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**ASEAN PUBLIC-PRIVATE PARTNERSHIP
REGIONAL FRAMEWORK
FOR TECHNOLOGY DEVELOPMENT
IN THE FOOD, AGRICULTURE AND FORESTRY
(FAF) SECTORS**

2017

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LIST OF ABBREVIATIONS

AMS	ASEAN Member States
ASEAN	Association of Southeast Asian Nations
ASOF	ASEAN Senior Officials on Forestry
ASWGC	ASEAN Sectoral Working Group on Crops
ASWGFi	ASEAN Sectoral Working Group on Fisheries
ASWGL	ASEAN Sectoral Working Group on Livestock
ATWGARD	ASEAN Technical Working Group on Agricultural R&D
CGIAR	Consultative Group on International Agricultural Research
CSA	Climate Smart Agriculture
CSO	Civil Society Organisation
CSR	Corporate Social Responsibility
EIU	Economist Intelligence Unit
ERIA	Economic Research Institute for ASEAN and East Asia
ESCAP	Economic and Social Commission for Asia and the Pacific
FAF	Food, Agriculture, and Forestry
FO	Farmers' Organisation
NARS	National Agricultural Research System
M&E	Monitoring and Evaluation
MSMEs	Micro, Small and Medium Enterprises
PPP	Public-Private Partnership
R&D	Research and Development
S&T	Science and Technology
SEARCA	Southeast Asian Regional Centre for Graduate Studies and Research in Agriculture
SOM-AMAF	Senior Officials Meeting – ASEAN Ministers of Agriculture and Forestry
SPS	Sanitary and Phytosanitary
TDFAF	Technology Development for Food, Agriculture, and Forestry

GLOSSARY OF TERMS

Benefit-cost analysis: a systematic method for estimating and comparing benefits and costs of a project.

Commercialising partnerships: PPP in which NARS and Ministries transfer research findings and materials to private firms for commercialisation, marketing, and distribution.

Contracting partnerships: PPP in which NARS and Ministries partner with private enterprises with facilities or expertise to conduct parts of their research.

Frontier research partnerships: PPP in which NARS and Ministries, together with private enterprises jointly undertake frontier research activities.

Impact pathway: a detailed description of actions or activities, and expected causal linkages to intended outputs, outcomes, and impacts.

Priority setting: in research, the process of identifying R&D options and stating priorities over these options, based on a pre-specified set of criteria, and following a systematic method.

Private - public partnership: a contractual agreement between the Government and private firm/s targeted towards financing, designing, implementing and operating infrastructure, facilities and services that were traditionally provided by the public sector.

Public goods: a good or service provided without profit to all members of a society, either by government, or a private individual or organisation.

Resourcing partnerships: PPP in which NARS and Ministries of Agriculture, Forestry and Fisheries, partner with philanthropic foundations associated with private enterprises for funding or receive scientific expertise from private enterprises.

Sector/value chain development partnerships: PPP in which NARS and Ministries collaborate in a partnership of public, private, and civil society and research / scientific community to jointly engage in the development of a commodity subsector or associated value chains.

Theory of change: a comprehensive description and illustration of how and why a desired change is expected to happen in a particular context.

Value-for-money analysis: a systematic method for ranking alternatives based on highest benefit for a given cost, or lowest cost for a given benefit. Also known as *cost-effectiveness* analysis.

Value-for-money driver: a factor which explains why a particular option (e.g. implementation by a private entity) will realize higher value-for-money than a default option (e.g. implementation by a public sector entity).

1. BACKGROUND

The ASEAN cooperation in the food, agriculture and forestry (FAF) sector defines the Vision and Strategic Plan for FAF 2016 - 2025 as a ‘competitive, inclusive, resilient and sustainable FAF sector, integrated with the global economy, based on a single market and production base contributing to food and nutrition security and prosperity in the ASEAN Community’. Central to achieving this vision is a sustainable increase in productivity and reduction in pre- and post-harvest losses, through innovative ‘green’ technologies and sustainable resource management systems. Climate smart agriculture (CSA) practices, comprised of (1) integrating increased productivity and food security, (2) resilience to climate change, and (3) mitigation of greenhouse gas emissions, are an important ingredient of sustainable resource management systems in FAF sectors.

Innovation and knowledge are critical in fostering sustainable competitiveness. However, technology development in itself is not enough. It is the commercialisation and the distribution of the technology, which is necessary for providing holistic solutions and ensuring these solutions are scaled-up, sustainable and inclusive. Developing partnerships with the private sector throughout the FAF value chain is integral for technology development and dissemination in the FAF sectors. Partnerships with the private sector are also crucial to leverage investments into innovations that would be inaccessible for the public sector to venture alone.

