks offer a viable path toward inclusive agricultural clustering in the Philippines must be answered in light of the local context and perhaps in terms of their potential to achieve special objectives more easily than any alternative. Two examples illustrate the kinds of special objectives that agro-parks may be designed to achieve. One comes from Malaysia, which has promoted the development of Halal Parks as part of its competitiveness strategy. These parks feature the

use of green design principles in developing park infrastructure, cleaner production systems, capacity building for small and medium enterprises, and the development, certification, and marketing of halal products. A package of services and tax incentives is linked to tenants' compliance with quality and safety standards. Concentrating enterprises and services with a similar goal and shared standards seems to have been an effective strategy for developing these parks. A second example comes from the Netherlands, where agro-industrial parks (typically involving intensive horticultural or animal production systems) have sought to apply the principles of industrial ecology, focusing on the re-use of waste streams, the minimization of solid waste release, and the generation of bio-energy, which is utilized by park tenants and others. Nuhoﬀ-Isakhanyan (2016) discuss both the economic and environmental performance of companies operating in these parks.

Sustaining and sustainable (peri-) urban agricultural clusters

Agriculture is not just a rural phenomenon, but its position in the urban and peri-urban space is increasingly vulnerable, despite its importance in the food system.³⁵ Globally and in Asia, a considerable amount of food and other agricultural products are produced in urban and peri-urban areas. There is a long history of urban agriculture in the Philippines, which launched a National Urban Agriculture Program in 1998, implemented by multiple government agencies and NGOs. Some urban agriculture programs continue—and early in the Covid-19 pandemic, special efforts supported community gardens to bolster the food supply—but the bigger picture is one in which urban agriculture generally fails to compete with other land uses. From the perspective of a vibrant and healthy national food system, a more significant trend may be the continued conversion of large areas of peri-urban agricultural land to alternative uses. This changing pattern of land use has affected rice production but arguably has had a greater impact on the production of vegetables and certain animal products, lengthening supply chains for these highly nutritious and perishable foods. The conversion of agricultural land has been most extensive on the margins of Metropolitan Manila, although the highest proportional rates of conversion are observed in the rapidly urbanizing regions of Calabarzon and Central Luzon (Bravo 2017). Bren d'Amour et al. (2016) estimate that some 250,000 additional hectares of peri-urban agricultural land will be lost by 2030 based upon existing urban expansion plans in the Philippines.³⁶ This section highlights international experience in protecting urban and peri-urban agricultural land and supporting clusters of sustainable agriculture in these locales.

Although cities are not solely responsible for protecting peri-urban agricultural land—they rarely have full or direct control over changes in peri-urban land use—peri-urban agriculture generally cannot be protected without the willing and proactive participation of cities. Decades of experience with land protection policy point to political will and commitment to a course of action as stronger factors in success than any particular combination of instruments. Experience also supports the conclusion that effective protection of agricultural land rests on the use of multiple instruments in combination, including both direct and indirect measures, as well as carrots and sticks. The integration of an agricultural perspective into planning can help cities identify and address urban development policies and practices that may unintentionally be increasing pressure on agricultural land. Integrating agricultural and food system considerations into spatial planning is probably necessary (though not sufficient) to ensure that strategic

³⁵ This section draws from Acharya et al (2021).

³⁶ A recent regional survey of urban food challenges and opportunities included responses from 18 Philippine cities. Fifteen of the eighteen indicated that land use competition between agriculture and non-agricultural uses has become a significant issue. Eleven of the eighteen indicate that they have mandates to administer farmland and are acting on those mandates.

agricultural land is identified and its economic viability is preserved. Economic viability can be lost when this land is bisected or atomized by transportation arteries, infrastructure, and other development.

The protection of urban and peri-urban agricultural land can call for the removal of policies as much as for the adoption of new ones. For example, some municipal policies or practices may be accelerating the conversion of farmland by inflating urban land and housing prices and fueling urban sprawl. Assistance from higher levels of government can be helpful or even necessary to protect farmland, as seen in China and Japan. One course of action is for national governments to establish incentives for municipal leaders to make agricultural land protection a higher priority. Planning on its own is seldom enough, but it can guide the selection of instruments suited to the task. For example, the city of Vientiane in Lao People's Democratic Republic developed a master plan in 2010 to protect its dwindling peri-urban farmland and forests, yet in the years following the plan's release, those areas were still being rapidly converted to other uses, including transportation systems. The planning process evidently did not take full account of development needs, and there was a disconnect between the entity designing the plan and those making decisions about urban development (Sharifi et al. 2014).

Municipal planning and policies guided by the aspiration of compact urban design represent an indirect but no doubt consequential approach to the protection of peri-urban farmland. The prevention of sprawl can help to preserve agricultural land, while the careful use of urban land can enable food to be grown locally (Jenks 2017). Policies related to transportation and density can foster this orientation. Fuel taxes, for example, have theoretically and empirically been shown to induce more compact urban form and preserve open space (see Creutzig 2014, Creutzig et al. 2015, both cited in Bren d'Amour et al. 2016). Instruments that have been used to support compact development and spare farmland by fostering density include clustered development³⁷ and downzoning.³⁸

Siting infrastructure investments to avoid disrupting agricultural activities is another indirect way in which authorities can protect urban and peri-urban agriculture. To the extent that urban development often follows lines traced by major transportation arteries as well as other physical infrastructure like water, sewage, and power lines, careful planning of infrastructure investments can be used to spare farmland. For example, new investments can be planned to avoid bisecting productive farmland at the time of construction or in the future. Incorporating agricultural activities into new developments as outlets for neighboring farms and supply chains for local restaurants, hotels, and other consumers, could be part of the infrastructure planning process to both preserve and enhance agricultural activities.

Urban growth boundaries and greenbelts offer more direct protections of peri-urban farmland. By prohibiting or limiting new construction beyond a defined urban fringe, growth boundaries and greenbelts

³⁷ Clustered development involves grouping new residences or structures (or subdivisions) in one area and can be used to spare surrounding farmland and natural landscapes. It works by moving development rights from an area to be preserved to an area proposed for the cluster. The density of development allowed in the protected space thus diminishes (to as low as zero), while the density permitted for the cluster increases. In this respect, clustered development is akin to the transfers of development rights discussed later. Clustered development can be dictated or merely incentivized by zoning codes. This approach requires careful management, however, as the juxtaposition of residences or offices with farms can lead to conflict.

³⁸ Downzoning reduces the development density or intensity of a property, such as from one dwelling unit for every two acres to one unit for every forty acres; it also tends to reduce property value (Haight and Held 2011). Subdivision ordinances govern the division of larger parcels into smaller parcels. While they have limited power to protect farmland on their own, they can help maintain parcels that are large enough to be farmed viably. The review process they entail can help to steer new development away from farmland and ensure that new developments are compatible with field drainage patterns and the ecosystem services on which farms depend. Conservation subdivisions explicitly require that key resources such as active farmland and ecosystem services be identified as part of the approval process, and that they be given top priority.

can prevent urban expansion into peri-urban farmland. London was an early and successful adopter of this approach in 1945 (Millward 2006), building on ideas put forward in 1900. In Seoul, local plans adopted in 1966 and national legislation adopted in 1971 led to the designation of a greenbelt that now encircles the city (Dawkins and Nelson 2002). Development is prohibited within its boundaries, although the land is largely under private ownership (Kim and Choe 1997, cited in Dawkins and Nelson 2002).

Policies that protect agricultural land more directly are also needed and can draw from a well-developed toolbox of instruments. A large number of instruments involve or derive from zoning rules and land transfer and development rules more generally. Overall, they function by designating areas, including agricultural areas, in which different land development, land market, fiscal, and other rules apply. In other words, they subject agricultural land to special treatment. Examples include right-to-farm laws, agricultural easements, restrictions on the subdivision of land, transfer of development right schemes, preemption rights on the sale of agricultural land, and special tax treatment schemes, among others. Box 7 provides a snapshot of the major approaches to peri-urban farmland protection that have been pursued globally. For illustration, the discussion that follows expands on two such approaches: preemption rules and agricultural investment zones.

Box 7: Agricultural land protection in the vicinity of cities: A well-developed toolbox

The protection of farmland in the vicinity of cities is an area of policy that offers considerable experience as a basis for learning and action. Many countries recognize the loss of peri-urban farmland as a threat, with widespread attempts by municipal and higher-level authorities to contain urban expansion or manage its encroachment into farmland. The protection of farmland has been a particularly prominent planning goal in a number of “crowded” countries and jurisdictions and in high-income regions—Canada (Ontario, British Columbia), China, Germany, Japan, the Netherlands, and the United States (Oregon) are only a few examples. The following clusters of instruments have been used to protect peri-urban (or urban) farmland more or less directly:

- **Planning activities that curb urban expansion on farmland:** Comprehensive planning that explicitly includes a view of farmland based on maps, surveys, stakeholder input, and other sources, and farmland protection plans (and incentives for public authorities to plan around and protect urban and peri-urban agriculture in the first place).
- **Measures to pursue compact urban design in general (not targeted to farmland):** Density targets and incentives (including clustered development), supportive transportation investments.
- **Land-use restrictions and prescriptions that protect farmland from atomization, in-fill development, and conversion:** Urban growth boundaries, greenbelts, zoning, exclusive agricultural zoning, right-to-farm laws, agricultural easements, purchase or transfer of development rights programs, agricultural district laws (voluntary enrollment), downzoning, clustered development and subdivision restrictions, and non-disruptive infrastructure investments (that avoid bisecting prime agricultural land or disrupting water supply, for instance).
- **Land market and fiscal measures that curb market pressure to sell farmland for other uses:** Right for farmers to preempt the purchase of farmland, fiscal measures leading to the higher valuation of farmland (special tax treatment of farmed land) such as use-value tax assessment, special inheritance tax treatment of farmland to facilitate its transfer, property tax reduction programs.
- **Farm and food economy support measures that increase the value of farming:** Agricultural economic development strategies that foster linkages to the non-farm economy, various forms of farm sector support, including supportive marketing interventions, buy-local, and agro-tourism campaigns.
- **Measures to increase the public’s appreciation of local farmland:** Farm-related recreational activities, awareness campaigns, and public education.
- **Development rules that compensate for farmland losses:** To offset agricultural land losses.

Source: Acharya et al. 2021.

Preemption rules allow farming interests to prevent the purchase of designated (yet possibly abandoned or non-farmed) agricultural land for non-agricultural development. The preemption approach circumvents the problem that, with limited means, smaller or less-well-endowed towns or rural entrepreneurs will be unable to purchase land at market rates reflective of non-agricultural uses of land—to use or protect it. In France, preemption rules were put in place not only to protect agricultural land but also to increase its viability for farming. A collection of public interest (non-profit) enterprises, known by their French acronym SAFER, have the right to preempt purchases of agricultural land for and reserve it for farming. Mandated into existence by law, these organizations are overseen by the ministries of agriculture and finance. Land that is preemptively acquired by the SAFER is sold or rented to agro-entrepreneurs for farming.

Agricultural investment zones are put in place to protect farmland from both conversion and abandonment. An enhanced form of zoning used by the municipality of Beijing has involved the designation of urban and peri-urban zones that are not only made available for farming but are also the target of focused public and private agricultural investment. In the late 1990s, Beijing dedicated five zones to the development of multifunctional agro-parks meant to support food production, educational programming, and tourism. Each zone has a distinct focus. The “inner urban core” focuses on gardening, landscaping, and exhibition (Cai 2014). The “inner suburban plain” specializes in recreational agriculture, attracting tourism, and also precision agriculture using smart technologies such as moisture monitoring and automatic irrigation. The “outer suburban plain” accommodates large-scale, modern agricultural production and processing, and the “mountainous zone” is expected to grow specialty fruits and support ecosystem services. Finally, the “regional cooperation zone” is a designated area that ensures food security by bringing together farmer cooperatives and helping to ensure the quality of imports.

In general, land protection instruments are best considered in the context of the urban political economy and not assessed only at face value. A lack of cooperation on the part of landowners and land regulators who see their private interests threatened can, de facto, ensure the demise of land protection policies. In such instances, more flexible, less restrictive, or stringent policies can sometimes do a better job at protecting agricultural land than policies that, if fully implemented, would protect more land over longer periods. At the same time, land protection demands sustained vigilance to prevent capture of public governance by business interests that conflict with the interests of urban communities.

