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Innovation Systems Research Status and Options

Applied Research on Innovation Systems in Agriculture (ARISA)
in Indonesia

Andy Hall, Liana Williams, Jimmy Tanaya, Mona Usmani, Klara Esti, Halida Nufaisa and Lauren Xie

September 2016

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Executive Summary

ARISA has a research and policy engagement component that uses an innovation systems framing to explore and advance smallholder-relevant innovation through partnerships between public research institutes and the private sector.

This involves:

- (i) Drawing lessons from ARISA including what works well, what needs more attention, and identifying the broader roadblocks in the organisational setting of research institutes, businesses and government, and
- (ii) Leveraging this analysis with lessons from policy domains dealing with questions of how to make better use of agricultural science and technology, partnerships approaches and private sector engagement to drive innovation and impact.

The purpose of this report is to present an initial diagnostic analysis of the Indonesian agricultural innovation system, to identify priority areas that could be addressed to better support innovation, and to explore options and opportunities to do this in the scope and comparative advantage of ARISA.

The report is based on an innovation system landscape study and briefings from the Centre for Innovation and Policy Governance (CIPG), and a synthesis of information collected on the ARISA's interventions through innovation practice logs — a tool to track practice changes and challenges in the interventions.

The report contains a number of high-level messages:

- The innovation system of Indonesia is characterised by many of the generic weaknesses that while not unique to Indonesia are deeply embedded in the culture and institutional setting of the country. These include: weak or missing links between research and the private sector reinforced by patterns of professional incentives and routines; underdeveloped capacities in research organisations to work with the private sector, lack of policy coherence; limited capability in key agencies to implement innovation initiatives; investment / disbursement driven performance metrics; and risk aversion in public bureaucracies.
- There are however, highly contextual conditions that add to the challenge of making innovation policy work effectively in Indonesia, such as the cultural and geographical diversity and a decentralised system of government. These features add complexity through the diverse local contexts of which policy is interpreted and implemented.
- The practice of documenting and organising lessons from policies and program implementation has not yet become a routine habit in Indonesia. This is a missed opportunity for *policy learning*. Such learning is needed to craft a coherent set of policies and interventions that support innovation system capacity building and do so in a way that address the contextual issues of Indonesia. This challenge is exacerbated by lack of appropriate metrics and associated data on the functioning and performance of the innovation system as a whole.
- The policy space around innovation is a crowded one with multiple agencies with overlapping roles and multiple champions. There are also other DFAT investments at play in this domain. However

there is convergence on the importance of strengthening the innovation policy environment as a route to systemic change and national goals.

- Over the last decade much of the high-level policy debate in Indonesia has adopted an innovation systems framing. However a lot of the energy around this debate has focused on trying to specify what this system should ideally be and has been pre-occupied with a search for best practice models from global experience. This has value, but distracts from the need to contextually design policies and interventions that address the needs of the country and address the specific challenges in the capacity of the Indonesian innovation system.

Ironically this blueprint approach to innovation systems design and strengthening contradicts the core global best principles of innovation system capacity development — experimentation, learning and evolutionary improvement. In the same vein ARISA needs to avoid the temptation of making normative recommendations on innovation systems reform. Instead it needs to identify areas of weakness or opportunity where it can make a useful contribution and engage with associated stakeholders in the development of solutions. Priorities appropriate to the scope of ARISA include:

1. Building the capacity of public researchers to work with the private sector. This is already the main focus of ARISA, although a focus beyond the interventions is needed.
2. Strengthening links between analysis and lessons of the effectiveness of interventions and policy for program and policy learning. ARISA's interventions and analysis are a source of lessons, but ARISA could play a role in piloting a wider process for program and policy learning.
3. Leveraging off the convergence of interest around improving the enabling environment for innovation. Current interest in innovation policy reveals a number of champions and wider dialogue processes that ARISA could connect with.

Options going forward include:

1. Using lessons from ARISA to inform policy. The practice logs are a key source of data to help interpret ARISA's intervention experiences and document lessons that can be shared more widely. They also play an internal learning function. Experience to date suggests that this is a viable way of developing new insights into the realities of making public-private sector partnerships work in public research institutes as well highlighting wider institutional challenges related to practice traditions and professional incentives. In the next 12 months the collection of information through the practice logs will be continued. This information will be used as an input into the wider capacity development support being provided to interventions (i.e. helping with reflection on what is working and where the challenges are). As the interventions mature over the next 12 months information from the practice logs will also be used to develop case studies and a synthesis of broader lessons from across the interventions. This material will serve two purposes: to share with organisations and policy agencies (see policy engagement options below) to help with improved design of their new initiatives in innovation; and for publication in collaboration with ARISA's partners.
2. Leverage off institutional entrepreneurs in public research institutes Based on the two or three individuals that have self-selected through the intervention commission process, use their energy

and networks of influence to implement capacity building and private sector engagement events that go beyond the existing intervention. Pitching ideas to private sector partners, or assisting with connection to funding for public-private sector partnership could give this real meaning. This could be a way of progressing the mainstreaming of ARISA approaches in partner organisations beyond the interventions.

3. Structure the partnership with RISTEKDIKTI as a technical assistance and as a learning alliance. Partnering with RISTEKDIKTI as an implementing partner presents the opportunity to contribute to two of the identified challenges in the innovation system: the need to strengthen innovation program implementation capabilities; and a limited tradition of learning in intervention cycles. One option is to broaden the partnership with RISTEKDIKTI to include joint assessment and lesson learning not just of the ARISA interventions but also of similar RISTEKDIKTI investments and grants. A first step will involve developing simple protocols to jointly assess existing program and schemes.. This protocol would need to incorporate RISTEKDIKTI key performance indicators as well innovation systems criteria developed by ARISA.
4. Act as a hub for sharing experience and bridging between field experiences of other public-private agricultural innovation partnerships. ARISA is only one source of lessons on public-private sector partnerships for agricultural innovation. Given the weak tradition of learning from experience in the innovation system, ARISA could play a role to collect, collate and share these experiences with policy partners. This would help expand the evidence base of ARISA. Linking it to RISTEKDIKTI would lend legitimacy and provide a useful connection to policy with considerable convening power. The Jakarta based Centre for Innovation Policy and Governance (CIPG), an innovation policy think tank could play a valuable role in this, particularly in tackling issues currently beyond the scope of ARISA. This option requires further scoping and it would need to consider ways of engaging local level agencies within the decentralised government system as well as the national agencies mentioned above.
5. Form / join a policy engagement coalition. With the convergence of a number of DFAT and other related initiatives around the broader capacity and innovation policy agenda there is much scope for collaboration. This direction is already being pursued by other parts of DFAT and it would seem sensible to join rather than duplicate these efforts. One configuration maybe that ARISA partners with the Knowledge Sector Initiative (KSI) and takes a lead on issues specifically related to agricultural innovation policy. This could be done either in a “light mode” (using ARISA evidence only) or in a more comprehensive mode incorporating elements of options 2 and 3. This option would need further scoping and will be contingent on any recent changes in KSI following their mid-term review earlier in the year.

1 Introduction

Innovation systems is a framework for understanding the organisational and policy conditions and capacities needed to enable innovation and impact. ARISA has a modest research and policy engagement component that uses an innovation systems framing to explore and advance smallholder-relevant innovation through partnerships between public research institutes and the private sector. This involves two linked dimensions that build on six public-private sector partnership interventions established by ARISA to date.

The first dimension seeks to draw lessons from ARISA's experience of establishing and progressing partnerships between public research organisations and the private sector with the purpose of delivering technology and business solutions to smallholder farmers. The focus of this analysis is on what works well and what needs more attention and also identifying the broader roadblocks in the organisational setting of research institutes and businesses, and at the policy level.

The second dimension is to leverage this analysis with lessons from policy domains dealing with questions of how to make better use of agricultural science and technology, partnerships approaches and private sector engagement to drive innovation and impact. The focus in this dimension has been to review the existing landscape of players and initiatives, the dynamics of debates in this arena, identify champions of the change process and to explore ways of engaging with relevant areas of policy development. How these two dimensions interact is illustrated in Figure 1.

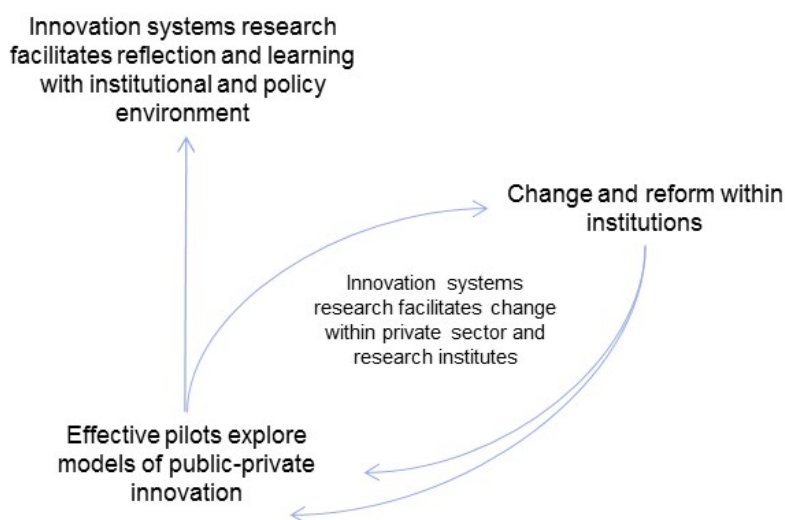


Figure 1: Representation of relationship between pilot projects and institutional change across levels.

The purpose of this report is to present initial diagnostic analysis of the nature of the Indonesian agricultural innovation system, to identify priority areas that need to be addressed to support innovation, and to explore options and opportunities to do this in the scope and comparative advantage of ARISA.

The paper begins by framing this discussion with a brief explanation of the innovation systems perspective and its relevance to the strategic intent of ARISA.