In that regard, ASEAN highlights the importance of leveraging private sector investments in technology development in the FAF sectors through Public Private Partnership (PPP), as well as collaboration between ASEAN Member States (AMS), international research institutes, and development partners. PPPs in the FAF sectors are an important mechanism that ASEAN promotes to harness technology, resources, skills, expertise and access to markets to improve productivity and competitiveness in the agricultural sector, as well as to ensure sustainability and inclusiveness.

2. OBJECTIVE

The overall objective of the ASEAN PPP Regional Framework for Technology Development in the FAF Sector (TDFAF) is to increase collaborative investments in sustainable technology development, adoption and dissemination throughout whole value chain in the FAF sector in ASEAN.

The PPP Framework for TDFAF is expected to contribute to the following action programs under the Strategic Plan for ASEAN Cooperation in Food, Agriculture and Forestry, 2016-2025 - Strategic Thrust 1:

- (1) Increase private sector participation in policy discussions, programme and project formulation, research and development (R&D), and provide incentives and foster and enabling environment for public-private partnerships towards enhancing productivity and quality;
- (2) Increase investments in collaborative R&D activities and strengthen existing regional collaboration among AMS and with key international organizations to develop sustainable technologies and management and harvesting systems, and effective extension/communication systems for technology diffusion;
- (3) Provide institutional mechanisms and appropriate incentives for PPPs in R&D and technology diffusion, collaborating with the private sector to identify priority research areas with high pay-offs in terms of private profit and societal well-being, and utilise it as a channel for both technology generation and diffusion;
- (4) Regularly review the nature of R&D partnerships and strategic partnerships with concerned organizations to ensure that the research and training agendas are aligned with ASEAN goals;

- (5) Identify and document technology success stories and explore new methods of extension, including enhanced use of information and communications technology and other communication facilities for the dissemination of successful technologies and management systems throughout AMS;
- (6) Standardise and harmonise concepts, methods and the presentation of national statistics and strengthen the technical capacity of AMS to conduct multi-country studies and undertake accurate situation analysis and planning.

To achieve its objectives, the aim of the PPP Framework for TDFAF is to provide guidance to AMS on how to create a predictable and efficient PPP environment for promoting technology development and dissemination in FAF value chains. It also aims to contribute to increasing the harmonization of the PPP policies, legal frameworks and institutional arrangements in AMS. The PPP Framework for TDFAF will furthermore act as a reference to communicate the political commitment of AMS for promoting PPPs in the FAF sectors, and furthermore to attract stronger and more consistent interest from the private sector to cooperate.

3. DEFINITIONS AND SCOPE OF PPP

Definitions in the PPP literature tend to be circumscribed by a narrow focus on infrastructure. For instance, the Economic Research Institute for ASEAN and East Asia (ERIA) defines PPP as a specialized procurement method employed by government for the delivery of public goods and infrastructure services. Likewise, World Bank defines PPP as a contractual arrangement between a public entity or authority and a private entity for providing a public asset or service in which the private party bears significant risk and management responsibility.

A PPP can be more broadly defined as a contractual agreement between the Government and private firm/s targeted towards financing, designing, implementing and operating infrastructure, facilities and services that were traditionally provided by the public sector. Given the challenges confronting FAF sectors, partnerships should cover development, adoption, and dissemination of sustainable technologies towards enhanced food security and climate resiliency, e.g. water-saving innovations, conservation agriculture, and similar systems.

The Consultative Group of International Agricultural Research (CGIAR) distinguish the following forms of PPP: resourcing partnerships; contracting partnerships; frontier research partnerships; commercialising partnerships; and sector/value chain development partnerships, with the following qualifications:

In resourcing partnerships, the private sector contributes financial or human resources to the research project or program of the public agency. When the private sector provides research funding to the public agency, the major source is still philanthropic foundations (though some private companies make direct contributions without passing through a non-profit).

Contracting partnerships meanwhile encompass the outsourcing arrangement found in conventional public procurement. However, as public agricultural R&D is still mostly done in-house, outsourcing is treated as a non-traditional mode of provision and therefore an example of PPP. Contracting partnerships though can involve more elaborate terms of collaboration on services and infrastructure, such as the following:

- The public sector owns the facilities, while the private sector provides researchers and other inputs such as knowledge (e.g. specific pathologies and treatment protocols in case of plant or animal disease), or patented products (e.g. improved seeds). This form of partnership may involve capacity building for the NARS partner.

- The NARS partner provides the researchers, buildings, and office space, while the private partner invests in heavy laboratory equipment, exclusively for the purpose of a project, with the equipment remaining with the NARS partner (a variation on Build-Operate-Transfer scheme of infrastructure PPPs). The private sector can also provide the knowledge and involve capacity building.
- Either NARS or the private partner is contracted to provide a set of highly technical services required repeatedly in a research project, such as remote sensing, molecular mapping, etc.

Frontier research partnership especially in developing countries may require capabilities often found only in the private sector. Hence in the 1990s to early 2000s, a research institute working on crops benefiting resource-poor farmers might have structured a genome sequencing project as a PPP. Today, the advantage of the private sector now lies in advanced bioinformatics and data management, which remain key bottlenecks for public sector research.