Although city and other local authorities are typically involved, public sector interventions to protect farmland frequently involve—and are driven by—higher levels of government. In Japan, the national government is heavily involved in containing urban sprawl to protect farmland. In China, too, the central government has increasingly involved itself in the preservation of farmland that it considers strategic from a national food security perspective—including by handing responsibilities and mandates down to lower levels of government. For example, China’s vegetable basket responsibility system has, since the 1990s, made mayors responsible for ensuring a secure supply of non-grain products to cities; province governors are responsible for ensuring the supply of grain products (Zhong et al. 2019).³⁹ In the meantime, China has developed a much more encompassing system involving every level of government to broadly stabilize the extent of its farmland (Box 8).

³⁹ This likely reflects the advantages of growing fresh fruits and vegetables and other non-grain foods close to cities, and the wider expanses of land needed to grow grain cost-effectively. This system presumably creates an incentive for local officials to protect and support peri-urban farming to the extent that it is important to local food provisioning.

Box 8: Major land protection policies in China

Between 1994 and 1998, the central government of China established strict administrative controls over farmland to prevent its conversion to non-agricultural use. The government adopted a comprehensive land-use plan that reflects long-term objectives and forms the basis for annual land-use plans meant to guide its implementation (Wang et al. 2010, cited in Zhang et al. 2014). National policy requires subnational authorities at every level, including townships, to formulate and abide by their own comprehensive land-use plans. These plans are meant to manage the conversion of farmland to non-agricultural uses and ensure that conversions are consistent with a set of rules.

Central among these land protection rules are the “basic farmland” and “dynamic balance” policies. They stipulate the protection of strategic farmland areas and the offsetting of farmland conversions, respectively. Under the basic farmland rule, land identified for conversion by subnational land-use plans must lie outside of zones designated as “basic farmland” for protection—and every village or township is required to have them. These zones designate the farmland that is considered to be strategic and must encompass a minimum of 80% of each jurisdiction’s cultivated land (Li 2014; Zhang et al. 2014).

The central tenet of the dynamic balance policy, also known as the “zero net loss” rule, is to require that conversions of cultivated land be offset by farmland reclamation, consolidation, or rehabilitation (Liu, Fang, and Li 2014; Zhang et al. 2014). Compensating measures are intended to leave behind an agricultural landscape of equivalent expanse and quality. Overall, the policy has been strictly enforced and upheld with respect to quantity but less so with respect to quality. Although implementation has been uneven, farmland losses have generally been compensated through farmland reclamation. However, farmland additions have not matched farmland losses in terms of quality and have tended to exacerbate farmland atomization (Liu, Fang, and Li 2014; Song and Pijanowski 2014; Xin and Li 2018).

Making space for farming in and around the city (and incorporating farming into city spaces)

In a context of heightened competition for urban space, farming has been or is being priced out of many cities. To the extent that cities are crowded, polluted, and often organized to accommodate the secondary, tertiary, and residential sectors, their physical and regulatory environments can also be inhospitable to farming. This section offers some examples of how cities have tried to accommodate space for farming, and sometimes even to drive farming into urban spaces.

A number of cities have proactively made space available to residents for farming. In Japan, the Tokyo metropolitan government has run such a program since the 1990s, making both public and private plots available to Tokyo’s urban farmers. The municipality of Seoul started taking proactive measures in this direction in 2012, under the impetus of an incoming mayor bent on making Seoul an urban agriculture leader. Between 2011 and 2013, the number of city-subsidized farming plots surged from 100 to over 2,000 (based on Seoul Metropolitan Government in Korea Herald 2014). And in 2015, the city of Seoul committed to designating a special zone for farming activities within its boundaries (Kim 2015). Part of the vision for the zone was to train city residents to become urban agriculture professionals.

One approach for cities is to make municipally owned land available for farming. Cities can make public land available for purchase or lease on the condition that it is used for farming (thus at implicitly subsidized rates). Cagayan de Oro has offered urban farming groups temporary leases of municipal lands that cannot be built on due to flood risk or the presence of electrical cables (Fages and Bricas 2017). Cities can also make public land available for farming by creating community gardens, with or without imposing access or usage fees. Many cities, including Cagayan de Oro since the early 2000s (Holmer and Drescher 2005), have designated green spaces as community gardens and established allotment systems that give

households the right to farm a small plot. The city of Daegu, Korea, reportedly engaged thousands of citizens in harvesting rice paddies it established in busy parts of the city for “greening” and recreational purposes (FAO, EStà, and City of Daegu 2018).

To make private land in cities available for farming, authorities at the municipal or higher levels can use approaches that are more or less commandeering. On one end of the spectrum, authorities can dictate that land be used for farming and purchase or otherwise claim land to mobilize it for farming. As discussed earlier, China has resorted to land reclamation on a large scale to maintain its farmland balance in the face of urban expansion. The national regulatory framework both directs and incentivizes municipal authorities to reclaim land for farming, and the business can be profitable for municipal authorities (Xi and Li 2018). In Cagayan de Oro, authorities have reportedly required parts of slum rehabilitation projects to be set aside for community gardens (Fages and Bricas 2017). Alternatively, authorities can encourage private landowners to use or lease land for farming, enticing them with tax, permitting, and other economic incentives. Cagayan de Oro has offered landowners tax incentives for farming (Fages and Bricas 2017). In the United States city of Baltimore, landowners benefit from a 90% credit on property taxes on the condition that they use their properties for urban agriculture for a minimum of five years and produce above a minimum threshold of food.

Different approaches can be used to make space for farming in cities depending on the types of farming systems and landowners being targeted. Urban and peri-urban farming systems are extremely diverse, and their spatial needs differ. Commercially oriented peri-urban farms generally need more space (for longer) than community-oriented ones in the heart of a city. In Rosario, Argentina, this diversity of spatial needs has been reflected in the recognition of different types of agricultural spaces by city planning documents. For example, city plans anticipated using 200 ha of peri-urban land for intensive, commercially oriented farming and envisioned gardens and parks in the heart of the city for agricultural use. As the following examples from Japan and Singapore illustrate, landowners also have diverse profiles that city programs need to take into account. Individual landowners can be sensitive to economic incentives couched in property and inheritance tax systems. Commercial developers can also respond to the (permitting or other) rules that govern what they can and cannot build on a property.

Japan has used a combination of approaches to protect farmland. Having mobilized public urban land for farming in the past, authorities more recently have focused on creating incentives to keep private (household-run) farms in operation. Such efforts have partly been driven by national-level authorities. Starting in 1992, the Government of Japan designated over 13,000 ha of urban land nationwide, including 3,200 ha in Tokyo, as “productive green space” and offered landowners 30-year tax breaks in exchange for using the land for agricultural purposes (Nikkei Asian Review 2017). Recently, national authorities have taken measures to maintain agricultural uses of this and other farmland in cities. In 2017, national authorities intervened to facilitate the rental of urban land for farming (The Japan Times 2017; Nikkei Asian Review 2017). These measures come at a time when the 30-year tax breaks are about to expire, and ageing farmers are selling or bequeathing their land to non-farmers at increasing rates.⁴⁰

⁴⁰ To entice landowners to lease their land to farmers, ministerial authorities made it easier for landowners to choose not to renew a lease after its term ends (The Japan Times 2017). They also took steps to minimize the involvement of local agriculture committees in approving farmland leases and directed municipal authorities to approve urban farming projects that supply food to schools, engage in community-oriented activities, or host agricultural experience events (The Japan Times 2017). In addition, inheritance tax exemptions were put in place for urban farmland that continues to be used for agricultural purposes.

In Singapore, the government has encouraged rooftop farming by putting in place incentives directed mostly at commercial developers. This case illustrates how incentives to make space for urban agriculture can be embedded in permitting or other development rules and, specifically, how green space requirements can be leveraged to encourage urban agriculture at the project level. Since 2009, Singapore's Landscaping for Urban Spaces and High-Rises, or LUSH program, has offered incentives to developers and building owners to integrate greenery into their spaces—something they are required to do when green spaces are lost in the development process (under a greenery replacement law). In 2017, in an effort to expand developers' replacement options, the government recognized rooftop farms as counting toward replacement requirements (SURA 2017).⁴¹ The government also imposed denser greenery requirements on buildings with more intensive use.⁴²

Supporting the development and the sustainable intensification of urban/peri-urban agricultural clusters

Efforts supporting the development and the sustainable intensification of agricultural production are often companions to spatial interventions involving the protection, designation, and accommodation of peri-urban farmland and other space for farming. By contributing to increasing the size, value, and efficiency of farming and other agricultural activities, intensification can help to expand the urban and peri-urban agricultural sector while compensating for the concession of some farmland to development. Cities support urban and peri-urban agriculture through a variety of means: they may provide infrastructure, advance research, offer farm and farm business extension services, and offer pertinent business support services.

One way in which municipalities can support urban agriculture is by developing infrastructure and services that support urban farms' access to inputs. Urban farms, like any others, need access to water, soil, nutrients, and sometimes electricity. While food from urban farms may not have far to travel to reach consumers in cities, resources sometimes need to be carried to urban farms with help from the built environment. Whether they invest directly or guide and facilitate the private sector to do so, municipal authorities can be involved in developing infrastructure to carry resources to urban farms and ensure the safety of resources that farms are accessing. To address water needs, for example, cities can invest directly or facilitate and guide private sector investment in water harvesting, testing, treatment, and conveyance infrastructure that can be used for irrigation or aquaculture. In particular, with the right infrastructure and standards in place, agriculture is a potential off-taker of partially treated "gray" water.

Cities can also help to ensure that foods grown in town are safe to eat by offering services to test and decontaminate urban soils. The needs of different farming systems vary by type of system and location. Aquaculture and horticulture operations are intensive users of water and nutrient resources, for example, and controlled environment farms are heavy consumers of electricity. Urban farms' access to clean and adequate resources also varies. In underserved urban areas in particular, municipal investments and oversight can support urban farming by enabling safe uses of urban runoff and waste streams. Urban

⁴¹ In a similar spirit, Shanghai allowed biodynamic farming to count toward the city's goal of reaching 35% vegetative cover by 2020 (WWF 2012).

⁴² At the same time, authorities introduced a protocol for assessing buildings' green plans. The so-called Green Plot Ratio framework measures vertical as well as horizontal green cover, opening the possibility that green walls and vertical farming structures could count toward meeting requirements. Green space requirements are just one way in which authorities can write building codes to encourage developers to make space for farming. In Singapore, to further encourage this use of rooftops, authorities committed to granting gross floor area exemptions for the space taken up by mechanical and electrical equipment relocated from rooftops to other parts of buildings.

farmers in underserved parts of cities often use contaminated urban runoff and residential waste streams spontaneously to meet their water and nutrient needs. In more developed urban contexts, urban farmers need support and encouragement to do so. In either case, municipal authorities can intervene to minimize the risk of foodborne disease that arises with the use of potentially contaminated inputs. Authorities in Kolkata, India, have long supported well-established sewage-fed aquaculture operations in the city—overseeing the safe use of domestic and industrial wastewaters over thousands of hectares of ponds (Cofie and Jackson 2013). Beijing has also promoted the safe and widespread use of wastewater in urban and peri-urban agriculture (Ji and Cai 2008). One advantage of using wastewater is that it can deliver some or all of the nutrients that are needed to grow seafood or crops.⁴³

Cities can support urban farms by developing organic waste management and composting services.

Cities of different sizes can establish composting programs of varying degrees of sophistication. Marilao in the Philippines and Balangoda in Sri Lanka are examples of secondary cities (populations of about 222,000 and 23,000, respectively) with programs to direct organic household waste streams toward urban farms (Cofie, Bradford, and Dreschel 2006; Cofie and Jackson 2013).

Some cities have developed research and extension services tailored to the needs of farmers and agribusinesses in urban and peri-urban settings. Research programs on urban farming have been undertaken at both the municipal and higher levels. In China, the Ministry of Agriculture’s Center for Protected Agriculture and Environmental Engineering is supporting research on urban agriculture, including vertical and indoor farming, across some 40 research institutes. Considerable research and development is conducted to support advanced indoor agriculture systems (“plant factories”) and hydroponic greenhouse systems (which are covered but rely on natural sunlight) in high- and upper-middle-income Asian cities. In 2016, there were at least 518 plant factories and 500 hydroponic greenhouses in East and Southeast Asia (Newbean Capital and Singapore Farming 2016).⁴⁴ With regard to extension, Beijing’s Rural Economic Research Center supports the development of knowledge and skills for urban and peri-urban agriculture—relating not only to farming approaches and technologies but also to relevant areas of business, finance, and marketing—and helps to link producers to markets (Cai 2017). Seoul’s “agro-city” vision is backed by comprehensive support that ranges from technical training and assistance to demonstrations (model farms and vertical agriculture) and awareness-raising (urban agriculture festivals, business fairs, and farmers’ markets).