1.1 An introduction to the innovation systems perspective

The global interest in innovation stems from the recognition of its economic importance as a process of creating and implementing new ideas in both business and social contexts. While the creation of ideas and knowledge through research and other means remains important, it is only when these ideas are brought into use that they create social and economic value. Simply put, although rather tritely paraphrased “research turns money into ideas, innovation turns ideas into money”.

Over the past 30 years or so countries have grappled with the question of how to get better at innovation. In recent decades the policy framing around this challenge has witnessed a major shift from managing the scale, quality and priorities of investments in science and technology (the creation of ideas and knowledge) to a much broader perspective that focuses on the necessary conditions needed to make use of these ideas. It is in this context that the idea of an innovation system has emerged.

An innovation system can be defined as a network of organizations, enterprises, and individuals focused on bringing new products, new processes, and new forms of organization into social and economic use, together with the institutions and policies that affect their behavior and performance (World Bank 2006).

Innovation in this framing is understood as a process rather than a technological artefact or output. An innovation system is heuristic to understand, plan and invest in the organisational and policy conditions and capacities involved in sustaining the process of innovation.

This provides an analytical lens to explore 4 key dimensions of the innovation process.

- Assessing the strength and quality of the linkages and interaction between knowledge producers and users that allow ideas and information to flow, particularly at the public-private sector interface.
- Assessing the patterns of incentives, regulations, public and private investments, capacities, financial services and operating environment conditions needed to make use of ideas and information and the alignment of these towards particular policy imperatives.
- Assessing national and organisational policies and practices, routines and norms (institutions in the sociological sense) that give rise to failures of the component parts to operate as a system or lead to a failure of the system to evolve in response to changing conditions and lessons from practice.
- Assessing the effectiveness of mechanisms to align the investments of the public and private sector around issues of mutual and strategic importance (environmental protection, food security, inclusive economic growth etc.).

From an analytical perspective an innovation systems perspective reveals the very wide range of enablers and impediments to the innovation process and has particular strengths in unravelling institutional dimensions. In the context of policy formulation it helps identify leverage points where innovation and impact performance can be improved and the ways in which this can be targeted towards specific policy imperatives. In the last decade or so innovation systems has come to prominence as a guiding framework for science and technology, innovation and economic development policy in OECD countries, but also in emerging economies. In Indonesia this can be seen in the priorities and policies of the Ministry of Research and Higher Education (RISTEKDIKTI).

1.2 How does this perspective relate to the intent of ARISA?

As part of the wider suite of AIP-Rural projects, ARISA is unusual in that it combines an applied research mandate with short-term impact ambitions of a scale more usually associated with a development project. AIP-Rural and PRISMA in particular have taken a market delivery approach, with the rationale that if market based solutions can be pioneered with project support, other market players will respond to market signals and “crowd in” to take advantage of an emerging market opportunity. The rationale of ARISA is that market-based solutions can be leveraged through technological opportunities emerging from public research institutes. This fills a perceived gap in the PRISMA portfolio, but also it also provides a way of exploring how the role research and technology could be better rolled into the PRISMA operating model.

The impact logic of ARISA, like PRISMA and the wider AIP-Rural program is that the demonstration of successful partnerships between the public and private sector will effectively stimulate public research institutes and businesses to “crowd in”, copying the approach and catalyse a wider range of partnerships as standard practice. This may well happen to some extent if sufficient market incentives become apparent to encourage this type of behavioural change.

However, the factors that condition public-private sector partnerships involve a deeper set of issues that do not necessarily respond to market signals and that will require purposeful capacity building and institutional and policy change. In other words scaling of the ARISA model cannot be left to market forces alone and will require engagement with, and influence of, the institutional settings of public research institutes as well as the wider policy environment dealing with research and innovation.

It is in this context that the heuristic of an innovation system is relevant. It provides a framing that can guide enquiry into the complex of institutional and policy issues that shape the progress and spread of public-private sector partnerships. Equally it provides a lens to explore the wider policy landscape of innovation, identify leverage points and helps frame lessons and insights from ARISA in ways relevant to institutional and policy design and reform.

2 Innovation research activity progress

Starting with a research framing document (Hall and Williams, 2015) developed in June 2015 ARISA's innovation research activities have proceeded on a number of fronts over the last 12 months as follows.

2.1 Understanding the policy landscape and influence points

The Centre for Innovation Policy and Governance (CIPG) was commissioned to undertake a mapping study that explored key actors and organisations, networks and influence in the policy environment relevant to agricultural innovation at the public-private sector interface (Appendix 1). CIPG are unique in Indonesia in that, to the best of our knowledge, they are the only dedicated research group working on innovation policy issues. The purpose of their study was to inform the way ARISA can develop a learning interface with champions in relevant areas of the policy arena. CIPG are well positioned to do this and have strong personal links and familiarity across the public policy domain relating to science, technology and innovation policy. This emerges in part from their work on innovation and capacity building under the EU-Indonesia Trade Cooperation Facility (EU-TCF). A draft study has been completed which has provided a broad picture of the landscape (Appendix 1), this includes an inventory of innovation initiatives that are implemented non-government agencies. CIPG has also provided confidential briefings and briefing notes to help in understanding and navigating some of the more sensitive dimensions of the innovation policy environment.

2.2 Tracking institutional change and challenges in the interventions

The core of value-add of ARISA is that it has on the ground interventions dealing with the day-to-day realities of making public-private sector partnerships work and deliver results to smallholder farmers. It is here that lessons on how to enable these partnerships will emerge and it is here that implications for institutional and policy adjustment will be revealed. ARISA's interventions are briefly described in box 1.

A tool — referred to as an innovation practice log — has been developed to capture the institutional change processes and challenges experienced by the intervention teams. The tool comprises an interview guide that asks interviewees to reflect on previous and current public-private sector partnership practices, changes that ARISA is catalysing, and the fit of these practices and changes in the wider setting of their organisations. The logs are also informed by a review of project documents over time, project team observations and review of relevant literature and news pieces. To date, the logs have sought to capture the starting point of the different organisations and partnerships and the extent to which their experience in ARISA has changed their approach and capacity to partnering. It is important to note that the sorts of changes that ARISA is seeking to foster through the partnership arrangements take time and for partnerships that have commenced later, such as dairy and sugar, it is too early to expect to see significant change.

These innovation practice logs will be updated at regular intervals in conjunction with the partnership reflections. They will therefore become an important record of how attitudes and practices around research-private sector partnerships change over the course of ARISA, and the key challenges and constraints to making the partnership work. The value of this is two-fold: first, they form an important input into intervention team capacity building. A summary of the logs will be discussed with intervention

teams through the partnership reflection meetings organised by the capacity building component of ARISA, encouraging learning across the teams. Second, by capturing insights into the challenges of 'doing' research-private partnerships in situ, an evidence-based, practical discussion can be had regarding key institutional or policy level changes that are required to enable innovation. To date the first practice logs have been completed for the maize and sugar interventions. Initial interviews have been conducted for dairy, beef and cassava, and finalised summaries will be available by the end of August.

Box 1: An overview of the ARISA interventions

ARISA is supporting collaborative projects between research institutes and private sector companies to incubate and deliver technology and business solutions appropriate to smallholder farmers in eastern Indonesia. These projects are supported by capacity building and technical assistance tailored to the individual partnerships. ARISA seeks to identify and analyse opportunities and barriers to the expansion of research-private sector partnership that can help translate and deliver ideas and solutions from research to farmers. Interventions are described below:

Beef intervention

This intervention involves developing a profitable and sustainable beef production system in Sumbawa Nusa Tenggara Barat. This is being done through improved engagement of cattle farmers with a traders association (PEPEHANI), individual large traders, and a beef processing company (PT Dharma Raya Hutamajaya). The research institute partner is the University of Mataram. The intervention aims to improve the incomes of approximately 1,100 cattle farmers in West Sumbawa and Sumbawa Districts by the end of 2018.

Maize intervention

This intervention involves promoting best practices for dual cropping models using new hybrid maize with pulses (mung bean and ground nut) on drylands in NTB. The partners are PT Syngenta Indonesia, Bank NTB, and the University of Mataram.

The intervention aims to improve the incomes of about 1,100 smallholder farmers in East and North Lombok by the end of 2018.

Cassava intervention

This intervention involves developing integrated modified cassava flour (MOCAF) chip clusters for improving the welfare of smallholder farmers in the southern part of East Java. The partners are PT Bangkit Cassava Mandiri (PT BCM), University of Jember, the KEHATI Foundation (NGO), plus a range of enterprise cooperatives. This intervention aims to improve the incomes of approximately 2,800 cassava and sheep farmers in the Jember region of East Java by the end of 2018.

Sugar intervention

This intervention involves improving market linkages, the commercialisation of agricultural innovations, and an enabling policy environment for sugarcane development in Madura, East Java. The partners are PT Perkebunan Nusantara X and the Indonesian Sugar Research Institute, along with Trunojoyo University. This intervention aims to improve the incomes of approximately 1,200 farmers in Madura by the end of 2018.

Dairy intervention

This intervention involves developing fodder farming business models for smallholder dairy production in East Java. The partners are PT Nestle and the University of Brawijaya. The intervention aims to improve the incomes of approximately 1,200 dairy and fodder farmers in the Malang region of East Java.

Shallot Integrated pest management (IPM) intervention

This intervention involves the using integrated pest management for shallot production in East Java. It is a joint ARISA-PRISMA intervention. The main partners are PT NuFarm, PT Nasa, PT Solbi, University of Gadjara Mada, and the Plant Protection Agency. CropLife Indonesia will also be involved. The intervention aims to improve the incomes of at least 3,000 shallot farmers in East Java through the adoption of IPM.

2.3 Engagement with policy and wider stakeholders

In parallel to, and in support of, the efforts to understand the policy landscape and define an appropriate set of mechanisms to enter dialogue with policy makers, the ARISA team have sought to engage with a wide set of stakeholders. This has included:

- Discussion in Jakarta with BPPT and the science Director at the Ministry of Industry
- Hosting of an Indonesian Science Academy delegation to Australia led by Prof. Sankot.
- Discussion with DFAT's Knowledge Sector Initiative.