In commercialising partnerships, a technology developed by the public sector already exists, but not produced in commercial quantity nor widely adopted. Further product development, extension to farmers, technology incubation, and initial commercialization, is taken over by the private sector; the latter is typically allowed to derive profit from the technology (which is the main incentive for wide scale diffusion or dissemination), subject to limitations (e.g. under a licensing agreement).

Certain technologies may raise concerns over the health and the environment, once disseminated on commercial scale. Partnerships may involve training, capacity building, and other safeguards to ensure sustainable and safe use of the technology.

Sector/value chain development partnerships target adoption over a broad range of actors in the value chain for crops, livestock (including poultry), and fisheries (both capture and aquaculture). However to delimit the scope of value chain partnerships, the following are proposed:

- Upstream: Partnerships encompass promotion of technologies to direct suppliers of inputs sold to farmers and fishers, e.g. improved planting materials for nurseries, or better spawning techniques for fish hatcheries.
- Downstream: Partnerships encompass adoption of technologies for transport and storage of raw materials for FAF, as well as processing of such materials.

4. ASEAN PPP REGIONAL FRAMEWORK

The framework is developed to address key issues and problem areas in public and private sector collaboration for TDFAF.

4.1. Policy and legal framework for PPP in TDFAF

A transparent, stable, and conducive and regulatory investment framework should be established for public and private sectors engaged in technology development and collaboration over the agricultural value chain.

Given the complexity of PPPs, often spanning a number of policy areas, there are usually several layers of legislation, regulations and levels of government involved. Hence AMS public policy, regulation and procedures must be coherent and aligned to ensure that PPP projects in the FAF sector can be developed and implemented efficiently. Furthermore, ensuring that AMS procedures and legislation are aligned, will facilitate transnational and regional PPP projects to be developed and respective investments to take place.

Streamlined and conducive regulatory environment should be ensured for key areas involving agricultural technologies, namely their development and dissemination; property rights over the technology; and policies on investments in the agricultural value chain.

A transparent policy and legal framework will contribute to a favourable investment climate, ensuring that it is attractive for the private sector to enter the market of agricultural innovation and technology development and distribution. Regulatory services should also be delivered efficiently to private sector clients, including producers and MSMEs; government should streamline the process flow of compliance, documentation, and, securing of approvals, avoiding red tape, inconvenience, and complex procedures.

The investment climate for agribusiness is a key determinant of their appetite for innovation and commercialization of agricultural technology. Elements of the business climate include:

Taxation policy: Business firms, whether large agribusiness or MSMEs, are subject to various types of taxes (corporate income tax, value added tax, excise tax, export tax, import tariffs, etc.) On the other hand, AMS also provide investment incentive for FAF, R&D, and MSMEs, all of which impact on technology commercialization. While these incentives exert a generally favourable effect on TDFAF, it is still critical that the incentive regime preserve a level playing field to ensure no unintended and adverse consequences for technology innovation (e.g. incentives that selectively shield favoured firms from innovative competitors).

Commercial transactions: AMS governments oversee upstream and downstream transactions according to their respective competition policy and regulations on doing business and agricultural contracts. Such policies and regulations though impact the pace and extent of technology commercialization in FAF sectors. Examples of regulations that affect private sector – producer partnerships are as follows:

- Various requirements for starting and operating a business, such as obtaining construction permits, electricity connection, and credit; registering property; protection of shareholder interests; paying taxes; and trading across borders.
- Contract farming in Thailand and Vietnam is subject to regulation with respect to *force majeure* provisions, compensatory damages, dispute resolution, and registration of contracts with authorities.
- In Cambodia, a Sub-Decree on contract farming regulates contract growing schemes. It requires contracts be in writing; state clearly the agreement on prices, buyer's contribution, and suppliers; commitments; and establishes a coordination committee to oversee development and coordination for contract farming.
- In the Philippines, farmers who wish to enter into contracts as a group, face difficulties registering as a formal legal entity due to tedious documentary requirements, whether as cooperative, proprietorship, partnership, or corporation.

Property rights: Property rights over natural resources, particularly land, are heavily regulated in AMS. Many lands are classified as inalienable property of the state. Intellectual property in the form of patents and trademarks may confer on certain agribusinesses considerable market share, opening up the possibility of asymmetric bargaining power upstream, as well as monopolistic marketing practices downstream. Generally such situations of asymmetry created by technology is not prohibited; what is prohibited is abuse of dominant position by the dominant firm. Other intellectual property concerns relate to indigenous technologies and practices, which may be misappropriated by profit-oriented companies with no benefits returning to the indigenous communities that had pioneered in the technologies.

4.2. Institutional framework and Roles and Responsibilities

Effective institutional arrangements, such as independent regulatory agencies with clear lines of responsibility, and professionally managed FOs, are necessary to effectively promote PPPs.