Municipal extension services or similar programs can support farmers and agribusinesses directly by developing their capacity for collective action. Extension services can help by focusing not only on transmitting production-level skills and technologies but also by building social capital and the organizational capacity of farmers. They can support collective action organizations such as POs and nonprofits that empower farmers to produce and market their products more efficiently or widely. Programs such as these are widely viewed as a needed departure from traditional extension services. The

⁴³ In areas where resources are scarce, authorities can adopt incentives for resource recycling and conservation. Where municipal resources and planning capacity are inadequate to support centralized or state-of-the-art systems, hyperlocal and decentralized solutions can sometimes be developed. For instance, a “constructed wetland” project was proposed to address the problematic use of contaminated river water to irrigate peri-urban farms in Hanoi (Nguyen 2016).

⁴⁴ Among East and Southeast Asian countries, Japan is the leader in this space, with at least 200 indoor “plant factories,” according to its industry association. Other Asian countries with a developing vertical farm industry include China; Taiwan, China; the Republic of Korea; and Singapore.

number of peri-urban farmer cooperatives around Shanghai increased from 38 to 84 between 2008 and 2010, reportedly helping farmers achieve substantial increases in their incomes (on the order of 20%).

Municipalities can support urban farms indirectly by facilitating the development of local enterprises catering to the needs of local farms. Many services targeting urban and peri-urban farms, including more or less professional or commercially oriented ones, can be offered by the private sector. In China, a business sector offering specialized equipment and advice to commercial indoor farms is reportedly experiencing rapid growth. In India, firms are emerging to support various types of urban farms. Living Greens Organics, a Jaipur-based firm, offers indoor and outdoor urban farms with a full suite of products and services, from physical structures, equipment, and inputs, to analytics and technical assistance. Also based in Jaipur, the firm Hamari Krishi specializes in supplying equipment and advice to vertical hydroponic farms. In certain cities, small firms are experimenting with a variety of turnkey farming business models that allow city residents or organizations lacking farming skills or space to take part in farming activities. In India, Delhi-based Edible Routes is one such firm; it provides support to create and manage organic gardens for customers living in the region (Kumar 2018).

Municipalities are also encouraging food-related startups involving conventional and more advanced agricultural systems. Since the mid-2010s, Bandung, the capital city of West Java, Indonesia, has experienced a surge of interest in local food initiatives ranging from community gardening to farmers' markets showcasing local products. A 2017 study counted over 300 local initiatives mentioned by members of an online social media community known as the 1,000 Gardens Community.⁴⁵ Several cities in Vietnam, including Danang and Ho Chi Minh City, are actively courting and supporting "high-tech" urban agricultural initiatives through a combination of site clearance, concessional loans, and business acceleration services. Likewise, Singapore has a variety of programs to support the development of specialized agricultural technology firms to service urban agriculture (Liu 2017).

Intervening in urban food marketing systems to ensure a safe, affordable supply of fresh food is a broad approach that cities can take to bolster urban and peri-urban agriculture. For many cities in developing Asia, support for peri-urban farms may be a critical means of ensuring access to safe, fresh, affordable, nutrient-dense produce that can prevent a range of foodborne and dietary diseases. Box 9 illustrates how cities can support the midstream and downstream ends of local food supply chains. A similar approach can also be embedded in municipal rules (or guidelines) governing food procurement for municipally controlled (or influenced) institutions.

Interventions targeting public or publicly influenced institutions involved in food delivery may be a major avenue for cities to influence dietary health. Institutions involved, or potentially involved, in food purchasing, preparation, and service include schools, hospitals, office buildings, universities, and prisons. The wide range of consumers reached by these institutions gives them the ability to directly influence the diets of many. In addition, they handle such high volumes of food that changes in their practices may spill over into the food system more broadly. The hope is that demands placed on suppliers to public

⁴⁵ What makes this case noteworthy, besides the fact that Bandung is a small-to-medium city by regional standards, is the degree to which food initiatives there have coalesced around structured networks, programs, and organizations, giving rise to a movement that seems not only to be shaping the city's identity but to be spreading beyond the city. For example, Gardening Bandung, a grassroots network that grew out of a forum initiated by the mayor, gained such momentum that it was renamed Gardening Indonesia to match its wide following. The network is credited with having seeded grassroots initiatives in other cities. Similarly, the effervescence around local food production and other initiatives has drawn the attention of multiple faculty members of one of the city's major universities (ITB), positioning Bandung to become a model and learning center for others interested in local food production in other parts of the country.

institutions (such as restrictions on the use of added sugars, sodium, and fats, or requirements to meet food safety and quality standards and serve fresh fruits, vegetables, and legumes) may lower the cost and other barriers to their replication in less specialized markets. Municipal-level institutions stand to have even greater influence by pooling their purchasing power, not only within cities but also across cities.

Box 9: Urban marketing interventions to support urban and peri-urban agriculture

In China, **Nanjing** City made the development of retail channels for local products a key component of its support for urban and peri-urban agriculture. To stimulate organic food production on the city's periphery, Nanjing took to organizing a series of agricultural product festivals and exhibitions, including ones devoted to plums, grapes, watermelons, crabs, and forest products (Renting, Naneix, and Dubbeling 2013). It has also guided and made significant investments in cold chain logistics infrastructure as well as in wholesale and retail markets (including wet markets) to develop the city's capacity to market local agricultural products (Zhong et al. 2019).

The city of **Bandung** in Indonesia has been actively involved in developing marketing channels for locally grown products. The city's "healthy markets" are reserved for regional producers selling their own products and must meet health and safety requirements. Growing demand for safe and local products in the city has led to the development of similar marketing channels, including the city's so-called Green Market, Small Market, Keuken Food Festival, and Bandung Agri-Market, the latter an initiative of the city council (Dwiartama et al. 2017). Another example, outside Asia, is the city of Rosario, Argentina, which has made significant and sustained investments in the development of markets for organically produced local products.

While cities are not typically the authors of product standards, they can be actively involved in promoting their adoption and recognition among consumers. To support the actual and perceived safety of locally produced vegetables, the city of Hanoi has promoted the adoption of three standards since the 2000s (VietGAP, "Safe," and Organic) through investments in physical infrastructure, training programs targeting urban farmers in designated zones, and the analysis of safety conditions at farming sites (Pham 2017). Bangalore (India), Huairou (China), and Dhankuta (Nepal) are other Asian cities that have promoted organic or safe production standards among local producers.

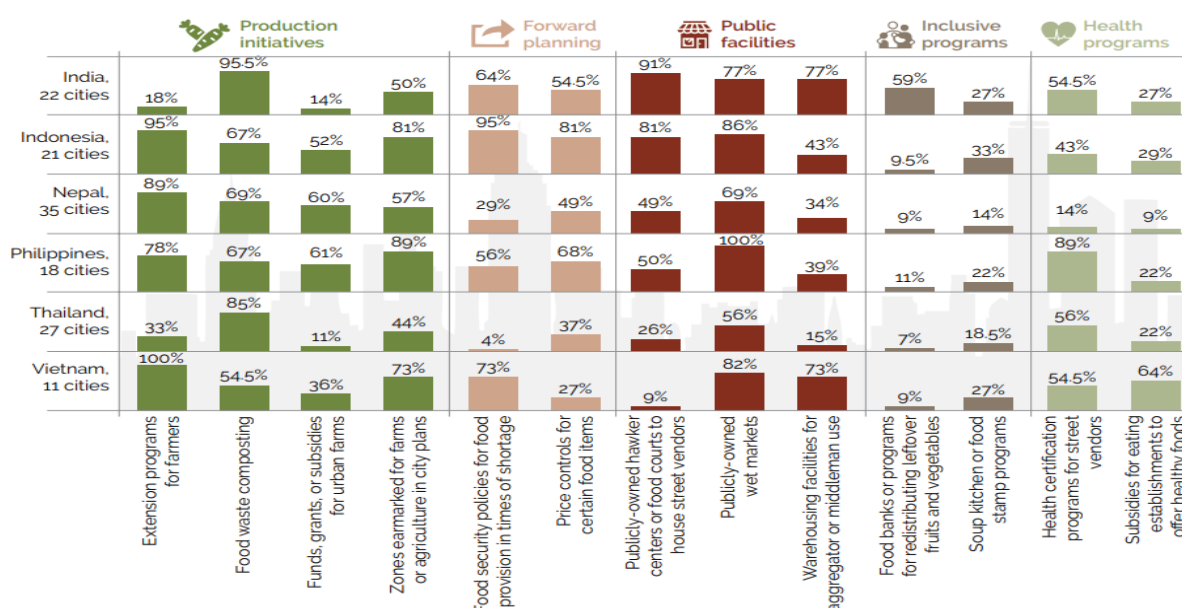
Municipal efforts to brand local products as a means of stimulating appreciation and demand have been less widespread. Japanese municipalities are noted for developing local brand names for traditional and locally produced vegetables. Some of the best known local brands are the Kyo and Kaga vegetables, named after the cities of Kyoto and Kanazawa, respectively. These and similar brands resemble geographic indicators in that they are governed by standards that restrict the brand's use to a small number of traditional vegetables that meet historical criteria and are grown using a number of traditional processes—although standards vary in specificity and stringency (Uchiyama et al. 2017). Developed during the 1990s in collaboration with local agronomists and stores, these brands are promoted by local authorities and groups as part of local revitalization efforts.

The levers of municipal authorities to shape institutional food procurement are varied. Instruments at cities' disposal include but are not limited to executive decisions relating to food spending, regulations, contractual and licensing requirements, conditional funding, public recognition, convening efforts, laws, and prizes. Additional program design variables include the pricing, timing, placement, and publicity of services; the focus on upstream measures relating, for example, to cooking and storage facilities, food service staff capacity, and supplier relationships; and the inclusion of companion food marketing and educational measures. The choice of instruments is partly informed by municipal authorities' formal and informal relationships with the institutions operating food services. Institutions may be directly controlled or funded by the city government, more loosely beholden to the city government for other reasons (dependent on permits, contracts, licenses, land leases, and so forth, or simply subject to city laws and regulations), or willing allies of government authorities looking to have a positive impact on public health.

Current levels of agri-food engagement in Philippine cities

Philippine cities have many opportunities to protect and strengthen peri-urban agricultural clusters and their linkages to consumers. Table 14 illustrates that as a group Philippine cities are as or more engaged than their peers elsewhere in emerging Asia in multiple farm-to-fork policy or program areas. The data in the table are drawn from a 2019 World Bank survey of cities in emerging Asia to gauge their perceptions of food-related challenges and opportunities and document the depth and breadth of their food policy and program engagement (Acharya et al. 2021). The survey included 170 cities in 21 countries. Nearly 60% had fewer than 500,000 inhabitants, and 40% had fewer than 200,000. The Philippines was well represented by 18 cities, ranging in size from Lubang, with a population under 20,000, to Iliolo, with nearly two million. A large majority of the Philippine cities reported having a mandate to act on many aspects of agricultural production and food marketing, and many had instituted policies and/or programs to do so. For example, a majority have mandates and undertake actions to administer farmland and administer grants or subsidies to support farming. All but three or four have a role in upgrading or planning new community food markets and in licensing food companies, food vendors, and restaurants.