The key message is that Indonesian agencies are searching for “models of what works”. That is, identification of models that are useful in promoting public-private sector partnerships that mobilise science for innovation.

Discussion with the Knowledge Sector Initiative drew attention to the way a number of streams of DFAT and economic diplomacy work including ARISA, the wider Commonwealth agencies (AusTrade, ACIAR) and the initiatives above are starting to converge in terms of strategic intent. Specifically, the recognition in both development assistance and in bilateral economic cooperation that capacity and policy issues around research, innovation and private sector led growth need to be tackled in order to unlock step change impacts and progress. In other words the systemic change agenda of development and growth strategies is going to need a much more concerted effort towards policy development for innovation. A specific implication of this convergence is that there are opportunities (outlined in Section 5) for ARISA to collaborate and contribute to larger scale policy engagement initiatives in related parts of DFAT such as KSI and beyond.

3 Situational analysis of the innovation system at policy and organisational levels.

This section presents a situational analysis of the innovation systems in Indonesia at both a policy level and based on the experience of ARISA’s intervention experience at the research and private sector organisational level. This purpose of this analysis is to highlighting key challenges where progress needs to be made and where ARISA could usefully play a role. Having identified these challenges a subsequent section explores the key agencies, debates and dynamics in policy enabling environment for agricultural innovation. Table 1 below provides an overview analysis of the challenges in the Indonesian innovation system. The sections that follow explore these issues in more detail.

Table 1: Overview of challenges in the Indonesian Innovation System. (Source: Authors’ analysis).

Dimensions of the innovation system	Current status
Strength of linkages	Weak linkages across government, research institutes and the private sector. Disconnect particularly between developers and users of technology. Strength of linkages within ministries and departments is stronger, but this does not necessarily support innovation (i.e. too internally focused).
Patterns of incentives	Government regulations and programs aim to incentivise collaboration between research and private sector. However could be better coordinated across different government departments.
National and organisational policies and practices	Strong leadership at regional and ministry level, and strong policy support for innovation, but so far this has not been sufficient to translate into fruitful innovation system. Structural and procedural issues that limit the capacity to turn strong political will into enabling environment Design of policies and programs is strong, but implementation capacity is weak, which limits effectiveness. Opportunities for evaluation and learning are missed due to a focus on monitoring financial accountability and outputs.
Effectiveness of mechanisms to align to development priorities	Varied — limited learning/sharing of experiences within or across programs. Limited mechanisms for aligning agendas of public and private sector at macro and implementation levels, with the possible exception of PISAGRO.

3.1 The policy environment and the national innovation system of Indonesia.

At the macro-level there is a clear policy narrative about the importance of science and innovation as part of wider development and economic growth ambitions. There is also widespread interest within different government agencies to promote public-private sector partnerships for innovation. This occurs across the economy as a whole, but includes agriculture. It is evidenced by a number of schemes dealing with technology and business incubation. However despite this interest, there remains a lack of clarity about how to support and strengthen the innovation system as a whole. Debate on this issue spans Ministries, universities and industry, however with multiple actors and agencies there is added uncertainty regarding where authority to push a change agenda resides, or which models should be applied.

There has been considerable debate about the importance of developing an innovation system in Indonesia. However, the habit of only looking for the models from global best practice has tended to distract from the need to properly consider the Indonesian context and the nature of an innovation system appropriate to that. Ironically this blueprint approach to innovation systems design and strengthening contradicts the core global best principles of innovation system capacity development — experimentation, learning and evolutionary improvement. This would require much stronger policy learning processes: analysis and documentation of existing schemes and the use of lessons from this to adjust policy settings. As will be discussed in detail below this sort analysis and learning is yet to become established as a common practice.

A diverse set of unique cultural, social and development contexts

Indonesia is incredibly diverse — this is visible in the range of cultures and languages; administratively, with decentralised government providing partial autonomy to over 500 districts (divided between 34 provinces); and visible in the different stages and pace of economic and rural development across these areas.

This diversity creates challenges in a) designing national policy and enabling innovation conditions that are relevant and appropriate to the diverse context, and b) ensuring the implementation of policy at the provincial and district levels is as anticipated or designed (ie. maintaining connection between national and district actors). Furthermore, the constant churn in government positions across the country at various levels, results in change in personnel, often leading to changes in district policy and programs.

Stakeholder connections and policy coherence

The innovation policy environment is a crowded space. Public policy and implementation agencies have overlapping, complementary and contradictory roles with little coordination between them. Figure 2 illustrates an idealised “division of labour” of different roles and responsibilities in the Indonesian innovation system. However in reality the system is characterised by weak links between research organisations, industry, government and civil society organisations. This results in fragmented or disconnected policies across agriculture, research, education and innovation policies more generally. This is particularly problematic for supporting innovation as it relies not on a single policy (as can be seen from figure 2), but on a coherent set of related policies that contribute to the functioning of the innovation system as a whole.

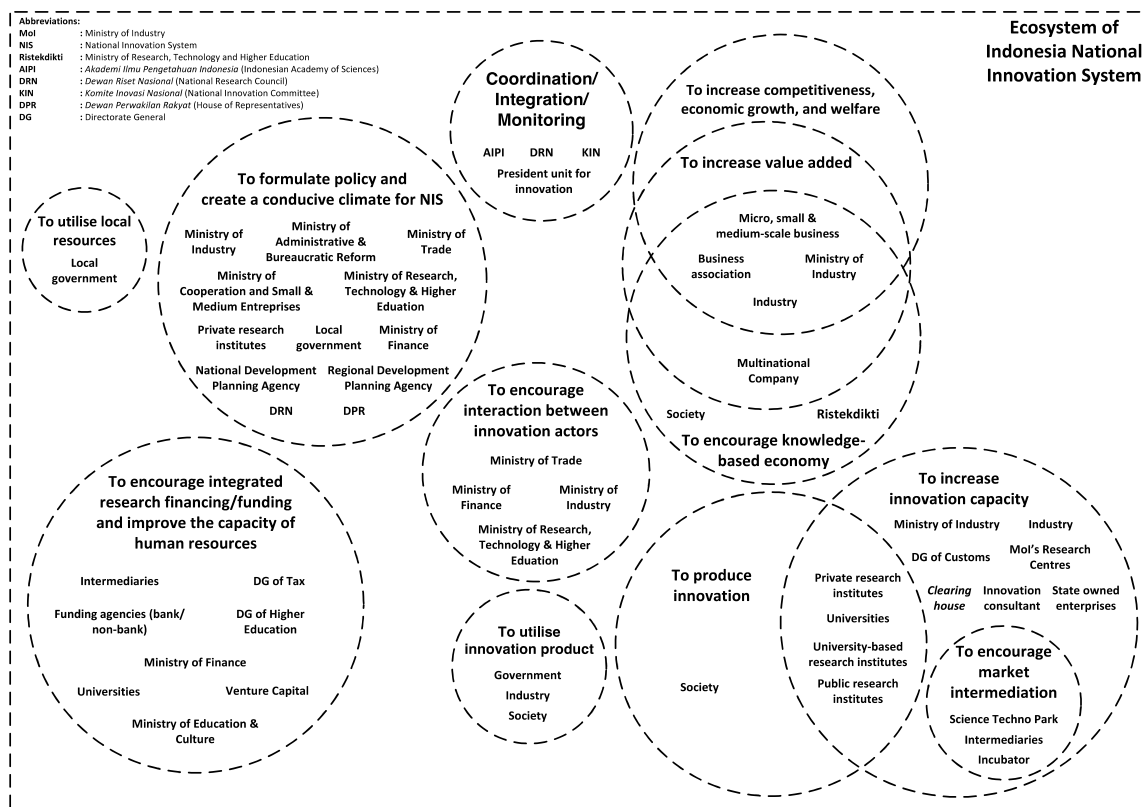


Figure 2: The ecosystem of Indonesian National Innovation System (Source: CIPG, 2016)

A consequence of this is the very wide range of initiatives that fall into the broad category of innovation support mechanisms. These span the infrastructural approach (setting up science and technology parks and business incubators) to a grants type approach (although a notable innovation fund focuses on funding research), and others dealing with risk and business incentives (see Appendix 1). However, the poverty reduction and/or inclusive business imperative is not strongly mainstreamed across different elements of innovation policy. Of course poverty reduction and food security is a clearly articulated policy goal at a national level. However, while smallholders are emphasised in agriculture related investments, the poverty imperative seems to get diluted in other areas of innovation policy that may have relevance to agriculture.

Within the research and industry sectors, there is limited communication between developers and users of technology, with limited exchange or mobility of human capital between R&D institutions and universities. The impacts of this disconnect was discussed in a recent presentation by the Director of Innovation Enhancement (Ristekdikti) and are summarised in Box 2. Within the universities themselves, there is a further disciplinary disconnect with incentive structures that discourage multi-, inter- and transdisciplinary research. Thus the majority of technology development in Indonesia still tends towards a supply-push approach, generating a mismatch between the technology available and user-needs. Though government regulations institute different tax incentives to encourage industry support to, and collaboration with, research institutes, these are either not sufficiently attractive for industry, or not yet operationalised.

The realities of these kinds of fragmentation were apparent in discussion with university staff involved in ARISA interventions and are discussed further in section 3.4. Suffice to say the siloed approach to innovation is reinforced at various scales, across and within organisations, and severely limits the potential for innovation.

Box 2: Challenges and consequences of weak R&D and industry linkages

1. Interactions between R&D institution and business do not develop properly;
2. Not a lot of government-funded R&D products adopted by industry.
3. R & D institutions are not exposed to the challenges faced by industries so that the gap between what R&D activities they do with what is required by industries is widened
4. Interactive learning process to transpose R&D products into innovations does not happen, so in the short term, company's competitiveness would not shift to innovation capabilities.
5. Government investment through R & D institutions to strengthen the mastery of science and technology are not effectively influence the performance and economic competitiveness
6. Potential for diminishing of return phenomenon is very likely to occur because of the investment in the form of facilities and equipment in the production sector is not supported by the strengthening of the mastery of science and technology.