Effective institutional arrangements, including independent regulatory agencies, with clear lines of responsibility are necessary to effectively promote PPPs. For this PPP Framework, this is especially relevant with regards to the ASEAN Ministries of Agriculture and Forestry, the NARS and other relevant ministries and agencies responsible for research and development as well as investment promotion. Particular attention should be provided to linking national, provincial and local level of authorities, and also considering transnational and regional institutional structures. The institutional framework should clearly identify the roles and responsibility of different government institutions as well as the private sector entities in the process of developing and implementing PPPs in FAF. Roles and responsibilities will of course vary depending on the type of PPP. Each partner will have to ensure its organisational configuration be appropriate for its assigned functions.

4.3. Development and Implementation of PPP for TDFAF

PPPs need to be guided by Principles for PPP Development and Implementation to ensure that desired outcomes and integrity are obtained. These Principles should be aligned to the existing ASEAN Principles for PPP Frameworks. The following Principles are recommended:

The agricultural research agenda and investment plan with appropriate analytical tools such as priority setting and impact pathway analysis.

An assessment of CGIAR partnerships with private sector finds that for many of the researches conducted, specifying pathway to impact on the lives of poor producers and consumers was often neglected. Not all available technologies or innovation strategies on the table, can be given adequate funding, hence priorities must be identified based on what can cost effectively deliver on concrete outcomes and impact.

Selection of projects and modalities of collaboration should be based on a consultative process involving concerned stakeholders.

Priority setting and impact assessment may start out as desk assessment based on related literature, and inputs from a few key informants. Ultimately however the broad TDFAF agenda, together with intended modalities of collaboration, should be subjected to an extensive consultative process. The consultative process should rather strive for genuine participation of the sectors and communities to be most impacted by the new technologies.

Design of PPP projects with significant investment exposure requires value for money analysis and whole of life analysis.

While some research activities may deliver substantial pay-offs with modest outlays, some may require significant investment outlays, from either or both public and private partners. For this scale of investment, more rigorous and systematic analysis is warranted based on whole-of-life methods and value-for-money.

Terms and conditions of the public-private partnership must ensure proper alignment of incentives in terms of sharing risk, costs, and benefits of agricultural technologies.

One rationale for PPPs is precisely the opportunity to align risk with potential rewards. Hence for instance the public sector may turn over the commercialization of a promising technology to the private sector in return for partial funding of investment costs by the

private partner. If so the private partner will likely demand a say in project design and operations; the partner is thereby incentivized to maximize the probability of research success (given an investment outlay). Care must be taken though to avoid one-sided contracts that tend to concentrate benefits on only one party. For instance, exclusive licensing agreements for the private partner that are too long allow the private partner to realize excess profits over an extended period.

Introduce mechanisms and safeguards to ensure capture of benefits by small farmers and MSMEs while maintaining attractiveness of the partnership to the private sector.

Another dimension of benefit sharing is to ensure that small- and medium-scale producers in the value chain receive a fair share of the benefits of agricultural innovation. Intellectual property and licensing agreements should be structured so as to just incentivize private sector participation, while spreading benefits of innovation to small and medium producers, as well as consumers. Several instruments may be considered to ensure this, such as:

- non-exclusive licensing;
- limited period licensing;
- mandatory price ceilings for the new technology;
- mandatory discounts or subsidies for marginalized farmers and fishers adopting the technology.

This builds on the renewed impetus for international cooperation as committed under the Paris Agreement, with support in the form of development and transfer of technologies, including CSA; access to finance; and capacity building, towards sharing in the costs of climate change mitigation and adaptation.

A system for monitoring of activities and outputs, as well as for evaluating outcomes and impacts, should be institute to maintain accountability, and reflect lessons learned back into the project development cycle.

Given the novelty of PPP in TDFAF, there will most likely be issues and flaws in design and implementation in present and future PPPs. It is critical to embed monitoring and evaluation (M&E) into the project design of all manner of PPPs. The M&E system should be developed based on the logical framework/impact pathway/theory of change of the TDFAF. Aspects to be covered are:

- Inputs (costs);
- Activities, as identified in the implementation plan;
- Outputs or the measurable accomplishments of the project. These include performance indicators and performance measures such as (depending on the actual project): number of farmers trained in CSA; whether new plant variety was developed embodying the intended traits (e.g. pest and/or drought resistance); number of fishers adopting sustainable fishing gears, etc. Outputs should also be assessed relative to the timeline set in the implementation plan.

The M&E system should also aim for ascertaining and measuring outcomes and impacts. This entails whole-of-life approaches to examine uptake and adoption of technologies and recommended practices. Broadening the scope of M&E leads to identification of good practices and lessons learned for future iterations of PPP for TDFAF. Setting up a fairly elaborate M&E system is clearly the task of the public sector as it is the partner directly accountable to the public. Nonetheless even private partners may be open or even contribute to M&E as part of its inclusive business or CSR mandate.