Table 14: Proportion of surveyed cities in emerging Asia with active food policies and programs

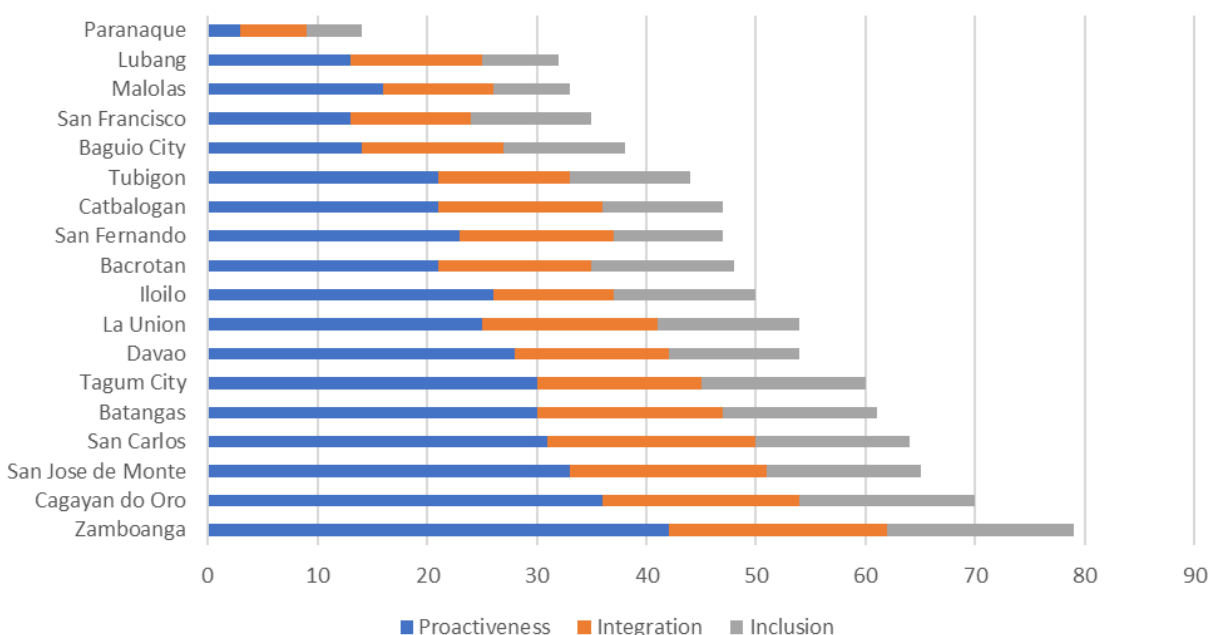


Source: Acharya et al. 2021.

Not surprisingly, there is great diversity in the depth and breadth of food policy and program engagement among Philippine cities. The conceptual framework for the 2019 survey emphasized that “smart” urban food policy engagement has three dimensions. First, it is forward-looking and proactive, anticipating future risks and opportunities and adopting measures to mitigate the risks and position the city and its hinterland to take advantage of the opportunities. Second, it is integrative (multisectoral) in nature, seeking to benefit from synergies in goals and interventions. Third, it is inclusive; it involves a range of stakeholders in prioritizing and undertaking actions, and it seeks to ensure that the urban food system delivers jobs and accessible, affordable, healthy food for all residents. Based upon the totality of survey responses, each city’s urban food engagement was rated and scored for proactivity, integration, and inclusiveness.

Figure 11 depicts the scores for the Philippine cities surveyed. Zamboanga and Cagayan do Oro received the highest ratings among the 18 Philippine cities surveyed and also ranked 3rd and 6th, respectively, among the entire pool of cities surveyed. Eight of the eighteen Philippine cities ranked in the top 25% of the regional survey, while another five ranked among the next quartile. Not all Philippine cities scored highly. Five ranked in the bottom half of the survey.

Figure 11: Philippine cities that are more versus less advanced in urban food policy engagement



Source: Acharya et al. 2021.

City respondents were asked about constraints that may have limited their agri-food policy and program engagement. A majority of cities listed limited financial resources and lack of human and institutional capacity as “major obstacles.” Far fewer cities cited the lack of a mandate to act, the absence of guiding laws or policies, or limited scope for action allowed for by the central government. Those types of constraints were more commonly cited by respondents in other countries. The Philippine cities were a particular outlier on one subject: only one reported that “lack of local political commitment and leadership” on agri-food matters was a major obstacle for more significant engagement. This issue was identified as a major obstacle in 26% of the regional sample and 40% of the cities that the survey found to be at a very early and underdeveloped stage of food policy engagement. This finding is encouraging. Overcoming resource and capacity constraints is much easier than overcoming restrictions on decentralization and/or the lack of political commitment and leadership in this area.

Implications for Inclusive Consolidation and Clustering

Throughout Asia and elsewhere in the developing world, countries have tested and applied different solutions to overcome problems associated with fragmented agricultural production and value chains. Table 15 summarizes the solutions reviewed in this chapter. In countries where the agrarian structure resembles that of the Philippines, efforts have been made to incrementally consolidate production, promote increased horizontal and vertical coordination, and cluster production, value-adding functions,

and support services in particular locations. The results are mixed. Success seems to involve a blend of strategies and interventions, with the private sector and government, especially local government, playing major roles. The review suggests that there are no shortcuts to progress—structural change and institutional innovation take time. There is no evidence that top-down, standardized models are effective in larger countries with diverse conditions. The evidence overwhelmingly points to the importance of synergies—among approaches and objectives—and the centrality of building trust, confidence, and collaborative relationships among stakeholders—whether they are farmers, communities, municipalities, other LGUs, or small and larger agribusiness companies.

Not all of the highlighted strategies or institutional arrangements are applicable, at least not at scale, in the Philippines in the near term. Some choices can be made. For example, if land consolidation is off the table, and joint farming seems unlikely except in very unusual circumstances, then efforts might focus on strengthening the enabling environment for the provision of mechanization services or the wider outsourcing of production functions. For some things, there is little choice. Given its ageing farmer cadre, it is essential for the Philippines to develop a vision and strategy for enticing entrepreneurial youth to remain in or enter farming. With its pace and pattern of urbanization, the Philippines must also develop and apply a coherent national policy for the protection of peri-urban agricultural land. Developing a strategy and set of interventions to strengthen POs is also fundamental, as the prospects for supporting successful farmer-agribusiness partnerships and successful agricultural clusters are much reduced without an expanding pool of well-managed POs. Such organizations are not developed by targeting POs and boosting them with subsidies. Professionally run cooperatives will need to be nurtured and facilitated on a sustained basis.

Table 15: Summary of consolidation and clustering approaches

Approach	Benefits	Limitations	Roles for government
Informal land aggregation and restructuring (via leasing arrangements, redrawing boundaries, etc.)	<ul style="list-style-type: none"> • Development of larger farm areas for more efficient operations and for marketing aggregation • Can be done without formal land registration • Allows people to migrate while still obtaining income from leasing land 	<ul style="list-style-type: none"> • Only relatively small areas can be consolidated on an informal basis • Usually only of short-term duration • Not suitable for long-term fixed investments 	<ul style="list-style-type: none"> • Facilitation of such processes by LGUs • Support trust development between participating farmers
Formal land aggregation (via government-supported land consolidation programs)	<ul style="list-style-type: none"> • Development of larger farms for more efficient operations, including mechanization • Provide opportunity for entry by younger farmers 	<ul style="list-style-type: none"> • Complicated to organize for large numbers of farmers • Usually requires formal land registration arrangements 	<ul style="list-style-type: none"> • Support land consolidation and provide practical assistance to bring this about • Maintain a land registry
Cooperative farming (joint farming of individually owned land)	<ul style="list-style-type: none"> • Larger land area facilitates use of mechanization, irrigation, etc. • Facilitates bulk input purchase and planting material preparation • Facilitates product aggregation for sale and development of linkages with buyers 	<ul style="list-style-type: none"> • Not all farmers may be willing to collaborate • Time consuming to organize and requires support from government officials 	<ul style="list-style-type: none"> • Develop skills of local government officials and extension staff to support cooperative farming development • Facilitate group access to finance for equipment purchase and/or access to outsourced services • Encourage private sector to develop linkages with cooperating farmers

Approach	Benefits	Limitations	Roles for government
Outsourcing of mechanization and/or other production functions	<ul style="list-style-type: none"> Realize economies of scale Enable more timely production functions by compensating for labor shortages Outsourcing overcomes the barrier faced by small farmers with the “lumpiness” of capital investment 	<ul style="list-style-type: none"> None, except when government tries to be the service provider (that is, with fleets of tractors) 	<ul style="list-style-type: none"> Promote equipment sharing, leasing, and purchase Remove obstacles to private service delivery, while developing standards for such delivery
Informal farmer marketing aggregation (for example through group marketing or farmer leaders)	<ul style="list-style-type: none"> Reduction in transport and other marketing costs Can also be used for input purchase 	<ul style="list-style-type: none"> Limited access to high-value markets Limited access to technical support 	<ul style="list-style-type: none"> Awareness creation of group marketing possibilities Support trust development between participating farmers and between farmers and traders
Promoting multifunction cooperatives	<ul style="list-style-type: none"> Reduction in transport, marketing, and input costs Economies of scale in aggregation and post-production functions Better ability to negotiate prices or lock in forward prices 	<ul style="list-style-type: none"> Smaller cooperatives may not have high caliber management; larger ones may have governance and accountability problems High failure rates, as is typical for small businesses Political interference is common 	<ul style="list-style-type: none"> Establish guidelines for cooperative management and services and monitoring performance against these benchmarks Facilitate a market for training and service provision to cooperatives When applying subsidies, have these be time-bound and part of co-financing arrangements Facilitate linkages between proven cooperatives and private agribusinesses (and financial institutions)
Contract farming (where buyers provide production and logistics support to farmers)	<ul style="list-style-type: none"> Can address rural finance constraints by providing farmers with inputs, land preparation, etc.; extension advice also supplied Reduces smallholder marketing and price risks with better market guarantees Companies are guaranteed supply, which enables them to sign contracts with their buyers and to aggregate supply to maximize throughput of processing facilities 	<ul style="list-style-type: none"> Not all farmers are suitable candidates for contract production The commodity scope is also limited (especially among staple crops) Often a need for a viable PO as intermediary or contracting party Sometimes a reluctance on the part of smallholders (and companies) to honor contracts when prices change significantly Tendency of national and local governments to want to intervene in what should be a fully commercial activity 	<ul style="list-style-type: none"> Create a policy environment in which contract farming ventures are supported Conduct basic “due diligence” on companies on behalf of farmers Organize multistakeholder meetings to explore potential for contract farming Ensure appropriate legal environment with emphasis on facilitation rather than control
Productive alliances (linking producer organizations with buyers)	<ul style="list-style-type: none"> Provide access to modern supply chains for smallholders Increase technical and managerial skills of farmers and their organizations Respond to needs of supermarkets, processors, and exporters for high-quality products 	<ul style="list-style-type: none"> Not suitable for many farmers and some commodities Risk of default on agreement by either PO or company Difficulty experienced by farmers in meeting stringent quality requirements Lack of social cohesion within POs and contradictions between commercial and social objectives Lack of managerial skills of POs and weaknesses of some private sector partners 	<ul style="list-style-type: none"> Develop co-financing from financial institutions in addition to matching grants from government or donors Pay greater attention to PO and private sector capacity at the feasibility study stage to reduce risk of failure Increase private sector awareness of both benefits and difficulties of working with smallholders to facilitate aggregation

Approach	Benefits	Limitations	Roles for government
		<ul style="list-style-type: none"> Considerable work involved in organizing linkages and preparing business plans 	
Rural agricultural commodity clusters	<ul style="list-style-type: none"> Realize “agglomeration economies” through the co-location of and relationships among producers and service providers Reduce the costs of delivering public services 	<ul style="list-style-type: none"> Successful clusters tend to center around exports and/or high-value commodities and not lower-value staples Cluster approaches may exacerbate inequalities The core of government support must often come from local rather than central authorities Growth ambitions often trump social and environmental considerations Monocropping or other narrowly focused systems may entail high covariant and ecosystem risks 	<ul style="list-style-type: none"> Employ public-private partnerships to upgrade the performance of pre-existing clusters facing significant competitiveness, sustainability, or other challenges Combine spatial and value-chain approaches to achieve sustainable development outcomes Tailor cluster-nurturing or upgrading interventions to the specifics of local circumstances and the core commodities
Peri-urban agri-food clusters	<ul style="list-style-type: none"> Securing a reliable supply of high-nutrient foods to all segments of urban populations Contribute to the realization of more vibrant, healthy, and resilient cities Provide opportunities for youth and other food entrepreneurs 	<ul style="list-style-type: none"> (Peri-) urban land may seem to be more valuable when used for non-agricultural purposes Municipal LGUs may be ill-equipped to support agri-food initiatives 	<ul style="list-style-type: none"> Protection of peri-urban cropland through zoning and other measures Leverage institutional procurement both to support farmers and promote healthy eating Provide guidelines, infrastructure, and support services to promote sustainable intensification
Agro-industrial clusters	<ul style="list-style-type: none"> External economies of scale via shared infrastructure, services, and labor Potential additional synergies via principles of industrial ecology (with re-use of waste and byproducts) 	<ul style="list-style-type: none"> Very challenging to set-up, given issues of land acquisition and the need to have suitable business models and incentives to attract investors 	<ul style="list-style-type: none"> Pilot the concept through public-private partnerships Ensure combined emphasis on economic, environmental, and social dimensions

The Way Forward: Setting Policy Priorities for the Medium to Longer Term



Chapter 5. The Way Forward: Setting Policy Priorities for the Medium to Longer Term

Building Blocks for Initiating Operations under the Clustering and Consolidation Framework

As demonstrated in many countries, the transformation of agriculture has many drivers and many important elements. Success requires comprehensive reforms to overcome the lingering effects of legacy policies, as in the Philippines, where inefficiencies developed as a result of the intense focus on rice production and reliance on input subsidies and protective trade barriers. A broad framework for such an overarching reform program is laid out in the report “Transforming Philippine Agriculture During Covid-19 and Beyond” (World Bank, June 2020). The important Rice Tariffication Act and accompanying Rice Competitiveness Enhancement Fund are a good start in this direction, but deeper and more comprehensive reforms are needed.