Source: Dr. Ir. Jumain Appe MSi. General Director of Innovation Enhancement Ministry of Research, Technology, and Higher Education. Business engagement presentation at Indonesian Science congress 2015

Implementing capacity

Despite the fragmentation and weak connections of actors and organisations within the innovation system, the capacity for national policy and program design is strong, as evidenced by many well-conceived and planned programs. The challenge is the capacity of decentralised public agencies to implement these appropriately. This is particularly challenging in cases where the scheme involves grants and problem solving, mentoring and program adaptation throughout implementation. This often arises from an unfamiliarity with innovation and its mechanics, and a limited focus on monitoring, evaluation and learning to build on past experience (see next section). This suggests a capacity building agenda is required in implementing agencies, although the precise nature of capacity gaps needs further investigation.

Evaluation and learning

There is significant opportunity within the Indonesian innovation system to learn from the large number of programs, grants and incentives that have been implemented across different agencies (see Appendix 1 and 2). However, the architecture of effective monitoring and evaluation programs are under-developed as are the processes to translate evaluation results into learning and improvement. As a result there is much reinvention of the wheel due to the lack of knowledge on how previous policies succeed or failed. The practice of documenting and organising lessons from policy implementation has not yet become a routine habit in Indonesia. The general evaluation documentation available usually consists of budget evaluation and target achievement.

At the level of national policy, assessing the effectiveness of clusters of policy intervention in terms of building the capacity of the innovation systems at a whole is a challenge. Benchmarking innovation performance at a national or sectorial level holds many challenges because of the difficulty of finding indicators to track system health rather than just the individual components of the system. The OECD innovation survey based approaches work well in industrial economies.. However attempts to do this in the

agricultural sector that use indicator based approaches have been largely unsuccessful (see Spielman and Birner 2007), with alternative approaches underdeveloped (eg. IDRCs work benchmarking rural innovation capacity, Dorai et. al, 2011 <http://www.cprindia.org/research/reports/south-asia-rural-innovation-capacity-benchmarking-report>).

At program and project levels, the focus of M&E is tightly framed around outputs and financial accountability rather than critical review and learning. Departments commission their own evaluations which tends to circumscribe the scope of enquiry . There is a degree of risk aversion in how KPIs and other performance criteria are defined, with a tendency to favour easy targets (ensuring success and securing future budget funding) rather than ambitious targets that would push innovation targets.

Ministry level champions are driven by their own KPI. These are variable but an important part of the engagement strategy going forward. ARISA will need to be able to articulate its achievements and associated lessons in existing terms of success and performance.

3.2 Implementation of research-private sector partnerships — insights from ARISA interventions

Table 2 presents an overview analysis of the key challenges of the innovation systems from at the public research institute level. These issues are elaborated in the sections below.

Table 2 Challenges in the system of innovation at research institute-private sector level. (Source: Authors’ analysis.)

Dimensions of the innovation system	Current status
Strength of linkages	<p>Individuals can and do work with the private sector but rarely as part of a broader strategy on the part of the universities to position themselves as partners and service providers that the private sector can work with.</p> <p>Limited tradition of working with the private sector means that linkages and capability are weak.</p> <p>Capacity weakness in the private sector and particularly SME’s makes partnership difficult</p>
Patterns of incentives	There is a broad based set of professional incentives in place, but disciplinary bound publication in international journals trumps all in matters of promotion.
National and organisational policies and practices	<p>Broad-based national policy shift for research to work more closely and collaboratively with the private sector, but challenges of translating this into practice.</p> <p>Traditions of research practice and community service orientation reinforce weak orientation to working with the private sector</p>
Effectiveness of mechanisms	Intermediary agencies and mechanisms to coordinate the efforts of public and private sectors and to broker and facilitated partnerships are generally missing

Shifting understanding and expectations of partnerships

Limited prior experience partnering with the private sector (aside from simple transactional relationships) left some university partners unprepared for the realities and complexities of shifting from more traditional

agricultural research to collaborations that push the focus from the farm to the market. Initial designs and conceptualisations of the interventions in some cases were shaped by past experiences in traditional research and familiar modes of practice that underplayed the new way of thinking and opportunities brought by a private-sector partner. For the ARISA team, this has led to reflections on how early partners were chosen, and how the aims and goals of ARISA could be better articulated.

The capacity building activities of ARISA, particularly those associated the development of the partnership agreement and developing results chains has helped the university researchers (and indeed the ARISA team) come to grips with the fundamentally different nature of ARISA. For example, in the beef intervention, researchers had a tradition of organising field trials and demonstration and taking responsibility for scaling technology to farmers. ARISA has encouraged the researchers to partner with traders and government agencies allowing them to play to their technology scaling strengths. This alignment of research with broader and market-facing development initiatives is a new direction. These modest changes are indicative of the role for ARISA like-interventions in reframing the role of researchers in a more market-facing technology delivery model.

The maize intervention illustrates further reframing of research. In this case the university partner's initial engagement primarily concerned the technical dimensions of maize agronomy. This role changed as the intervention progressed, particularly following the departure of a partner providing production credits to farmers. Increasingly the university has had to play a facilitator role, negotiating how the market systems could be used to provide farmers access to credit. This is not yet a pervasive change in the university. However it does illustrate the way experiences from an intervention exposes researchers to different problem solving roles and the way prescribing private sector involvement and setting impact targets can help drive this problem solving.

Research institute structures and incentives

The reality of the institutional setting of the universities is that, as a whole, traditions of research practice and modes of funding and professional performance rewards need considerable transformation before partnership with the private sector can become common practice. The scale of the task would be daunting even in one university department. Attempting this across multiple universities through modest scale interventions supported by ARISA is extremely ambitious.

There is certainly a broad-based national policy shift for research to work more closely and collaboratively with the private sector (see discussion below) and this is evident in the meta-narrative of the universities. However, the mandate of the universities is structured around research, teaching and community service, which have particular implications for guiding how academics work and are incentivised (or not) to work with the private sector.

Science publication in international journals is the main route to promotion. Furthermore, value is only attributed to publications that are in the researcher's primary or original discipline — that is, an agronomist only receives recognition for agronomy publications, an animal nutritionist only for publications in animal nutrition and so on. Where an initial strategy in ARISA was to try and broaden the scope of thinking around what is publishable (eg. to include the science of innovation or partnerships) this is a clear disincentive, especially for junior academics with an aspiration for promotion. It tends to be only when academics have reached their desired level of seniority that they become more comfortable to explicitly and deliberately broaden the scope of research and how they publish. This is not to say that other performance metrics are not in place for example teaching, providing project experience for students, community service and even

working with the private sector. In reality the actual and perceived weighting of these metrics is overshadowed by the pressure to publish in order to be promoted. This is not a challenge restricted to the research profession in Indonesia. Our own experiences at CSIRO tell us that a shift to a more outward, impact focused professional reward scheme requires strong leadership and deep cultural change. It would be extremely unlikely to achieve this sort of change bottom up from an intervention like ARISA.

Another interesting ambiguity is that universities in one sense already have a reward system for being outward and impact focused through their community service mandate. Researchers are mandated and encouraged to work with farmers and communities. A result of this laudable emphasis on local community impact is that this has been interpreted very narrowly as specifically not working with the private sector. For example, much of the rural enterprise development work observed at universities has been focused on establishing community-based enterprises that either compete with the private sector or have a very incomplete understanding of the markets that these rural enterprises might be serving. This community service tradition therefore reinforces the idea that working with the private sector is not part of normal professional practice.

This is not to say that scientist do not work with the private sector. In fact there are rules that allow them to do this on a contract basis, with the university retaining a small percentage. In many cases this work is an important supplement to otherwise modest university salaries (Hill and Wei 2012). This is very much a transactional process between companies and individual researchers. It does not seem to be part of a broader strategy on the part of the universities to position themselves as partners and service providers that the private sector can work with. One result of this is that the capability of universities to work effectively with the private sector is very thin and dependent on individuals and their networks with the private sector. Similarly universities have not established a deep tradition of service provision to the private sector (let alone partnership or collaboration).

It is worth acknowledging here that there are “institutional entrepreneurs” operating within the universities who are leading the way in innovative engagements. The lead researcher in the cassava intervention is one such character. He has a history of knitting together alliances with cooperatives and the private sector in order to open up new (cassava) market opportunities for farmers. ARISA support is helping expand the scope of this. Institutional entrepreneurs typically face significant challenges as they push organisational boundaries and norms of behaviour.

A key feature of the history relating to the development of modified cassava flour (MOCAF) in the cassava intervention is the persistence, determination and creativity of the lead researcher to navigate professional and operational challenges to get to his end goal of delivering benefits to smallholders. The entrepreneurial aspects extend to working with a company, PT BCM, on cassava policy to achieve higher recognition for this crop in national programs and priorities. It remains to be seen whether this individual’s drive can be harnessed by ARISA to drive wider changes in the university by using his sponsorship of an innovation fair as a way of broadening the interface with the private sector.

Compared to the universities, the intervention with the Indonesian Sugar Research Institute (ISRI) paints a different picture due to the history of ISRI and different funding dynamics. Historically this was a public funded research institute charged with developing improved sugar varieties and allied technology that was provided as a free service to the public sugar industry. Public funding was stopped and ISRI has struggled to generate revenue even though it diversified its offering to industry considerably.

Some public core funding has now been reinstated to maintain research facilities and to allow ISRI to continue long term strategic research (i.e. plant breeding). This has created a very different sort of institutional setting compared to the university system. ISRI has the ambition to play the role of science informed sugar innovation agency; a source of technology and related expertise, and is also undertaking sector development feasibility studies and helping to address market and social issues associated with smallholder sugar production. It is experimenting with acting as a hub to broker in other expertise; for example it is supplementing its biophysical and economic skills in the ARISA intervention through a partnership with the anthropology department of the local university. ISRI already has close historical relations with industry. Its challenge is how to develop its capacity to fulfil its new role, and to demonstrate its value to industry players who are accustomed to free services.