4.4. Areas of cooperation

Priority areas to work on and priority sectors to engage as well as the steps along the value chain of FAF products, need to be agreed upon, and should include input technologies, production system technologies and pre- and post-harvest technologies, and downstream processing. For prioritisation, the overall objective of the PPP Framework, to increase collaborative investments in sustainable technology adoption, and the FAF vision of a competitive, inclusive resilient, and sustainable FAF sector should be taken into account. Hence, its focus should lie in the sectors and processes most relevant to achieve this outcome and the FAF 2025. The following areas of cooperation are identified considering experiences in ASEAN, together with FAF 2025:

- i) Development and commercialization of new varieties of plants and animals; in particular: germplasm and seed sharing; training and exchange of experts in genomics; dissemination of varieties with desirable traits such as pest and disease resistance; high nutritive value; and climate resilience.
- ii) Innovation in agricultural inputs and production systems and value chain, particularly addressing best agricultural practices, food safety and food security, and climate change;
- iii) Support for development and adoption along the value chain of technologies and innovations by FAF-based MSMEs.

A common format of partnership is for the private sector to donate their proprietary technologies while the public sector provides the germplasm, laboratories, manpower, and associated biological knowledge.

Throughout the value chain, innovations to promote food safety, establishing a traceability system, and improvements in post-harvest quality, are also key areas of cooperation between producers, institutional buyers, and government. Partnerships formed through dialogue, networking, and coordination, whether formal or informal, may enable as well the provision of sanitary and phytosanitary (SPS) infrastructure (e.g. diagnostic laboratories), and trade facilitation (e.g. IT –enabled SPS clearance).

Opportunities for collaboration likewise abound in cooperation area iii). Large agribusiness companies may be engaged in downstream marketing (especially for export), or supply of key logistical services (such as cold storage). Meanwhile, MSMEs may offer intermediate levels of processing and packaging. Partnerships together with the public sector may support the reduction of postharvest losses and waste, through adoption of improved practices and postharvest technology. Food processing research through academic/research institution, technology incubation schemes, and joint venture, arrangements, are found throughout agricultural innovation systems in ASEAN.

4.5. Procedures for Project Development and Implementation

In terms of the PPP principles, project selection, development and implementation, details of the agreed procedures can be found within the ASEAN Principles for PPP Frameworks. They cover the procurement methodology and the management of the PPP process, and are based on principles of highest value for money and most efficient allocation of risks.

Procedures should also include clear guidance of benefit sharing models (e.g. for royalties and Intellectual Property Rights) in PPPs as well as rules for disclosure and information sharing, dispute settlement and other relevant procedures to be taken into account to ensure the desired outcomes of PPPs.

Project selection: Selection of projects should first be informed by the anticipated pathways from inputs, to activities, to outputs, then outcomes, and finally, impact, in terms of changes in ultimate goal indicators (e.g. household income, poverty, nutritional

status, etc. The outputs correspond to the technology being developed). A prominent consideration in the selection of the project will be the relevance of the intended outputs and outcomes to promotion of CSA and climate resiliency, leading to protection and improvement in livelihoods and food security of farm-, fishery-, and forestry-based households who are most vulnerable to climate change.

These anticipated pathways underpin the theory of change being posited by the technology development project. Often design of research project ends at the output level, with no further consideration of adoption by intended technology users, and the outcomes of such adoption choices. Projects must be selected not only based on the merits of technology generated and likelihood of research success; decision-making must also be forward-looking, ensuring that technology should be disseminated, command widespread acceptance, and redound to the benefit of intended users.

Second, the project should be subjected to various types of analyses for evaluating project options. An important type of analysis is cost and benefit analysis. Significant positive impact at the household level, anticipated by a well-articulated theory of change, is not enough to justify the research investment; the expected benefit should also be larger than the cost. Benefit-cost analysis involves two important techniques, namely discounting both benefits and costs to present value; and valuation of benefits and costs. Other forms of analysis to complement benefit-cost analysis, or replace it when unsuitable, include: break-even analysis; cost effectiveness analysis; and multi-criteria analysis.

Procurement methodology: A proposed PPP arrangement should pass a *value-for-money* test; this involves comparisons with alternative procurement methods to verify if a proposed arrangement offers the greatest benefits to government and society at large.

Comparison can be qualitative, quantitative, or both. Qualitative analysis screens a procurement method based on suitability criteria, such as:

- Relevance of the project to the Sustainable Development Goals, and Strategic Thrusts of the Vision and Strategic Plan for FAF, such as development of CSA, and climate resiliency;
- Simplicity in identification and allocation of project activities, roles, and responsibilities;
- Services that are well standardized, available from the market on competitive basis, should be procured by competitive bidding
- Projects requiring proprietary technologies or processes may entail direct contracting
- Risk should be allocated commensurate to the benefit to be realized.