For the Philippines, the legacy model of highly fragmented production and irregular and disjointed value chains has run its course. It is now broadly recognized that the current trajectory of agriculture and fisheries cannot effectively deliver higher living standards for most Philippine farmers, cannot attract many new and young agro-entrepreneurs, cannot take full advantage of the opportunities presented by the expanding middle-income consumer class at home and in the region, and cannot effectively mitigate a growing set of biosecurity, climatic, and commercial risks. Transformation of the agriculture and fisheries sectors will depend on a broad range of complementary supporting policies. This report addresses only a subset of such policies, and while it is inadvisable to rely exclusively on the initiatives described here to promote transformation, they can, it is suggested, certainly form part of a more comprehensive policy framework.

The first steps toward transformation have been undertaken by the DA with AO27, establishing the Farm and Fisheries Clustering and Consolidation Program (F2C2). This program—a forerunner of the planned overarching Clustering and Consolidation Framework⁴⁶—is designed to guide the transformation process in (1) realizing economies of scale and other efficiencies in production and value chains, (2) improving the delivery of and access to support services and infrastructure, and (3) strengthening agricultural growth and the sector’s contribution to the broader rural and national economy.

The Philippines’ own experience with clustering and consolidation, combined with lessons from international experience, can provide a solid basis for rolling out operations under the Clustering and Consolidation Framework. Based on international experience, design and implementation guidelines have been developed for a range of themes related to agricultural clustering and consolidation. Some of them are noted below, and Philippine practitioners would benefit from utilizing and adapting such insights. Within the Philippines, guidelines are also being developed to implement some types of

⁴⁶ A follow-on AO providing for a “One DA Agenda” is currently being drafted to further consolidate and sustain the integration of the key strategies for transformation of the agriculture and fishery sectors.

specialized production (aquaculture, for instance) and to involve the Indigenous Political System in raising the productivity of large tracts of underused agricultural land in Ancestral Domains.

Several building blocks for initiating operations under the Clustering and Consolidation Framework are summarized below, with an emphasis on nurturing and strengthening collective action at different levels in the agri-food system:

- **Realizing scale in primary production.** This report has largely set aside the issue of agricultural land markets (leasing or other types) and has viewed the pathway to agricultural consolidation occurring, at least for the time being, via collective action among farmers, supplemented by the outsourcing of some productive functions to service-providing (small) companies. The outsourcing of mechanization, pest management, and/or other services can happen anywhere there is a cluster of farmers involved in similar activities and following similar seasonal calendars. The development of block or cooperative farming has somewhat more limited applications, however. In the Philippines, perhaps the most promising areas to pilot or pursue such models would be (1) in selected irrigation schemes where water user associations are already well established, (2) in Ancestral Domains, where there is much underused agricultural land or widespread shifting cultivation, and (3) within Agrarian Reform Communities supported by the Department of Agrarian Reform. Philippine stakeholders can draw insights and lessons from Malaysia's long experience with block farming and from Vietnam's much more recent experience supporting the SFLF model, both of which have primarily centered on rice.
- **Using collective action to foster more market-oriented smallholder production.** As noted in Chapter 4, POs can take many forms. In a farm economy dominated by small-scale growers, the reach and effectiveness of POs is critical for delivering agricultural services efficiently and as a foundation for many forms of vertical coordination. While the Philippines certainly has successful cooperatives, the vast majority of producers are not affiliated with such entities. A steppingstone rather than shotgun approach is probably needed. Attempts to force cooperation or simply entice the creation of cooperatives via subsidies or other favored treatment do not generally succeed, at least not on a sustainable basis. A voluntary and incremental approach has a better chance of success, with support being sustained through several stages of farmer group, cooperative, or enterprise development and maturation. Within the region, Japan, South Korea, and Taiwan (China) have had especially rich experiences promoting farmer groups or cooperatives. The Philippines has its own useful experience to build upon, including the support provided to like-minded farmers to establish producer groups or enterprises under MRDP and PRDP. A subset of these groups might be expected to develop into larger, commercially oriented cooperatives or enterprises over time. Over the long term, a desirable outcome would be the emergence of a variety of multifunction cooperatives, along the lines of the Sorosoro Ibaba Development Cooperative.
- **Fostering the consolidation of value chains via contract farming, productive alliances, or other regularized linkages between farmers (groups) and agro-enterprises.** These models are well understood in the Philippines, although they are not widely applied. Elsewhere in the region, contract farming has become increasingly common in poultry, pork, and vegetable/fruit production, and it has also taken hold in value chains for specialized varieties or systems for rice production. Thailand, India, and Vietnam have contract farming experiences relevant for the Philippines. Several countries in Latin America have had ample experience with contract farming and productive alliances involving smallholders. A very good analytical tool for assessing the potential and support

needed for contract farming is available (World Bank 2014),⁴⁷ along with an excellent review of Latin American experiences in supporting productive alliances (World Bank 2016).⁴⁸

- **Promoting specialized agricultural and agro-industrial clusters.** Both the potential and limitations of agro-related cluster development are highlighted in this report. Greenfield agricultural cluster development is a risky endeavor, so efforts might focus first on upgrading existing clusters, which can be done through public-private partnerships. The motivations to act and the benefits of clustering are likely to be greater in relation to the production and aggregation of higher-value commodities, perhaps involving fruit and vegetables, aquaculture-based products, or elements of the feed/livestock complex. Agricultural cluster development need not be limited to rural areas but can also be fostered in peri-urban areas in close proximity to consumers. As noted in Chapter 4, successful (and sustainable) clustering efforts will need to pay attention not only to increasing productivity but to addressing environmental, social, and other risks. A smaller subset of cluster initiatives can take the form of agro-industrial clusters (or agribusiness clusters, as they are more commonly known in the Philippines). This model should be pursued cautiously, where there is very strong private sector interest to invest, as appears to be the case of the freshwater aquaculture ABC in Taguig City and the multicommodity ABC planned for Subic Bay. Good operational guidelines pertaining to agricultural (and agro-industrial) clusters are available from FAO (2010, 2017).⁴⁹ Some cluster initiatives may need to be accompanied by an integrated approach to landscape management in order to address national resource competition. Guidelines for such efforts are also available.⁵⁰

In moving forward with the transformation agenda, it needs to be recognized that history includes many cautionary tales of poor outcomes when governments invested enormous resources in clustering and consolidation approaches that were planned and implemented in a top-down manner and/or were insufficiently piloted and adapted to local conditions. Chapter 4 of this report has many lessons in this regard, a number of which have also been experienced in the Philippines. Furthermore, as underscored by the results of the spatial analysis of Chapter 3, the Philippines is more diverse than many countries, requiring that policies and investments be crafted or adapted to local conditions. Above all, before they are scaled up in a major way, approaches must be proven to (1) be cost-effective, (2) have buy-in from stakeholders, and (3) be sustainable over time.

Evolving Roles of National and Subnational Entities

With the shift toward decentralization, LGUs will come to control and deploy the bulk of public resources in support of agriculture, heralding major changes in the roles and activities of government entities. This shift, from national (banner) programs to more locally determined and implemented programs, is expected to happen quickly in the Philippines. It has already been completed for agricultural

⁴⁷ See <https://documents1.worldbank.org/curated/en/575871468204575206/pdf/881810REVISED00y020140WB0Internal02.pdf>.

⁴⁸ See <https://openknowledge.worldbank.org/handle/10986/25752>.

⁴⁹ See FAO (2010), *Agro-Based Clusters in Developing Countries: Staying Competitive in a Globalized Economy* (<http://www.fao.org/sustainable-food-value-chains/library/details/en/c/267092/>), and FAO (2017), *Territorial Tools for Agro-industry Development: A Sourcebook* (<http://www.fao.org/3/i6862e/i6862e.pdf>).

⁵⁰ See, for example, EcoAgriculture Partners (2017), *Public Policy Guidelines for Integrated Landscape Management*, available at <https://ecoagriculture.org/publication/public-policy-guidelines-for-integrated-landscape-management/>.

extension. The DA and other central government entities will maintain their important roles in providing a national sector strategy and vision and providing an overall regulatory and business enabling framework. The implementation of centrally managed programs, if not rare, is likely to become much more selective, and increasingly central agencies will be tasked to incentivized and indirectly influence the decisions taken by LGUs and to provide technical backstopping for LGU programs. This backstopping function may include the provision of support services that require some critical mass of technical expertise that would not be effectively and efficiently managed at the local level, such as high-quality project appraisal and economic benefit/cost analysis, as well as program monitoring and impact evaluation.

This section highlights recommendations and options related to the roles that national entities, subnational entities, and other institutions can play in supporting a more modern and diverse agriculture, especially through spatially differentiated strategies and through promoting agricultural clustering and consolidation.

Department of Agriculture and other central government entities

The following recommendations or options should be considered by the DA and other central government agencies:

- **Undertake high-quality analysis to assess the scope for, constraints on, and needed policy instruments in support of agricultural diversification.** Agricultural diversification can take many forms and occur at different levels. At the level of individual farms, diversification can take place within or beyond rice-based systems, with the introduction of rotation crops or aquaculture as examples of the former, and entry into tree crops or livestock as examples of the latter. Livelihood diversification for “farm households” often extends beyond their own farm to include other sources of income and forms of employment. Particularly for poorer households with very limited land, facilitating shifts to “alternative livelihoods” may be as or more important and likely to succeed than encouraging shifts to higher-value commodities that might be fairly risky to produce and/or commercialize. Diversification—or new forms of specialization—may also be pursued at the community and landscape levels, in the business lines of particular companies, and “vertically” within an industry through the development of new products or commercialization of byproducts. To inform both national and subnational policies and programs in support of agricultural diversification, it could be beneficial to undertake and combine analyses to:
 - *Segment and distinguish the characteristics of households, communities, and natural resource landscapes*, which may influence both the need for, and the potential barriers presented by, shifting patterns of land use and agricultural livelihoods.
 - *Apply multiple (social, economic, environmental) criteria* for determining the potential benefits, costs, risks, overall suitability, and potential distributional (including gender-related) impacts of alternative farming systems, new forms of specialization, and so on.
 - *Distinguish between the private and social costs and benefits of alternative farming systems* to inform considerations of potential fiscal and technical support. Sometimes the ecosystem services benefits of diversified farming systems are considerable, yet often they are not factored into farmer or enterprise decision-making. This oversight sometimes leads to monocropping or other single-commodity investments when, in fact, the optimal approach from a social perspective might be a mixed farming, agro-forestry, or other type of system. Selective subsidy

schemes and technical support aimed to encourage economic activities with positive “externalities” or “spillovers” for society as a whole are likely to be much more beneficial than subsidies aimed at providing farmers with “private goods” such as inputs.