Unlike the university based interventions the appetite for institutional change is strong and led from the Director of ISRI who has a clear vision of the nature of the role her organisation needs to play within the sugar sector: another institutional entrepreneur, though it could be considered quite differently to the cassava case. In contrast to the institutional entrepreneur in cassava case where challenges to norms and behaviours were driven by the individual's own motivation, in the ISRI case, there are strong external forces driving change (specifically changing funding modalities). ISRI's involvement with ARISA is evidence of how they are trying to change their agenda and capacity. With a champion of change of this sort in place, a real window of opportunity exists for ARISA to help ISRI better fulfil its sugar innovation agency role with various forms of technical and organisational capacity building. However the design of such support needs careful consideration and probably considerably more resources — this needs to be co-developed but could include capacity and understanding in multi- and interdisciplinary work, giving greater strength to current attempts to partner with other universities and bring in missing skills to address industry needs.

The private sector environment

Interviews with at least one private sector partner suggests that past experiences of trying to work with a university was unsuccessful because the research undertaken had not been orientated to deliver practical solutions. This is a familiar challenge and illustrative of the cultural differences between research and private sector organisations. It does however illustrate that simply putting public and private sector players on the same team is not sufficient to support successful outcomes. It involves changing the institutional setting of research by framing research questions differently and setting new measures of what constitutes a useful research finding, as well as a research success. It involves researchers joining the private sectors' experiments rather than pursuing more curiosity driven lines of research enquiry. That is, it involves both research and private sector partners having a better understanding of their respective priorities, goals and requirements. ARISA has an important role in helping advance this perspective in its interventions. Supporting researchers to present an attractive pitch to potential private sector partners will be a critical element of ARISA capacity building going forward.

It is worth noting that there is uneven development and presence of private sector actors across Indonesia. Though this is evolving, it can mean a limited pool of potential private sector actors for research to partner with. Furthermore, the capacity to partner with universities — eg. through co-funding — is limited for many of the small/medium enterprises that are would gain the most benefit from collaboration with research.

There are also challenges on the private sector side including, limited capacity and confidence to approach or partner with universities in the first instance or limited technical capacity for them to engage with science advances. The innovation practice logs highlight the way initial support and resourcing for a partnership can address this capacity gap. For example, we have seen partnerships shift from pure

transactional exchanges of resources to collaboration with a deeper appreciation of the universities legitimising role for the private sector in negotiations with government agencies and in building relationships with farmers. Another dimension of this is the way universities can play in a regulatory role, certifying products; for example in the beef case they play a role in certifying 'herbal' beef. This presents another avenue for collaboration.

This, however, also underscores the observation that public-private sector partnerships in Indonesia is not a match of equals and that intermediaries are, at times, going to need to broker these types of alliance. With few intermediaries in the current innovation landscape, ARISA is currently playing this intermediary function. As part of the CIPG led landscaping study a number of mini case studies are presented that reinforce the way NGOs often play this role: for example Mercy Corp has been convening the pre-competitive aspects of its "8 villages program" that will eventually be driven forward by the private sector partners. There is currently no public agency playing this role. The PISAgro platform is perhaps one example that has the ambition to be a mechanism to coordinate the efforts of public and private sector collaboration. Going forward it would be useful to explore how ARISA could both strengthen this type of intermediary role, but also use the capability of existing intermediary organisations as part of the intervention commissioning and capacity building process.

The challenge of institutional change in public research institutes and the universities is formidable. While macro-level policy ambitions are sending positive signals about the importance of innovation and partnership with the private sector, there is a disconnect between these ambitions and their implementation. Institutional inertia in the universities arises from their historical emergence and deep traditions as seats of learning, research excellence and community services. These are laudable traditions, but difficult to change quickly without considerable capacity building and support at the upper levels of university governance structures – which is further compounded by the continued control of the Ministry of Education in many aspects of university governance. ARISA has made links into a number of departments in a number of universities. The energy generated by "institutional entrepreneurs" who are already pushing boundaries within the system provides an opportunity for ARISA to further progress dialogue on how to support innovation. This could create an avenue to undertake capacity building and private sector engagement initiatives that go beyond the interventions and engage a wider set of university staff in a subset of the universities ARISA is partnering with.

4 Overall assessment of the innovation system and its challenges and opportunities.

The following presents the key features of the Indonesian innovation system that ARISA needs to consider going forward.

- The innovation system of Indonesia is characterised many of the generic weaknesses that while not unique to Indonesia are deeply embedded in the culture and institutional setting of the country: weak or missing links between research and the private sector reinforced by patterns of professional incentives and routines; underdeveloped capacities in research organisations to work with the private sector, lack of policy coherence; limited capability in key agencies to implement innovation initiatives; investment / disbursement driven performance metrics; and risk aversion in public bureaucracies.
- There are however, highly contextual conditions that add to the challenge of making innovation policy work effectively in Indonesia, such as the cultural and geographical diversity and a decentralised system of government. These features add complexity through the diverse local contexts of which policy is interpreted and implemented.
- The practice of documenting and using lessons from policies and program implementation has not yet become a habit in Indonesia. This is a missed opportunity for the *policy learning* needed to craft a coherent set of policies and interventions that support innovation system capacity building and do so in a way that address the contextual issues of Indonesia. This challenge is exacerbated by lack of appropriate metrics and associated data on the functioning and performance of the innovation system as a whole.
- The policy space around innovation is a crowded one with multiple agencies with overlapping roles and multiple champions. There are also other DFAT investments at play in this domain. However there is convergence on the importance of strengthening the innovation policy environment as a route to systemic change and national goals.

Over the last decade much of the high-level policy debate in Indonesia has adopted an innovation systems framing. However a lot of the energy around this debate has focused on trying to specify what this system should ideally be and has been pre-occupied with a search for best practice models from global experience. This has value, but overshadows the need to contextually design policies and interventions that address the needs of the country and address the specific challenges in the capacity of the Indonesian innovation system.

5 Implications and options for policy and stakeholder engagement to strengthen the enabling environment for agricultural innovation.

This paper highlights that ARISA's strategic intent of progressing public-private sector led innovation through policy channels is well aligned to the broader policy narrative of Indonesia. ARISA is dealing with relevant challenges and has the potential to generate valuable insights into critical policy and institutional change processes. Furthermore ARISA is starting to build relationships in the policy domain and with public policy agencies, notably RISTEKDIKTI (but also others), who are aware of ARISA's strategic intent and show interest in learning "what works". The challenge ahead concerns how this alignment and awareness can be translated into a practical learning alliance.

ARISA has the goal to contribute to an enabling environment for innovation. ARISA needs to avoid the temptation of making normative recommendations on innovation systems reform based on a slim evidence base from its interventions. Any approach to enable innovation needs to be contextually driven – this is not to say that approaches from other contexts cannot be applied to Indonesia, rather that any transfer of mechanisms or approaches must go through a process of translation and reinterpretation to be relevant and applicable (and owned) by local actors.

Therefore, the approach taken in ARISA has been to understand the current environment of innovation policy in Indonesia as a way of identifying how most usefully to enter into a dialogue about change. This is a step-wise approach: understanding the innovation landscape/actors; proposing different processes for how to engage; seeking feedback and buy in from key actors within the system regarding which of these is the most feasible and has the most support. The aim is to facilitate discussion to make full use of the existing expert knowledge about the innovation system, as it sits within those government actors that intimately understand the institutional, bureaucratic and cultural complexities of national policy in Indonesia, and can put the theoretical principles of innovation system function into the practical realities of Indonesia.

Priorities appropriate to the scope of ARISA include:

1. Building the capacity of public researchers to work with the private sector. This is already the main focus of ARISA, although a focus beyond the interventions is needed.
2. Strengthening links between analysis and lessons of the effectiveness of interventions and policy for program and policy learning. ARISA's interventions and analysis are a source of lessons, but ARISA could play a wider role in piloting a wider process for program and policy learning.
3. Leveraging off the convergence of interest around improving the enabling environment for innovation. Current interest in innovation policy reveals a number of champions and wider dialogue processes that ARISA could connect with.

Implementation options going forward include the following:

1. **Using ARISA's lessons to inform policy.** The practice logs are a key source of data to help interpret ARISA's intervention experiences and document lessons that can be shared more widely. They also play an internal learning function. Experience to date suggests that this is a viable way of

developing new insights into the realities of making public private sector partnership work in public research institutes as well highlighting wider institutional challenges related to practice traditions and professional incentives. In the next 12 months the collection of information through the practice logs will be continued. This information will be used as an input into the wider capacity development support being provided to interventions (i.e. helping with reflection on what is working and where the challenges are). As the interventions mature over the next 12 months information from the practice logs will also be used to develop case studies and a synthesis of broader lessons from across the interventions. This material will serve two purposes. Firstly to share with organisations and policy agencies (see policy engagement options below) to help with improved design of their new initiatives in innovation and for publication in collaboration with ARISA's intervention partners.