Quantitative analysis of value-for-money meanwhile involves a set of benefit-cost analyses of alternative procurement modalities, e.g. in-house R&D, compared to the proposed PPP.

In case a PPP is found to be the preferred option, the next step is deciding on implementation modality and procedure for the PPP. In conventional PPP for infrastructure, modalities include: Build-Operate-Transfer; Build-Transfer; Build-Own-Operate-Operate Transfer; Build-Own-Operate; and so forth.

For the resourcing partnership, implementation is the responsibility of the NARS. The R&D and/or commercialisation activity will be determined and structured by the NARS. The partnership will specify the obligation of the private partner and the timing of support. If funding, then the modality will specify project milestones and program of fund

release; if expertise, the modality will specify hosting arrangement by the NARS, and the expected outputs from hosting the private sector expert.

For the contracting and frontier research partnership, activities and milestones will need to be jointly planned by the NARS/Ministry partner and the private partner. Responsibilities of each in terms of facilities, personnel, and activity roles, will need to be specified beforehand. The plan will then be incorporated in a contracting agreement.

For the commercialising partnership, a new technology has presumably been completed and owned by a NARS/Ministry, as formalized in a patent. What remains is the technology development leading to commercialisation. This entails the following steps:

- Mutual agreement on the set of rights and responsibilities of the private partner (i.e. license to the technology; duration of the license; access of small producers to the technology; etc.)
- Programming of activities and milestones for commercialisation
- Arrangement for engaging CSOs and FOs
- Signing of formal agreement between partners (including CSO/FOs, as applicable); implementation, and monitoring.

Lastly, for value chain development partnerships, a technology exists and is already held by the private partner (or jointly owned by the partners), and is already to some extent commercialised. What remains is to upscale the technology to address constraints to value chain development. This entails the following steps, which closely parallel those of the commercialising partnership, though on a wider scale:

- Value chain situation analysis, and assessment of potential for a specific technology (or package of technology) to address value chain constraints;
- Programming of activities and milestones for upscaling
- Arrangement for engaging CSOs and FOs
- Signing of formal agreement between partners (including CSO/FOs, as applicable); implementation, and monitoring.

5. PPP DRIVERS AND SUITABILITY

5.1. Phases of a R&D and commercialisation along value chain

A typical project for the provision of a good or service, such as a new seed variety, laboratory testing, etc., can usually be divided into four phases. These are: design; resource mobilisation; investment; and operation, i.e. generating the flow of benefit or service. In the context of agricultural research, investment is the research phase, while operation is the phase of development and dissemination.

Roles for public and private sectors can be assigned in various ways. Traditional public agricultural research is purely public: for instance, a line agency (say the Ministry of Agriculture) commissions research to a state-owned university; the new technology may then be turned over to the government extension system for dissemination to farmers. At the other extreme is purely private provision, as when a company R&D department develops a new biotechnology application.

Public-private partnerships involve arrangements in-between these two extremes. A resourcing partnership, as the label implies, involves financial and other contributions from a private entity, typically a philanthropic foundation. A contracting partnership involves research commissioned to a private firm. Meanwhile the commercialising as well as value chain partnership involves development and dissemination being

assigned to private entities, such as an agribusiness company, and/or farmer cooperative.

5.2. Drivers of partnership with the private sector

Pure public provision is more advantageous when benefits from research are difficult or impossible to commercialise, e.g. improved inbred seed. Private firms may not be able to profit from the technology; hence, if the seed is to be developed at all, the research may be conducted by a public research institute funded by taxpayers and organised to produce public goods.

On the other hand, given a different set of circumstances, higher value-for-money may be realised by private sector participation. These value-for-money drivers imply a greater advantage for organizing the various phases of technology development under the private sector. These drivers are presented under the following headings:

1. Private sector has the ability to realise profit from technology products.
2. Private sector has the ability to develop technologies with strong market potential.
3. Private and public sector have specialized competencies owing to scale economies and past investment.
4. Private sector may be able to accelerate roll-out of new technologies.
5. Engagement of private sector may lead to improved quality of technology solutions provided.
6. Engagement of private sector allows risk sharing, alignment of incentives, and complementarity between phases.
7. Partnerships are made feasible when outputs are measurable based on predetermined performance indicators.
8. Private philanthropy and inclusive business can mobilize more resources for TDFAF than is available from the public sector alone.

Some types of research may be most advantageously organized as purely private. For instance, suppose the research product can be patented, and production limited to the patent holder, e.g. development of a new hybrid seed variety, whose traits are highly desired by the market (Driver 1 and 2). Part of the economic benefits of planting the seed can be appropriated by the seed company. The commercial impetus may be sufficient for incentivizing the design, finance, research activity, and dissemination of the new technology. Moreover, the seed company may have had a past history of investment in equipment, laboratories, and scientists, realising economies of scale and specialized competencies (Driver 3). The public sector may still insist on doing the research itself, but at great cost and perhaps unnecessary duplication of private sector research.