- **Implement policies to support the incremental consolidation of farming and agricultural production functions.** Particular attention might be given to:
 - *The next generation of farmers.* Review the evolving demographics of Philippine agriculture both in terms of farmers and agricultural workers, and assess the potential implications of this for farm management in the future. Use this analysis to inform ongoing policy discussions about agricultural land, agricultural diversification, and approaches to agricultural consolidation and clustering. Consider the feasibility of a national program to enable socially secure agricultural retirement and of a broader program to encourage new, younger entrants into the sector.
 - *Land leasing.* Review and reform agricultural land laws to permit the emergence of a more flexible land market and especially the development of an expanded market for the leasing of agricultural land by existing or new farmers and/or agro-enterprises. If deemed appropriate, support the piloting of an initiative for facilitated land leasing in selected locations.
 - *Mechanization and other services.* Review the policy and legal framework as well as the efficacy of existing programs to incentivize private investment in the supply of agricultural equipment, the development of machine hiring services, and the private supply of mechanization and other production services, especially for smallholder farmers. Consider developing a licensing or accreditation system for agricultural service providers.
- **Develop and institutionalize programs to strengthen the human capital base for a modernizing and sustainable agriculture and agri-food system.** Particular attention might be given to:
 - *Programs that encourage agro-entrepreneurship among Philippine young adults.* In this regard, review the relevance and effectiveness of current agricultural/agribusiness education programs and review the effectiveness of the various grant and loan programs introduced to support youth agro-entrepreneurship.⁵¹
 - *Programs that support the professionalization of agricultural cooperatives.* These might include training curricula, management toolkits, codes of practice, manager accreditation schemes, and so on.
 - *Programs that help to strengthen the “soft” facilitation skills of LGU (agricultural) officers.* Important matters extend beyond technical knowledge and also relate to methods/approaches for communicating strategies/policies, convening multistakeholder priority-setting platforms, brokering farmer group-company relationships, and resolving conflicts in such relationships.
- **Further develop and clarify the delineation of responsibilities and reporting among central, subnational, and LGU levels for implementing regulatory functions that are important for a modernizing and sustainable agriculture and agri-food system.** Particular attention might be given to matters related to regulatory reforms and providing regulatory oversight for: (1) agricultural

⁵¹ For example, the Youth Entrepreneurship Loan Program and the Micro and Small Entrepreneurship Loan Program.

inputs, (2) animal and plant health measures and practices, (3) food safety and hygiene practices, (4) the management of agro-related natural resources, and (5) environmental protection.

- **Provide improved frameworks and support services that can help guide and incentivize LGUs, private companies, and farmer organizations to adopt contract farming or productive alliance arrangements.** Useful functions that the DA and other central entities could perform might include: (1) development of “codes of practice” for contract farming and productive alliance relationships, including guidelines to resolve problems and conflicts in those relationships; (2) development of analytical tools for assessing the feasibility of contract farming and productive alliance arrangements and for monitoring and evaluating their performance; and (possibly) (3) putting in place financial incentives such as lines of credit or a challenge fund, using partial matching grants, to incentivize especially innovative contract farming and productive alliance arrangements, perhaps involving new products or in challenging locations.
- **Facilitate deeper engagement by municipalities in agri-food policies and programs.** While most initiatives to support this engagement need to be designed and implemented at the local level, national agencies can play very important roles to enable effective local action by: (1) reviewing and updating regulations and otherwise providing guidance to cities on policies, rules, and incentives to protect peri-urban agricultural land; (2) creating an information platform for cities to share experiences and solicit advice on addressing urban food matters; (3) developing a national strategy for wholesale food market development and financing to encourage (yet avoid duplicative) investment; (4) developing and disseminating guidelines for cities to upgrade community food markets and improve their management and regulatory oversight; and (5) as mentioned, providing support services that require a critical mass of technical expertise that are beyond the capabilities of local governments, such as high-quality project appraisal and economic benefit/cost analysis, and program monitoring and impact evaluation.
- **Facilitate the development and competitive upgrading of agricultural clusters.** The best way for central agencies to support this development may be to: (1) disseminate analytical tools for LGUs to diagnose cluster status and needs, and (2) provide guidelines for LGUs on how to facilitate cluster-level dialogues and other platforms, assess the rationale/feasibility of public-private investments or other collaborative ventures, have stakeholders tap into other pertinent national programs, and monitor and evaluate progress against stated objectives or targets. To develop these tools and guidelines, the DA can draw upon guidance tools already developed by the FAO and other organizations and adapt them to Philippine circumstances.

Local Government Units and municipalities

LGUs are expected to be the primary implementors of programs to support agriculture and agro-enterprises. LGUs and municipalities will be responsible for using block grants from the central government and mobilizing other resources to catalyze and support the transformation of agricultural production and value chains.

Recommendations and options for LGUs include:

- **Use proven approaches to help consolidate local farming and/or realize more economies of scale in farming systems that are still based upon smallholders.** LGUs might aim to facilitate a more active local market for agricultural land leasing by creating an information platform and developing

surveying, recording, and brokerage services, which could greatly reduce the transaction costs and risks for those involved. LGUs can also act to promote more active and competitive markets for the provision of mechanization and other agricultural services by accrediting and incorporating such players into local programs, encouraging links between them and farmer organizations, and ensuring that such service providers are able to participate in existing small business promotion schemes. These entities can create information platforms to enable farmers to rate and comment on the quality of services provided to them.

- **Incentivize and support different forms of collective action among local farmers.** LGUs can determine the feasibility of and potential interest in joint/block farming arrangements and support pilot testing of this model, perhaps through partial matching grants, yet without locking in farmers for multiple years in case the pilots do not bring satisfactory results. They could also implement a phased program to support the emergence and evolution of different types of local POs, including small groups and multipurpose cooperatives. Where water user associations are well established, LGUs can consider whether those associations could assume a broader set of functions, and if so, assist this process. They can incentivize and support agro-enterprises to collaborate more closely with farmer organizations, yet only where they have a proven track record.
- **Support agricultural cluster upgrading.** LGUs can apply best practice methods for assessing agricultural cluster potential and support needs. They can draw upon multistakeholder platforms to define needs and prioritize interventions. Initiatives would seek to combine spatial and value-chain interventions and to integrate social and environmental dimensions. These efforts should initially focus on clusters that have already developed organically and matured but face critical productivity and sustainability challenges that require increased collective action and would benefit from a formal public-private collaborative program.
- **Develop and implement multifaceted urban and peri-urban food system initiatives to realize important synergies among interventions.** For cities with limited experience in this domain, start with a single focal topic (theme, problem, or opportunity), develop a constituency around that topic, and pilot interventions. Subsequently build upon that experience to widen the targeted engagement. Cities should be proactive and use multiple instruments to protect peri-urban agricultural land. In some circumstances, they might promote sustainable high-value agriculture there and tie it into city programs to promote healthy and safe eating (including through institutional procurement programs). Agri-food matters should be mainstreamed into city economic and physical development plans. A broad menu of possible entry points and instruments available to cities has recently been documented by the World Bank (Acharya et al. 2021).

Research and training institutes

Philippine research institutes, universities, and other entities that provide training also have significant roles in supporting a more modern and diverse agriculture. Their roles include providing information for policy deliberations, helping national government entities and LGUs to design and implement programs, and assisting farmers and agro-enterprises to collaborate and raise their performance.

In support of the F2C2 agenda, research and training institutes can:

- **Adapt and facilitate the application of various methodological tools,** including those used to undertake spatial analyses of agricultural systems and performance, to apply multiple criteria in

prioritizing problems and solutions, to assess the potential for and possible constraints/risks associated with agricultural diversification and new forms of specialization, and others.

- **Develop and assist in the application of monitoring and evaluation tools for the F2C2 initiative.** This activity would likely include development of a set of indicators and regularized reporting systems, together with periodic surveys and case studies to drill down deeper into emerging patterns and perceptions and extract lessons from various interventions or examples to inform policy and program revisions in the future. Programs and projects need to be evaluated using high-quality economic analysis of costs and benefits, not just against uni-dimensional indicators such as production, participation, or income targets.
- **Develop training curricula and train trainers, which will have a wide outreach in support of local initiatives.** Training might focus on various topics covered in this report, including the professionalization of cooperatives and acquisition of facilitation skills by LGU officers. Important training needs could be identified through a survey of LGU staff and others.

Clustering and Consolidation Operational Framework Requirements

Achieving the goals initially defined by AO27 and to be elaborated upon in the planned AO defining the “One DA Agenda”, will require significant changes in how technical, financial, and advisory services are formulated, delivered, coordinated, and managed. This “whole of government” effort will require coordinated approaches by national government agencies, LGUs, and private sector interests.

The key overriding requirements to operationalize and sustain the Clustering and Consolidation approach to transforming the agriculture and fisheries sectors are:

- **Leadership.** Reshaping the agriculture and fisheries sectors must be seen as a “whole of government” goal, which will require leadership from the DA. The mainstreamed PCIP process (Chapter 2), recently enhanced with links to regional and national planning processes, provides solid collaborative, convergence, and technical underpinnings for “whole of government” connectivity in the transformation processes. The PCIP and Regional CIP processes also provide a means for leveraging key infrastructure investments to catalyze further development of the sector—for example, through farm-to-market roads, post-harvest facilities, fish landings, or private investment in ABCs.
- **Clarity of policy.** While the AO27 goals are well defined, DA policy requires further clarity to establish that henceforth all DA services, programs, and collaborative arrangements should be directed to supporting those goals, and that service delivery by the DA (including partnership arrangements with other national government agencies, LGUs, SUCs, research agencies, and the private sector) should seek to promote the clustering of farmers and fishers, the consolidation of production to build economies of scale, and diversification into higher-value commodities.
- **Timeframe.** The approach and key thrusts in operationalizing the Clustering and Consolidation Framework will require long-term, sustained support across administrations. While short and medium-term outcome targets should be set and monitored, international experience shows it will be essential to maintain a consistent trajectory of change in the way of doing business. The pace of transformation will also undoubtedly vary across regions and commodities, providing experiences

and best practices that will be essential to capture and disseminate, but also requiring interventions tailored to the status of development in different regions.

- **Consistency and convergence in service delivery and approach.** Each concerned agency of government, the DA, and LGUs needs to evaluate and revise its ongoing programs to show explicitly how those programs contribute to reshaping the agri-fisher food system consistent with the AO27 goals and other policy priorities. A fragmented and inadequately coordinated approach to the AO27 goals should be discontinued or substantially reformed.
- **Stakeholder engagement.** A comprehensive communication strategy is needed. It should be tailored to the interests of specific stakeholder groups and provide direction on the nature and means for each group to support and contribute to the overall goals of reshaping Philippine agriculture. The DA's many existing collaborative mechanisms and fora should all be used/refined to promote and explain the national imperative of transforming the agriculture and fisheries sectors.
- **Social formation and sequencing of support for development of enterprise clusters.** It is a priority to develop the expertise and capacity that service providers require to promote and support the formation and sustainability of viable clusters. Service providers will need to be able to explain the benefits of clustering, provide information on incentives and processes, and build consensus and understanding of business plan processes, requirements, and commitments. The scope of this undertaking and the sequencing of support that will be needed should not be underestimated; specialized training and assignment of dedicated staff/service providers will be essential to provide these key functions. Experience developed through PRDP in enterprise startup and expansion should provide a basis for developing this broader expertise. Moreover, as the Enterprise Tracking Assessment tool of PRDP has shown, substantial follow-up support will be needed by new enterprises on a continuing basis to support their viability over the longer term.
- **Multifaceted approach.** Considerable spatial variability exists across regions and provinces, which will require a flexible approach tailored to the specific provincial, municipal, and regional circumstances, while also providing a wealth of experiences and options to inform approaches in other areas. The kind of spatial analysis used in Chapter 3 could be applied to help guide the selection of regions that would be considered priorities for particular approaches, although more in-depth analysis would need to be carried out before final decisions were made.
- **Accountability for results.** The proposed AO defining the "One DA Agenda" integrating strategies for transforming the agriculture and fishery sectors must be underpinned by well-defined key performance indicators and monitored against annual targets. Targets will necessarily be different across regions, but it is suggested that DA-ManCom assume responsibility and accountability for ensuring that DA regional targets are met and that bottlenecks and constraints are addressed as they arise. A "whole of DA" institutional commitment (buy-in) to the goals of the program will be necessary if the program is to be successful and sustained.
- **Costs.** As an overarching framework, designed to contribute to the goals and directions for reshaping the agriculture and fisheries sectors, the incremental costs of a Clustering and Consolidation Framework are expected to be minimal. Costs associated with the various strategies outlined below should be covered through ongoing programs that are reoriented or modified as needed to respond to the new way of doing business under the framework.

Near-term Implementation Strategies for Clustering and Consolidation

Lessons and feedback from the various consultations that have underpinned this analysis suggest that six operational strategies are key to implementing the Clustering and Consolidation Framework (Figure 12). Implementation will be an evolving and iterative process, however, requiring adjustments as experience is gained over time.