2. **Leverage off institutional entrepreneurs in public research institutes** Based on the two or three individuals that have self-selected through the intervention commissioning process, use their energy and networks of influence to implement capacity building and private sector engagement events that go beyond the existing intervention. Pitching ideas to private sector partners, or assisting with connection to funding for public-private sector partnership could give this real meaning. This could be a way of progressing the mainstreaming of ARISA approaches in partner organisations beyond the interventions.
3. **Structure the partnership with RISTEKDIKTI as a technical assistance and as a learning alliance.** Partnering with RISTEKDIKTI as an implementing partner presents opportunity to contribute to two of the identified challenges in the innovation system: the need to strengthen innovation program implementation capabilities; and the need for stronger learning in intervention cycles. An option here is to use the partnership with RISTEKDIKTI to include joint assessment and lesson learning not just of the ARISA interventions, but also of similar RISTEKDIKTI investments and grants. A first step will involve developing simple protocols to jointly assess existing interventions. This protocol would need to incorporate RISTEKDIKTI key performance indicators as well innovation systems criteria developed by ARISA.
4. **Act as a hub for sharing experience and bridging between field experiences of other public-private agricultural innovation partnerships.** ARISA is only one source of lesson on public private sector partnership for agricultural innovation. Given the weak tradition of learning from experience in the innovation system, ARISA could play a role in using its analytical expertise to collect, collate and share these experiences with its policy partners. This would help expand the evidence base of ARISA. Linking it to RISTEKDIKTI would lend legitimacy and provide a useful connection to policy with considerable convening power. In the long term, partnering with the Jakarta based Centre for Innovation Policy and Governance (CIPG) their role as an innovation policy think tank responding to agency needs on specific policy issues; for example a more detailed exploration of the implementation capacity issues and innovation systems capacity benchmarking that have been highlight in this report as areas needing attention, but are currently beyond the scope of ARISA. This option would need further scoping and it would need to consider ways of engaging local level agencies within the decentralised government system as well as the national agencies mentioned above.
5. **Form / join a policy engagement coalition.** With the convergence of a number of DFAT and other related initiatives around the broader capacity and innovation policy agenda there is much scope for collaboration. This direction is already being pursued by other parts of DFAT and it would seem

sensible to join rather than duplicate. One configuration maybe that ARISA partners with KSI and takes a lead on issues specifically related to agricultural innovation policy. This could be done either in a “light mode” (using ARISA evidence only) or in a more comprehensive mode incorporating elements of options 2 and 3. This option would need further scoping and will contingent on any recent changes in KSI following their mid-term review earlier in the year.

The next steps are to take these options and discuss them in more detail with relevant stakeholders and partners to think through the practicalities and resourcing implications. Once agreement on the preferred pathway(s) has been established, ARISA will need to undertake a more detailed design of next steps, actions and responsibilities, including timeframes. In cases like this there is always going to need to match aspiration with resourcing. In the case of ARISA this probably means a wider strategic set of choices about how to adapt its operating model based on experiences to date. Of equal importance are strategic choices associated with finding a balance between driving market systems change through interventions that rely on market signals to stimulate market change; and investing in processes that connect these and other experiences to the policy and institutional change process and the systemic change agenda that is increasingly prominent in development and economic growth policy and strategies.

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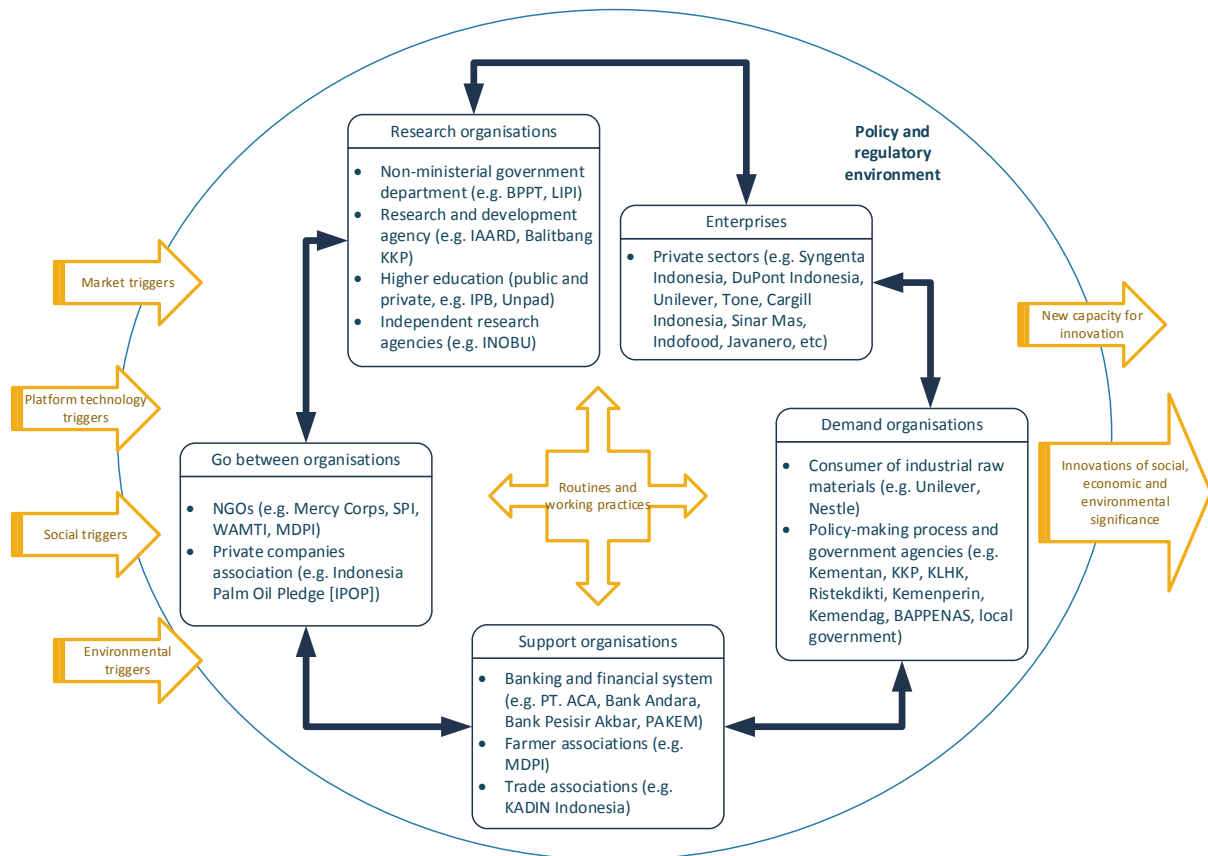
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Appendix 1: CIPG Report: Mapping Indonesian innovation landscape

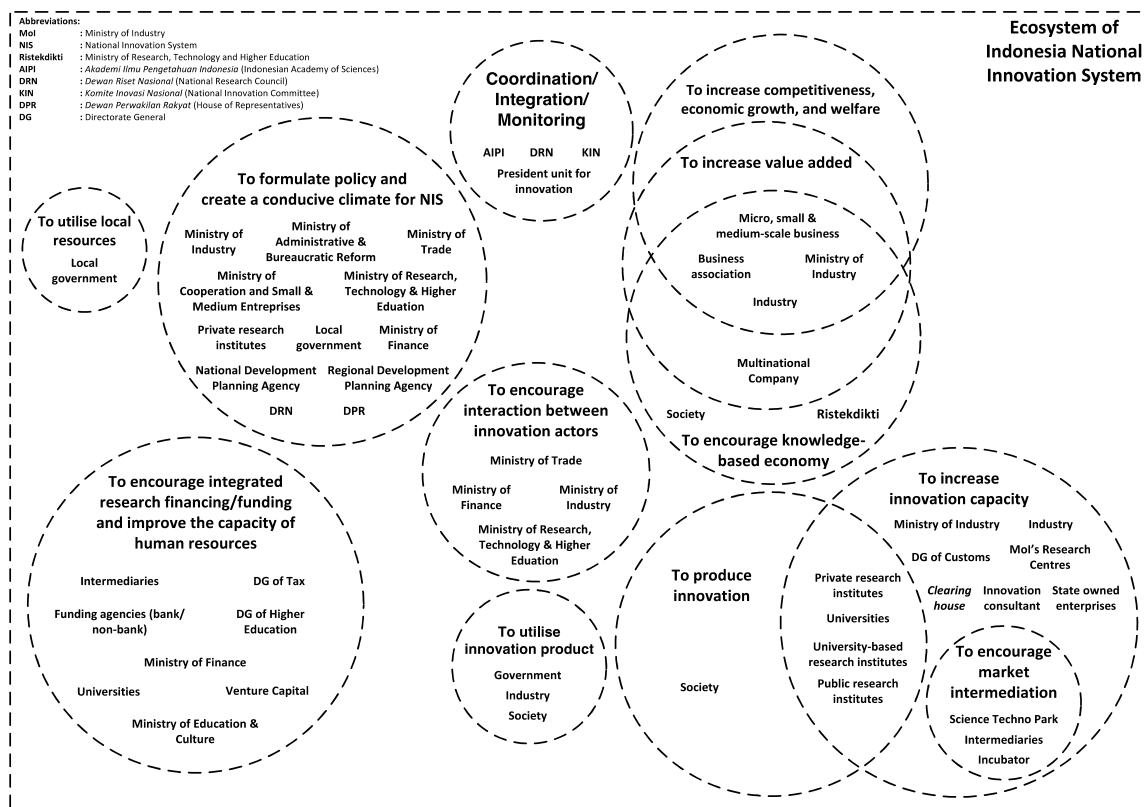
Indonesian AIS Dynamics: An overview

Elements of a dynamic working system in Indonesian agriculture sector more or less can be seen in the figure below:



Source: Adapted from Hall (2012)

The innovation policy environment is a crowded space. Public policy and implementation agencies have overlapping complementary and contradictory roles with little coordination between them. Figure 2 illustrates an idealised “division of labour” of different roles and responsibilities in the Indonesian innovation system. However in reality the system is characterised by weak links between research organisations, industry, government and civil society organisations.