Involvement of the private sector may also sharpen incentives otherwise blunted in public sector research. The latter may be characterized by long research lags and cost overruns. Technology products may also be of ineffective, or not user-friendly. The private sector on the contrary seeks the shortest feasible research lag, and quality products attractive to potential adopters (Drivers 4 and 5).

For large investments, risk compounds the abovementioned difficulties, in all phases of a research project. Risks may involve faulty design, falling short of investment objectives, failure to reach research objectives (or of long delays in achieving research success), and of reaching uptake objectives of the research. By structuring technology as a PPP, risk can be shared, in such a way as to allocate risk to the partner better able to manage it, as well as realize complementarities across phases (Driver 6). Allocation

of risk and rewards can be better structured if performance and deliverables are easy to measure (Driver 7).

In developing countries, where the private sector remains far from the mature development phase, the public sector may be the partner with historically greater investments in agricultural innovation. The contract partnership may then assign the public sector being the implementer of research, while design, finance, and commercialization may be undertaken by the private company.

Finally, investing for the public interest need not be a monopoly of government. Private philanthropies may have been organized and endowed precisely to supply public goods (Driver 8). Socially concerned investors may, under the *inclusive business* model, prefer commercialization of technologies that maximize scale and impact on resource-poor farmers and MSMEs. FOs may facilitate linking small individual growers with investors, while CSOs may support the establishment of these FOs, or help in linking FOs with investors.

6. ACTION PLAN TO PROMOTE THE IMPLEMENTATION OF THE PPP FRAMEWORK

6.1. PPP Awareness and Opportunity Identification

Given that the PPPs in the ASEAN context currently focus on infrastructure, creating awareness of the benefits of PPPs for technology development (which could also include infrastructure), adoption and dissemination specifically in the FAF sectors is needed. To raise the potential of PPPs, providing relevant information for interested parties, is crucial. This entails looking at already currently existing projects in the region and best practices of PPPs from other regions, as well as identifying opportunities and interested parties to develop the PPP portfolio for technology development in the region and in AMS.

The promotion of PPPs at the regional level, transnational or in AMS in the FAF sectors, requires AMS to actively pursue the process of stakeholder and PPP dialogue in order to identify PPP opportunities and facilitate and review implementation. AMS must be aware of the contribution of FAF sectoral reforms and their role in developing and supporting PPP schemes. Furthermore, AMS should recognise the need for political commitment towards the promotion of PPP schemes in the FAF sector towards technology development.

The information generated in the foregoing will be disseminated in an information and education campaign. The campaign will be anchored on both PPP initiatives in general within AMS, to raise awareness of a specific subset of PPP for agricultural technology (and not only on infrastructure). The campaign will also be anchored on agricultural S&T initiatives in general within and among AMS, raising awareness on the role of partnerships and collaboration. For the latter, the campaign should leverage national and international agricultural S&T networks.

FAF-related S&T Networks in ASEAN

Asia-Pacific Agricultural Research Institutes (APAARI)

Exchange by Promoting Quality Education, Research, and Training in South and Southeast Asia (EXPERTS)

Asia: Life Sciences, Food, Agriculture, Biology, Economics, Technology (ALFABET)

ASEAN Science and Technology Network (ASTNET)

ASEAN – European Union Cooperation in Science, Technology and

Innovation (ASEAN-EU-NET)

Greater Mekong Subregion Research Network (GMSARN)

Conservation Agriculture Network in Southeast Asia (CANSEA)

ASEAN Social Forestry Network (ASFN)

Other related networks are: the Southeast Asian University Consortium for Graduate Education in Agriculture and Natural Resources (University Consortium); and research consortiums organized by the CGIAR system.

6.2. Capacity Building and PPP Readiness Tools

Linked to the above are self-assessment readiness tools to identify gaps and capacity building needs of Ministries of Agricultural and Forestry, NARS and other relevant government institutions and authorities. A number of PPP readiness assessment tools are in use or proposed, such as:

- Infrascopie from the Economist Intelligence Unit (EIU);
- Rapid Needs Assessment Tool of the Public-Private Infrastructure Advisory Facility;
- The assessment tool developed by UN Economic and Social Commission for Asia and the Pacific (ESCAP);
- A set of tools from World Bank, namely: PPP Project Preparation Status Tool; PPP Fiscal Risk Assessment Model; and the PPP Benchmarking tool.

Common elements in these assessment tools are:

- Legal and regulatory framework – clarity, supportiveness, functionality
- Institutional framework – quality of PPP agencies/units
- Development and implementation – transparency and fairness in awarding projects, specifying and renegotiating contracts

EIU and World Bank evaluate financial facilities – that is, budgetary support to PPPs development, framework for public finance, depth of private financial markets. ESCAP and EIU meanwhile include the macroeconomic context and investment climate in their assessment tools.