Figure 12: Six key strategies for operationalizing the Clustering and Consolidation Framework



Strategy 1. Provide effective communication of goals, policies, incentives, and opportunities for clustering and consolidation. An enhanced, intensive Communication Strategy is fundamental for promoting broad awareness and understanding of the changes envisioned through AO27. To reach the entire range of stakeholders effectively, the strategy must tailor communications to different audiences and their interests, including farmers, LGUs, national government agencies, SUCs, research institutions, buyers, consolidators, agri-aqua processors, business outlets, and civil society. The Communication Strategy needs to include a feedback mechanism to assess whether key messages have been clearly received and whether the DA in turn has understood stakeholders' concerns, which may call for the strategy or specific programs to be adjusted. The messages to be conveyed must: (1) clearly explain how the DA, in partnership with LGUs, plans to accelerate the modernization of the agriculture and fisheries sectors; (2) describe how programs will be reoriented to focus on providing technical support, building entrepreneurial skills, and facilitating market linkages for small-scale farmers who are willing to cluster and consolidate their production to build economies of scale; and (3) specify the incentives that will be available to promote and support the active engagement of farmers and fishers in clustering and consolidation—for example, the provision of farm equipment, inputs, machinery, and scholarships. The communication about incentives must be clear and consistent from the outset. Success stories and best practices in promoting clustering, consolidation, market opportunities, and other initiatives should be widely shared. Success stories and best practices in promoting clustering, consolidation, market opportunities, and other initiatives should be widely shared. Suggested key messages are provided below.

Suggested key messages in a Communication Strategy supporting clustering and consolidation

- a) PAFES/CAFEPs will be the platform for the convergence of extension and research services of the DA, SUCs, other national government agencies, and other partners in support of business-oriented and managed clusters, associations, groups, and cooperatives.
- b) Programs and services will be directed primarily to organized groups of farmers and fishers included in the National Farmer and Fisherfolk Registry System.
- c) The process of forming clusters, strengthening their capacity, and developing and implementing viable business plans is a special focus.
- d) Clusters will be linked where feasible with agri-aqua-industrial business corridors (ABCs).

Strategy 2: Expand support for business planning and enterprise management along key value chains.

The operational framework must include a strong element of support for the formation of viable clusters and the development of business plans, combined with training to orient, help develop, and sustain viable clusters to become well-managed enterprises, as discussed later. While such support has long been recognized as critical for the viability of associations and cooperatives, it must become an institutionalized, sustained, and core function of service delivery. A practical approach for providing this support would be to build on the considerable capacity in social formation and business plan formulation and evaluation that has been developed (nationally and in RFOs and LGUs) through implementation of the I-Reap component of PRDP. As experience from PRDP has also shown, building DA and LGU staff capacity in business planning and enterprise management takes time and requires concerted, sustained, on-the-job training. Suggested activities are listed below.

Suggested activities to support business planning and enterprise management

- a) Provide one-time grants to assist business plan development, coupled with incentives such as the provision of equipment, seed, livestock, brood stock, and others.
- b) Enable clusters with enterprise business plans to have priority in accessing The Agricultural Competitiveness Enhancement Fund (ACEF) loans.
- c) Explore the possibility of delivering services to support enterprise management by contracting qualified service providers, such as SUCs.
- d) Further adapt the business plan requirements to be more commensurate with the size of the enterprise, whether micro, small, or medium. Avoid overly complex or lengthy requirements, especially for micro and small enterprises.
- e) Consider refining the nature of the enterprise and infrastructure support being provided through PRDP to reinforce the goals of AO27 (for example, in supporting key public-private enterprises and agri-aqua corridor investments needed to further catalyze enterprise-based agriculture and fisheries sectors, such as cold-storage, consolidation and packing warehouses, fish landings, and online trading platforms).

Strategy 3. Adopt a spatial approach to agricultural development plans and policies. Clustering and consolidation already incorporate a spatial approach, although at a more meso level—communities and perhaps townships. The spatial approach should also span a broader land- and sea-scape at a more macro level, taking into account differences across space and customizing interventions accordingly. Such spatial differentiation should explicitly reject a “divide-by-N” mentality and embrace location-specific targeting.

It is convenient to assess differences at a regional level (Chapter 3), because the data are available and national government programs are structured administratively into regions. Nonetheless, the spatial approach could be adopted down to the provincial level or, better still, contiguous agriculture and

fisheries development zones (delineation of such zones is itself a spatial planning exercise). In turn, these zones, together with the assessment of key value chains, will support the establishment of agri-aqua corridors as a focal point for coordinating public and private investments, some of which can be made through formal public-private partnerships.

The spatial approach is essential to Strategy 2 above, as a way to refine the nature of the enterprise and infrastructure support being provided through PRDP to reinforce the goals of DA's Consolidation and Clustering Framework. Whereas PRDP was designed to provide catalytic funding for startup and expansion of enterprises to demonstrate opportunities and motivate farmers and fishers, as the framework is rolled out nationwide, PRDP enterprise support (I-Reap) could be more effectively directed at promoting and supporting key public-private enterprises and agri-aqua corridor investments needed to support and further catalyze enterprise-based agriculture and fisheries sectors. Such a refinement could, in particular, strengthen the focus on infant industry constraints by supporting partnerships with LGUs and/or the private sector for provision of services (cold storage, consolidation and packing warehouses, fish landings, and market facilities such as online trading platforms). The Multi-Criteria Decision Analysis described in Box 10 may offer useful insights for refining options and strategies.

Box 10: Alternatives to rice monocropping: Using multi-criteria analysis

Multi-criteria decision analysis (MCDA) has particular value in situations where there is likely to be no single optimal result but rather trade-offs among objectives. One example is agricultural diversification, where different farming patterns may have varied strengths and weaknesses with regard to economic, social, and environmental dimensions, while being more or less suitable for different types of farming units and locations. MCDA is being applied in the Mekong River Delta region of Vietnam to explore farming systems options where the underlying economics of monocropping rice on small scale farms is marginal and where adverse environmental impacts are emerging. The ongoing work has covered four main categories (resilience, economic, social/institutional, and environmental) and eighteen subcategories. It has involved: (1) a stock-taking and mapping of existing agricultural production systems, (2) a soil and water suitability analysis of alternative production models, and (3) multiple criteria analysis of alternative models based on consultations with experts, local officials, and surveys/focus group discussions with farmers.

The results of the analysis shown in the figure below point to the poor economic and environmental performance of monocrop rice production (denoted by 2-crop rice and 3-crop rice). Other forms of specialization have favorable characteristics, although the bulk of the recommended land-use shifts in this region relate to diversification *within* rice-based systems, essentially to involve rotation models with other, higher-value crops, or with aquaculture.

Ranking of livelihood models for suitability and sustainability, Upper Region

Model	Suitability with natural condition (weight=2)	Climate change resilience index	Economic index (weight=2)	Risk coping ability index	Social index	Environment index	Gender index	Final suitability and sustainability index
Rice-lotus	4.0	4.7	4.0	3.5	4.0	4.9	4.5	4.2
Rice-aquaculture	2.5	4.3	4.0	4.0	3.5	4.6	4.5	3.8
Duck	4.0	3.7	2.8	3.3	2.5	4.8	4.5	3.6
Rice-fish capture	2.5	4.0	3.5	2.8	2.5	4.8	4.5	3.4
Fruit tree	2.5	1.7	4.0	2.8	4.0	3.2	4.5	3.2
Rice-vegetable	2.0	3.0	3.3	2.8	4.0	4.0	4.0	3.1
Pangasius	2.5	2.0	3.0	2.5	5.0	3.3	4.0	3.1
Specialized vegetable	2.5	2.0	3.0	2.8	5.0	3.1	3.5	3.0
2-crop rice	2.5	3.3	2.5	4.0	1.0	3.6	4.5	2.9
3-crop rice	2.0	2.0	2.5	4.0	3.0	2.1	4.0	2.7

Note: 1 = very low; 2 = low; 3 = medium; 4 = high; 5 = very high.

Source: Authors' calculation from survey data. See World Bank and IPSARD (forthcoming). "Climate Change and Sustainable Livelihoods in the Mekong Delta: Development Alternatives and Policy Implications."

Strategy 4. Provide targeted support for social preparation, institutional build-up, and enhanced access to technical and financial services for clusters. While arrangements between the DA and LGUs for the provision of technical services are undergoing changes as PAFES evolves, the nature and quality of technical services needed to support the goals of the proposed Clustering and Consolidation Framework will also need to change. As discussed under Strategy 2, enhanced service delivery (through SUCs, for example) in enterprise management will be essential. With crop diversification, new cropping patterns and more intensive cultivation and fishing techniques will be required, and such factors as pest and disease outbreaks, water shortages, changing weather patterns, and requirements for soil management will add to the risks and challenges facing farmers and fishers.

Increased emphasis also needs to be given to closing the technology gap for many of the country's farmers and fishers. While collectively the DA, Department of Science and Technology (DOST), The National Irrigation Administration (NIA), SUCs, and the national and international research centers have much to offer, the dissemination of technology is largely uncoordinated, often linked to a specific commodity, and not delivered in support of a diversified, collective farming approach. Accordingly, it is suggested that the Clustering and Consolidation Framework should put the dissemination and demonstration of technological advances, opportunities, and best practices as the centerpiece of the overall strategy. The DA's Bureau of Agriculture Research could play a leadership role in coordinating the focused response to the technological advances needed to underpin the modernization of the sector. It should maximize the use of digital tools to enhance access to technical and financial services (such as IRRI Crop Manager, PRDP eVSA, PRDP I-Plan, PRDP geotagging and geo-maps, CRVA, current DA-Agricultural Training Institute IT tools, Commodity Online Pricing platforms, and others).

Strategy 5. Strengthen market and value-chain linkages and productive partnerships. While much has been done by the DA nationally and regionally through RFOs, LGUs, and others to strengthen the collaboration with consolidators and agribusinesses, this must remain a key strategy for the successful operationalization of the Clustering and Consolidation Framework. Key suggested activities are listed below. RFOs in collaboration with Provincial LGUs should establish a regular forum for meeting with consolidators/buyers and relevant agribusiness firms operating in the area to exchange information, identify bottlenecks, and jointly work toward strengthening the value chain and associated logistics for key commodities in the area. To promote tangible results, a key element of the DA's role could be support for public-private partnerships or critical infrastructure, as well as assistance in meeting regulatory requirements. Provinces should be encouraged to support such ventures through tax concessions, permit facilitation, and other means.

Suggested activities to strengthen market and value-chain linkages

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|---|
| <ul style="list-style-type: none"> a) Develop mechanisms for reducing lengthy delays for farmers and fishers in receiving payment for produce from consolidators/buyers. b) Fast-track farmer/fisher registration in the National Farmer and Fishery Registrations System to better target support and enable insurance coverage under PCIC. c) Share successful or innovative initiatives—for example, through learning caravans—to stimulate creative competition among provinces and across regions. d) Explore where feasible the branding or grading of produce, both to enhance quality and increase sales price for farmers and fishers. |
|---|

Strategy 6. Enhance education and outreach through digital agriculture and enabling IT tools. While the strategies outlined above are designed to accelerate the pace and effectiveness of transformational change in the short to medium term, a strategy for developing employment and business opportunities over the longer term should also be included. In particular, the DA, through its Agricultural Training Institute, should expand the development of short courses specifically designed for managers of cluster, association, and cooperative enterprises, as well as the financial/accountant managers in such enterprises. Such courses could include applications of modern technologies (digital agriculture and enabling IT tools, such as drones, computer software, geotagging, and others), tailored to the interests of small and larger clusters. To actively promote this training, a program of financial support could be offered to managers of established enterprises (perhaps defined as enterprises that have operated successfully for more than three years) to participate in courses (of one week, for example).