Line ministries

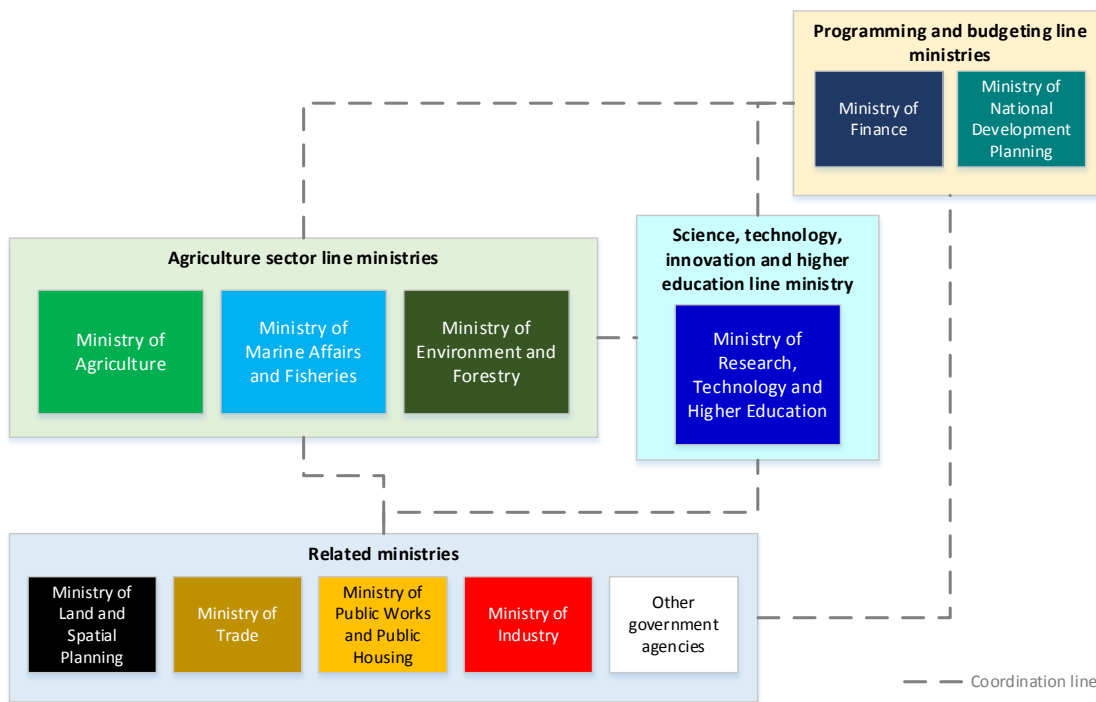
The line ministries for agriculture sector are Ministry of Agriculture (*Kementan/Kementerian Pertanian*) for crops, plantation, horticulture and livestock sub-sector, Ministry of Marine Affairs and Fisheries (*KKP/Kementerian Kelautan dan Perikanan*) for fisheries sub-sector and Ministry of Environment and Forestry (*KLHK/Kementerian Lingkungan Hidup dan Kehutanan*) for forestry sub-sector.

Kementan is used to be the sole ministry regulating agriculture sector. However, circa 1960s, the responsibility for forestry sub-sector has been moved to Ministry of Forestry (later was merged with Ministry of Environment into KLHK) and since 1999, fisheries sub-sector has been under the responsibility of KKP.

Ministry of Research, Technology and Higher Education (*Ristekdikti/Kementerian Riset, Teknologi, dan Pendidikan Tinggi*) is the line ministry for science, technology, innovation and higher education. Kementan, KKP and KLHK supervise Indonesian Agency for Agricultural Research and Development (*IAARD/Badan Penelitian dan Pengembangan Kementerian Pertanian*), Indonesian Agency for Marine Affairs and Fisheries Research and Development (*Balitbang KKP/Badan Penelitian dan Pengembangan Kelautan dan Perikanan*) and Forestry Research and Development Agency (*FORDA/Badan Litbang dan Inovasi*) respectively. In terms of agricultural innovation, it is under coordination of Kementan, KKP, KLHK and Ristekdikti. In practice, Ristekdikti would coordinate with IAARD, Balitbang KKP and FORDA for innovation related issues.

In addition to those four ministries, coordinating ministries which have roles in agriculture, innovation and agricultural innovation development among others are: Ministry of Industry (*Kemenperin/Kementerian Perindustrian*), Ministry of Trade (*Kemendag/Kementerian Perdagangan*), Ministry of Finance (*Kemenkeu/Kementerian Keuangan*), Ministry of Public Works and Public Housing (*PUPERA/Kementerian Pekerjaan Umum dan Perumahan Rakyat*), Ministry of Land and Spatial Planning (*ATR/Kementerian Agraria*

dan Tata Ruang) and Ministry of National Development Planning (BAPPENAS/Kementerian Perencanaan Pembangunan Nasional).



Source: Author.

There are also non-ministerial government department (NMGDs) which have roles in agricultural science, technology and innovation development, among others are: Agency for the Assessment and Application of Technology (BPPT/*Badan Pengkajian dan Penerapan Teknologi*), Indonesian Institute of Sciences (LIPI/*Lembaga Ilmu Pengetahuan Indonesia*). Both are under coordination of Ristekdikti.

Higher education

The transition into greater autonomy in higher education was started in 1998 and later in 1999. Through government regulation No. 61/1999, seven state universities gained new status. In which, four universities were given greater independence and the other three had become a model for other institutions that were set to join the group (Rakhmani & Siregar, 2016). Those seven universities are Bandung Institute of Technology (ITB/*Institut Teknologi Bandung*) in West Java, Gajah Mada University (UGM/*Universitas Gajah Mada*) in D.I. Yogyakarta, Bogor Institute of Agriculture (IPB/*Institut Pertanian Bogor*) in West Java, University of Indonesia (UI) in West Java, Indonesia University of Education (UPI/*Universitas Pendidikan Indonesia*) in West Java, North Sumatera University (USU/*Universitas Sumatera Utara*) in North Sumatera and Airlangga University (Unair/*Universitas Airlangga*) in East Java.

In a nutshell, this autonomous state universities scheme was updated, criticised, annulled and reformed. Now, there are three kind of state universities, specifically: conventional public universities, Public Service Unit (BLU/*Badan Layanan Umum*) universities and autonomous state universities (PTN BH/*Perguruan Tinggi Negeri Badan Hukum*). Conventional public universities are fully regulated under the responsibility of Ristekdikti. Both BLU universities and PTN BH universities have more freedom in managing their financial. In addition to public budget (through Ristekdikti), they have the autonomy to seek other financial sources. Furthermore, PTN BH universities also have the autonomy to manage their academic affairs.

Autonomy to manage:	Conventional Public Universities	BLU Universities	PTN BH Universities
Academic	No	No	Yes
Non-academic (such as financial)	No	Yes	Yes

Now, there are 12 PTN BH universities. In addition to seven universities stated above, there are Diponegoro University (*Undip/Universitas Diponegoro*) in Central Java, Padjadjaran University (*Unpad/Universitas Padjadjaran*) in West Java, Sepuluh Nopember Institute of Technology (*ITS/Institut Teknologi Sepuluh Nopember*) in East Java and Hasanuddin University (*Unhas/Universitas Hasanuddin*) in South Sulawesi.

For agricultural research and education, the prominent universities, to name a few, are: IPB, Unpad, UGM, Undip, Unair, ITB (technology for agriculture in general) and ITS (particularly for fisheries sub-sector), Unhas. Other prevalent state universities in agriculture sector are: Sebelas Maret State University in Central Java, Jember University in East Java, Riau University in Riau, Haluoleo University in South East Sulawesi and Tadulako University in Central Sulawesi.

To some extent, Ristekdikti still has limited roles in academics and non-academics in PTN BH universities. For instance, through research incentives such as Research Incentives for National Innovation System (*InSINas/Insentif Riset Sistem Inovasi Nasional*). In 2015, there were 35 universities (public and private) included in consortium funded by InSINas.

Policy directive/thrust

In the long term, Indonesian policy directive for agriculture is food sovereignty. For 2015-2019, government has focused on food security. Policies to reach food security are:

- Increasing productivity of main agriculture commodities
- Maintaining foodstuff price stability
- Improving the quality of food and nutrient consumption
- Mitigation for food security disturbance
- Increasing the welfare of agriculture actors mainly smallholders

Government, through Kementan, has supervised seven commodities. The commodities are rice, corn, soybean, sugar, shallot, beef meat and chilli. KKP supervises four commodities, namely: shrimp, tuna, mackerel tuna and skipjack tuna. KLHK supervises timber and rattan commodities.

Policy schemes and instruments

This table summarised the agricultural schemes provided by Indonesian government. There are at least five ministries that have major influence in Indonesian agriculture: Ministry of Agriculture (Kementan), Ministry of Marine Affairs and Fisheries (KKP), Ministry of Research, Technology and Higher Education (Ristekdikti), Ministry of Industry (Kemenperin), and Ministry of Trade (Kemendag).

No	Schemes	Instruments	Agriculture	KKP	Ristekdikti	Industry	Trade
1	Capacity building	Training, extension, mentoring	v	v	v	v	v
2	Partnership	Consortium, MoU, MRA, collaboration	v	v	v	v	v
3	Access to finance	Credit, investment, access to capital	v	v	v	v	v
4	Fiscal policy	Tax	-	-	-	v	v
5	Non-fiscal policy	Subsidy	v	-	-	-	v
6	Risk management	Insurance	v	v	-	-	v
7	R&D	Product development, research	v	v	v	v	v
8	Certification/standardisation	Assistance on certification/standardisation process	v	v	v	v	v
9	Infrastructure	Machinery, laboratory	v	v	v	v	v
10	Facilitation	Regulation assistance, access to other stakeholders, bureaucracy	v	v	v	v	v
11	Technology support	ICT utilisation, information system, monitoring system	v	v	v	v	v
12	Promotion		v	v	v	v	v
13	Data and information		v	v	-	-	v
14	Innovation support	Technology transfer, innovation cluster, business incubation	v	v	v	v	v

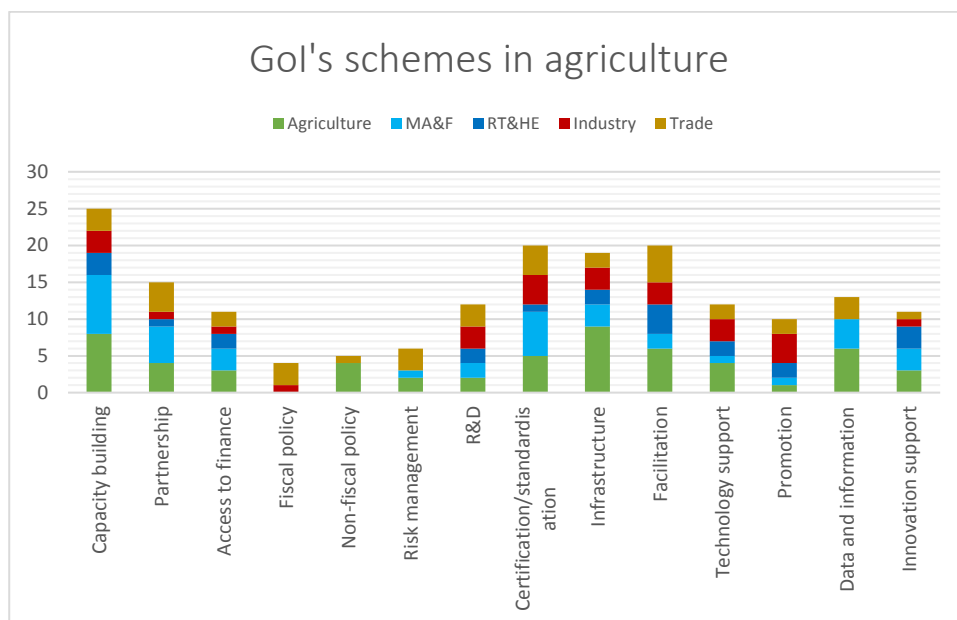
Note: MA&F (Marine Affairs and Fisheries); RT&HE (Research, Technology and Higher Education)