Generally though the available readiness assessment tools are skewed towards infrastructure PPPs. There is a need to develop PPP readiness tools specifically for technology development in FAF. The tool shall be a modified version of existing tools to make them relevant to technology development in FAF. The tools may cover:

- R&D investment climate – public agricultural spending on agricultural R&D; R&D investments of private agribusiness sector; availability of a large pool of knowledge and technologies growth rate of FAF and agro-processing industry; growth rate of agri-exports.
- Investment climate for commercialization – extent of formal organization of farmers; commercial orientation of farmers and farmer organizations; willingness of agribusiness to source raw material locally and collaborate with farmer organizations.
- Legal and regulatory framework – transparent rules on intellectual property, licensing of proprietary technologies; and environmental and health regulation for agricultural technologies; presence of fair, transparent, and functional legal

and regulatory framework for contract farming and related arrangements (e.g. joint agribusiness ventures)

- Institutional framework – awareness of NARS, agribusiness, and farmer organizations on PPP arrangements and potential; ability of NARS to structure PPP contracts, monitor and evaluate PPP performance indicators

6.3. Public Private Dialogue and PPP Platform

In order to promote PPPs in technology development, adoption and dissemination in the FAF sectors, there is the need to enhance public-private dialogue. A communication strategy for public-private dialogue to promote PPPs can be established at both regional as well as AMS level. This could include a dialogue platform to provide 'space' for networking opportunities for fragmented stakeholders with different assets, knowledge and experience to be brought together in identifying PPP opportunities. The platform will not only include the public sector (for research and development, monitoring and review) and the private partners (research, technology provider and distributor), but also CSOs (mobilisation of communities), research and scientific community (research) and development partners (resources and facilitation of process). Communication hence should be targeting all these important stakeholders. Such a platform could also serve for information exchange and review mechanisms and monitoring of the implementation of PPP projects.

A Guidelines document by ERIA suggests establishing a PPP Forum to establish a realistic and workable PPP guidelines and supporting technical documents, as well as to disseminate and build equal perception across AMS. The proposed Forum will also support constant inputs and feedback from stakeholders; communicate the concept and practical approach of PPPs; provide knowledge exchange, and sharing of experiences.

Based on this suggestion, this Framework proposes an ASEAN Forum/Dialogue on TDFAF (henceforth the Forum). The Forum engages NARS (including public agricultural extension), representatives of agribusiness, CSOs, FOs, and development partners. A stakeholder analysis shall be conducted to ensure that the target audience are invited to the platform.

The proposed Forum on TDFAF will serve as venue for information exchange, dissemination, voluntary compliance, as well as reporting/monitoring on PPPs for TDFAF in ASEAN. Convening of the Forum can be done by the ASEAN FAF bodies assigned to TDFAF, namely ATWGARD, ASWGC, ASWGL, and ASWGFi and ASOF. PPP matters in the Forum agenda may cover: awareness raising; profiling of countries by PPP readiness; sharing of experience and lessons learned; and opportunity identification, etc. Aside from the usual meeting documents, the Forum shall be accompanied by a website and social media accounts for on-going communication, advocacy, and monitoring of PPPs. Drawing on the current Strategic Plan of Action-Food Security (2015-2020), the website may, as well, serve as e-portal for technologies with high commercial potential to inform potential investors and farmer organization partners. For funding, the ASEAN FAF bodies may request resources from AMS, GrowAsia, Southeast Asian Regional Centre for Graduate Studies and Research in Agriculture (SEARCA), Dialogue Partners, and related agencies.

7. IMPLEMENTATION AND GOVERNANCE

At ASEAN, the ATWGARD, ASWGC, ASWGL and ASWGFi as well as ASOF and other ASEAN bodies under FAF sector are responsible for the development and implementation of the framework together with the relevant bodies at national level, under the guidance of the Senior Officials Meeting of ASEAN Ministry of Agriculture and Forestry (SOM-AMAF). AMS will be responsible for the approval, design and

implementation process of PPP projects, in line with national and regional policies and frameworks.

Similar to the ASEAN Principles for PPP Frameworks, the PPP Framework for TDFAF is formulated as a guide for AMS, offering non-binding but useful recommendations towards strengthening PPP Frameworks for TDFAF within each AMS. The proposed Forum on TDFAF will serve as venue for dissemination, voluntary compliance, and reporting/monitoring on PPPs for TDFAF in ASEAN. As such, the Forum will not duplicate existing agricultural S&T networks in ASEAN, including networks with academic institutions. Participants in these networks may in fact be invited to likewise participate in the Forum.

The ATWGARD, with support from ASEAN FAF bodies, will formulate the PPP Dialogue Plan 2018 – 2025, of which the Forum will be a core activity. The PPP Dialogue Plan will outline the aims, objectives, and intended outcomes of PPP Dialogue for TDFAF; propose a program of activities and agenda for the Forum; and identify possible sources of financial support.