Suggested activities to promote a business/enterprise-oriented approach to farming and fisheries

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| <ul style="list-style-type: none">a) A scholarship program could be offered to students of cluster members, perhaps building on such ongoing initiatives as the Youth in Agriculture Agricultural Credit Policy Council and PCIC programs.b) The DA, in collaboration with the Department of Education, could seek ways for school programs to foster an appreciation of technological advances and business/employment opportunities in the agriculture and fisheries sectors, rather than focusing primarily on production.c) SUCs could be encouraged to ensure science-based agribusiness is included in business management case studies, and that up-to-date technological innovations are included in all agricultural courses. |
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Annex 1: Space and Agricultural Transformation: Clustering, Consolidation, and Geography

Economic specialization in the agri-food system is driven by spatial characteristics on both the supply and demand sides. At the meso level, farming areas may configure into supply and service clusters to realize advantages from horizontal and vertical coordination. At the macro level, geographic specialization can be explained by natural and historical endowments of different national and subnational regions. Aside from endowments, endogenous differentiation into urban centers and rural peripheries is the foundation of development of an agri-food system. In this system, the periphery becomes a supplier of land-intensive products (food) catering to both domestic urban demand, as well as export demand. The entire agri-food system is tied together by a logistics network whose efficiency strongly affects the smooth functioning of the system. This framework provides a conceptual underpinning for the discussion of meso-level clustering and macro-level programming.

Space at a Meso Level

A narrow view of agriculture focuses on primary production (crop cultivation, capture fisheries, and so on), which can be replicated no matter how many production units are used (one hectare or one hundred, one boat or twenty). Implicitly this view imposes constant returns to scale at the level of primary production. There are however advantages to coordinating production decisions over a contiguous area to benefit from positive externalities across plots or fields. This coordination is readily achieved in a large-scale plantation under a unified management; to some extent it can be replicated in a more decentralized smallholder setting. Synchronization of planting over separate fields has been deemed essential in the control of pest, disease, and water flow in the Philippine setting (PhilRice 2020). In Bangladesh, the decision to adopt integrated pest management in isolation may be disadvantageous to the pioneering farmer, as neighboring farmers' conventional practices may still damage the natural ecosystem on which the pioneering farmer depends for pest control and human health (Dasgupta, Meisner, and Wheeler 2006).

The advantages of clustering farm production are amplified once vertical relationships over the value chain are introduced. Historically, large-scale plantations have emerged to coordinate with large-scale processing and logistics downstream (Hayami 2010), as seen most clearly in oil palm plantations surrounding a palm oil mill, sugarcane haciendas surrounding a sugar mill, and banana plantations in relation to packing and export shipment facilities. The first two examples ensure some minimum throughput of feedstock deliveries into a large-scale processing plant. The third includes quality control in the vertical relationship—in other words, the exporter must impose production and postharvest systems that ensure adherence to product and safety standards required by downstream buyers. Prior to land reform, this was typically accomplished under unified management and land ownership. Post-land reform, the advantages of land consolidation had to be conferred through alternative arrangements such as leasehold and contract farming (Pantoja, Alvarez, and Sanchez 2019).⁵²

⁵² Pantoja, B., J. Alvarez, and F. Sanchez. 2019. Recommendations toward successful Agribusiness Venture Arrangement. Research Paper Series No. 2019-02. Quezon City: PIDS.

Overall, clustering realizes economic benefits based on a network of vertical, horizontal, and support relationships (Galvez-Nogales 2010). Vertical relationships along a “value chain” coordinate between suppliers of raw materials and production inputs, producers, processors and exporters, institutional buyers, and retailers. Horizontal relationships meanwhile realize benefits from coordinated production across numerous farmers through cooperatives or smallholder arrangements. Finally, support relationships from service organizations such as business service providers, research institutes, community organizers, and local governments strengthen quality and sustainability features of the chain.

These rationales for clustering are not merely conceptual figments, but are supported by evidence. In Brazil, soybean farmers benefit from producing in clusters (Richards 2017). In China, while manufacturing has agglomerated towards the South and East, crop production has moved out of eastern provinces, towards central and western provinces. The breadbaskets in the northeastern Yangtze plain and the Pearl River Delta have been on the decline as industrial development was prioritized. A fundamental driving force in the evolution of agricultural cluster regions was simultaneous specialization and diversification out of traditional staples (Li et al. 2017). Finally in West Java, Indonesia, Wardhana, Ihle, and Heijman (2017) find the following:

- Horizontal clustering significantly reduces poverty rates in subdistricts.
- Specialization in agriculture within a subdistrict reduces the poverty rate of that subdistrict.
- Localization externalities support agricultural growth—in other words, farmers are expected to perform well when they are able to share inputs, knowledge, information, or labor.

Space at a Macro Level

Natural and historical endowments

One obvious way that geography affects agriculture is proximity to resources; for instance, marine fisheries and marine aquaculture must typically be implemented in coastal communities. Cost differences across space may often be traced back to the natural resource base, or else understood as the legacy of past investments, such as investments in land development or a perennial crop stand. The Philippines is a major seaweed exporter owing to its vast tropical coastline. Likewise coconut, a coastal palm tree, became a widely planted crop after a Spanish colonial edict in 1642 mandated the growing of coconut to supply fiber and charcoal for Spanish ships. Later, during the American period, coconut planting further expanded when copra found a market in Europe as raw material for soap and margarine (Dayrit 2005). Conversely, geography can also introduce cost disadvantages: the Philippines is a high-cost producer of rice compared with the Mekong countries endowed with vast river basins and floodplains; hence the Philippines is a traditional rice importer while Cambodia, Myanmar, Thailand, and Vietnam are traditional rice exporters (Dawe et al).

Supplier to urban markets

Not everything can be explained by natural or historical endowments. The field of economic geography has cogently argued that agglomeration economies are the critical factor behind the emergence of economic concentrations known as “cities” or urban centers. Economic actors benefit from being located close to each other; agglomeration economies arise when the advantage is reinforced as more and more actors concentrate. Where a concentration arises is essentially arbitrary—it is not necessarily based on

deeper fundamentals such as the resource base. (Historically, though, some geographic feature may “seed” a concentration, such as a natural harbor or wide riverbanks.)

Obviously transport cost goes down for the average transaction when agents reside together; these transport cost advantages interact further with economies of scale to further incentivize concentration. External economies of scale imply horizontal agglomeration—firms that locate near each other reduce per unit cost. This is because of spillover benefits, such as a reduction in search costs of buyers and skilled workers, or the diffusion of innovation within the cluster. Internal economies of scale imply vertical agglomeration, meaning a bigger market size will incentivize firms to invest in a larger scale of production, thereby reducing the unit cost of production. In turn, households may opt to migrate closer to such firms and thereby increase access to lower-cost goods, further increasing the size of the local market. The concentration is referred to as an urban zone or area, and the periphery a rural zone or area.

There are of course countervailing forces to agglomeration: essentially, immobile goods and resources become scarcer and scarcer within an urban zone as households and producers continue to move into it. This drives up the cost of land and non-tradables; moreover, ecosystem services (waste disposal, dispersal of air emissions, and others) may become severely burdened, especially in largest concentrations. At the margin, the marginal household/producer should find the decision to move into a concentration or to stay outside to be of equal benefit, which delimits the equilibrium size of an urban center. The residual production area defaults to the rural periphery, which therefore specializes in land-intensive farming activities. The sale of agricultural products to urban households entails marketing channels that are more extended in space, as well as connecting infrastructure such as roads (and perhaps railways and ports).

The rural periphery is not only a producer of agricultural goods; it is an economy in its own right, with considerable levels of economic activity occurring in the non-farm sectors (Briones 2020). Gruber and Soci (2010) point out that the rural periphery may be divided into at least three zones, namely the peri-urban, the middle countryside, and the remote rural area. The former may specialize in supply of perishables (such as fruits and vegetables) as well as labor to the urban center (accessed via commuting). Empirical work has shown that urban decentralization and increased commuting have significant spillover effects on rural areas. Meanwhile the middle countryside and even remote rural areas offer, aside from agricultural goods, recreational and ecosystem services to cities and towns.

Policy Takeaways

The spatial perspective on agricultural transformation extends beyond conceptual frameworks, as it offers actionable implications for policy. In developing Asia, the burgeoning middle class resides primarily in urban centers. Their preference for safer, more diverse, and time-saving food consumption opens a vast market opportunity for the rural periphery. Cities already contribute half of food expenditures, and this spending share continues to rise; unfortunately, in middle-income Asia (including the Philippines), cities have become a hotspot for the double burden of malnutrition. Urban policy, long associated with urban planning within its territory, can extend outward toward the agri-food supply network (Jaffee et al. 2020). Implications at the meso level of farm clusters are explored in depth in Chapter 2 in the context of the DA F2C2 and other national government programs. At a macro level, considerations for agricultural programming and investment are discussed for subnational units in Chapter 4.

Annex 2: Summary of Findings from Farm-to-Market Road (FMR) Development Program Public Expenditure Review

Among the important findings of the review are:

- While the budget for the national road program as a whole has been increasing significantly in recent years, the share of that program devoted to FMRs has been declining, falling from 7.6% of the total in 2015 to 2.6% in 2021 (projected). Even in absolute terms, the FMR budget has been reduced from PHP 14.9 billion in 2015 to PHP 10.4 billion in 2021.
- One reason for the budget reductions is poor performance by the program, including an apparent underutilization rate of 70% in 2019—meaning that only 30% of the budget for FMRs was actually disbursed – and 58% in 2020. Some of this under-execution may be due to under-reporting, but it is not clear to what extent this is the case. Factors contributing to actual underspending may include the fragmented approach by which the FMR program is managed, with generally poor supervision of the regional field units charged with screening proposals and inadequate time for them to do so. The Bureau of Agriculture and Fisheries Engineering (BAFE) in the DA was established in 2020, and one of its responsibilities is this supervisory function. This development is very positive, but it is too soon to observe much impact.
- Criteria that the DA has said it uses to allocate FMR funds include poverty incidence and proximity of key production areas. But Luzon—which has received the bulk of the FMR budget—has the lowest incidence of poverty, while the Visayas and Mindanao areas with the highest incidence of poverty only received half of the budget combined. As for proximity to production areas, the specific location of key production areas has yet to be identified or consolidated by the DA based on the regional and local development plans, as well as the road network plans of the various LGUs. And the allocation criteria do not seem to yet be systematically underpinned by high quality evidence-based benefit-cost analysis. This is another task that the BAFE is working on.
- It is far from clear how devolving more responsibilities for the FMR program to the LGUs would be likely to improve performance of the program. Experience with the LGUs to date has been very uneven, with anecdotal evidence pointing to a tendency of some LGU governments to use FMR funds to spread political patronage by building many short road segments rather than focusing on more complete roads that would have a much bigger impact. In addition, there seems to be a consensus that LGUs will require significant capacity building if they are to assume more administrative responsibilities, and for some important functions it may not even make sense for each LGU to have its own capacity rather than having a central unit providing the service to them all. Furthermore, it is unclear how the myriad decisions on local road investments in a highly decentralized system would be coordinated to make a coherent contribution to the national network. This is likely to be a major issue until BAFE completes an inventory of existing roads and - based on that -- designs a nationwide master plan for the future.
- There are reasons to doubt that LGUs will in general devote adequate resources to FMRs. The Internal Revenue Allotment (IRA) funds come as block grants, not earmarked for specific purposes, so decisions on allocation among competing demands are made at the LGU level. Past experience

shows that the economic sector (which includes roads) is often accorded low priority by the LGUs in spending decisions. The problem is exacerbated by the fact that LGUs are heavily dependent on the IRA, with limited authority to raise revenue on their own. Because of the Mandanas ruling, they will receive incremental IRA funding, but at least one study has indicated that it is likely to be insufficient for many LGUs (around 16%) to continue to provide devolved services at the same level as currently provided by the national government.

- One problematic area especially relevant for FMRs may be under-funding of operations, repair, and maintenance. This is an issue in many countries, which is unfortunate, since spending on road maintenance has been demonstrated to have very high returns. Poor roads greatly increase costs for vehicle operators. And according to World Bank estimates, road repair costs are 6 times higher after 3 years of neglect and 18 times after 5 years. Under current arrangements, LGUs are given responsibility for keeping FMRs in good condition after initial construction, but non-compliance seems to be common. It seems unlikely that this will change with devolution in the absence of other mechanisms to ensure compliance.
- Considering existing shortcomings in capacity in many LGUs, one good option moving forward may be for a number of the FMR-related functions of the DA-BAFE and the Regional Agricultural Engineering Division (RAED) of the RFUs to be retained at the central level, at least for a while. As LGU capacity improves and coordination problems are at least partially mitigated (e.g., by construction of a national master plan), more responsibilities could be devolved.
- In any case, whenever more decision-making responsibilities are devolved, mechanisms need to be in place to provide LGUs with incentives to make appropriate investments in FMR construction and maintenance in ways that maximize connectivity benefits for the network. The review discusses options for doing this.