- **Capacity building** is the most common scheme provided by the government. The instruments vary from training to mentoring either for extension workers, farmers, fishermen, community, or business units.
- **Certification/standardisation** and **facilitation** are other common schemes provided by the government. These processes are often accompanied with capacity building for the stakeholders involved.
- All five ministries provide **access to finance**, including credit or investment for farmers, fishermen, fish farmers, SMEs, and large-scale industries.
- Only the Ministry of Trade and the Ministry of Industry have **fiscal policy**. For example, tax holiday for investment in related government's programmes.
- The Ministry of Trade and the Ministry of Agriculture provide **non-fiscal policy**, particularly using subsidy as the instrument. For example, Ministry of Trade gives subsidy for exporters who were able to market their products in a new country.

- Based on its 2015 national budget, Indonesia had a total of Rp 414.7 trillion subsidy. Only 17% of it (Rp 70 trillion) was allocated for non-energy subsidy. From that number, 79.28% alone (equal to Rp 55.5 trillion) was for agricultural related subsidy, including fertilizer and seeds subsidy for farmers and rice subsidy for poor household.¹
- **Insurance** is provided by the Ministry of Agriculture, the Ministry of Marine Affairs and Fisheries, and the Ministry of Trade as part of risk management. Ministry of Agriculture has recently issued a new policy on crop failure insurance. While Ministry of Marine Affairs and Fisheries is expected to launch an insurance scheme for fishermen by 2016.
- Most of the **infrastructures** are provided by the Ministry of Agriculture. These include tertiary irrigation, post-harvest machinery and on-farm equipment.
- **Innovation support** is usually provided by the ministry R & D agency. The Ministry of Agriculture has its own technology transfer office (BPATP/*Badan Pengelola Alih Teknologi Pertanian*) which is responsible for commercialising R & D products. Meanwhile, the Ministry of Marine Affairs and Fisheries provides technical support on innovation and technology transfer through its R & D agency.

Note on data and information:

It seems that data and information is an issue here. Almost all ministries, except the Ministry of Industry, have specific programme regarding data and information consolidation. For example, since 2013 the Ministry of Trade has developed Enterprises' Online Information System (*SIPO/Sistem Informasi Perusahaan Online*) to collect all data from regional office to be stored in its central database. Meanwhile, the Ministry of Marine Affairs and Fisheries has a programme for data and information consolidation (include map of protected and prohibited biodiversity agent, diseases, marine bio toxin, hazardous materials) and integrated data and information on marine spatial planning



¹ For Indonesia 2015 national budget in brief, see <http://www.anggaran.depkeu.go.id/dja/acontent/bibfin.pdf>

Review on Gol's schemes and instruments

In the elements of a dynamic agricultural working system, INSINAS works as a go-between organisation operated under the Ministry of Research, Technology and Higher Education. It gives a grant scheme for basic and applied research which prioritised seven research subjects: food security, energy, transportation, ICT, defence, health and medicine, and advanced materials. There are two mechanisms to apply for the scheme via consortium and non-consortium. Both of the mechanisms last up to three years of agreement. In 2015, there were 46 organisations as grantee. They produced 272 researches, 151 (55.51%) are agricultural related researches. This programme supported by Research, Technology and Higher Education Ministerial Regulation and Ministerial Decree.

While INSINAS works in a policy and regulatory environment, there is a Technology Business Incubation Centre (TBIC) which helps incubating technology and products developed by partners. TBIC was run under the administration of Centre for Science and Technology Research (Puspiptek), still a research organisation under the Ministry of Research, Technology and Higher Education. Currently there are 20 tenants from 5 different partners. In 2014, one of the enabling factors to develop TBIC was Research, Technology and Higher Education Ministerial Decree No. 20/M/Kp/IV/2014 on Revitalization of Centre for Science and Technology Research and Development of Indonesia Science Techno Park. Based on the elements of a dynamic working system, TBIC works both as a market triggers and platform technology triggers. TBIC aims to increase technological start-ups from Puspiptek and other R&D organisations. TBIC conducts in-wall and co-incubation so that it allows TBIC to works closely with its partners and allotted more resources on capacity building and market development. Furthermore, TBIC will provide product incubation run by Indonesia Life Science Centre.

Currently, another programme which gain wide support from several ministries and government agencies is the establishment of Science and Techno Park (STP). Based on Nawacita (Nine Priority Agenda) in Science and Technological Innovation, STP is an area that is professionally managed, aims to improve the welfare of its members through the creation and enhancement of ecosystems that support innovation to improve the competitiveness of the industries and institutions it supports. There are currently seven ministries and government agencies received funding for STP programme. They are Ministry of Research, Technology and Higher Education, Ministry of Agriculture, Ministry of Marine Affairs and Fisheries, Ministry of Industry, Agency for Assessment and Application of Technology (BPPT), Indonesia Institute of Science (LIPI), National Nuclear Agency (BATAN).

In the Ministry of Research, Technology and Higher Education STP has been implemented by Director of Science and Technology and Other Supporting Institutions. Their working definition of STP is adapted from the International Association of Science Parks (IASP). An area that is managed by professional management to encourage sustainable economic growth through mastery, development, and implementation of relevant science and technology. By 2019, the ministry aims to establish 100 STPs and going to have 58 mature STPs.

The implementation of Techno Park has also been a concern for the Ministry of Agriculture. They have been attempting to develop Agro Science Park (ASP) and Agro Techno Park (ATP) since 2015. Each of ATPs and ASPs have their own main commodities to be developed. Currently there are five ASPs in Sumatra (1), Java (1), Sulawesi (2) and Kalimantan (1) islands and sixteen ATPs in Java (7), Sumatra (3), Kalimantan (3), Sulawesi (2), and Nusa Tenggara (1) islands. The ASP and ATP programme has been implemented under the Agricultural Research Centre (BBIA) which obtain an additional ceiling funding of IDR 5 Billion.

There has been lots of challenges of putting STP/ATP/ASP concepts into practices. First thing, there are different understandings among stakeholders of STP/ATP/ASP. Second, some of the existing STPs do not

have master plan, thus it is not optimally functioned. Third, there has been a delay in disbursement of fund which hindering coordination to implement the programme. At the current situation, it later worsened by the budget cut for this state funding.² Another challenge come from a lack of monitoring and evaluation mechanism for STPs maturity assessment since this has been a new programme. Last but not least, there is yet a commercialisation of research outputs/products in a high-level products. The current product development in existing STPs are undertaken without any market intelligence and there are only weak connections with the industry/business as well. Here it can be concluded that there are missing stages in the routines and working practices where the enterprises and markets have oftentimes been engaged only at the end of the product development process.

Due to current economic situations where there is a deeper trade balance deficit between the value of exports and imports, the President launched Ten Economic Policy Package, one of them is National Interest Account (NIA).

NIA is a programme to strengthen export financing intended for transaction/project that is commercially difficult to implement but is considered necessary by the government. This programme involves Coordinating Ministry of Economic Affairs, Ministry of Trade, Ministry of Finance, Ministry of Cooperatives and SMEs, and Ministry of Industry. This program has officially been acknowledged under the Law 2/2009 (UU) and implemented by Indonesia Eximbank (LPEI). It also has Export Oriented People's Business Credit (KURBE) mainly for SMEs export-oriented and other export supporting agency.

Under the Ministry of Trade, NIA has been a stimulus to increase diversification of export markets and products which ultimately are the goals of Directorate General of National Export Development (Dirjen PEN). The incentives for private sectors are the Primaniyarta Award which will be given to the most outstanding exporters in the field of exports and the award recipient will receive a special export financing scheme from Indonesia Eximbank and Standard Chartered Bank (include: export capital financing, investment, guarantees, insurance, and trade finance facilities). Within a period of 5 consecutive years there are 6 companies receiving the award: PT. Bio Farma, PT. Growth Asia, PT. Indesso Aroma, PT. Megasurya Mas, PT. Musim Mas, and PT. Smart Tbk.

For the official, the incentives are given in a form of Balanced Scorecard which have been implemented since 2007. It is a tool for measuring the performance through a system of planning, monitoring, evaluation of the implementation of policies, programmes, and achievement. In order to be effective, NIA should ideally meet the following criteria:

(I) shall be decided collegially by several ministries / agencies;
(Ii) cannot be financed on commercial (high risk); (Iii) have a long-term export development prospects; (Iv) boost value added and competitiveness of Indonesian products, (v) set specific and measurable (clearly define); and (vi) is carried out within a certain time period (limited). Here it can be concluded that this programme have been implemented to put the missing link in the routines and working practices mainly to involve more enterprises and attract new market/consumers.

As the main support organisation for the agricultural development is certainly the Ministry of Agriculture. The fact that this institution may provide supports mainly in the development of vegetation phase, the Ministry of Agriculture have a programme called Horticulture Agribusiness Area Development (PKAH). It is implemented by the Indonesian Agency for Agricultural Research and Development (Balitbangtan) specifically under the Horticulture Research and Development Centre. This program has been implemented

² Kompas, 15 June 2016, "Pemotongan Perlambat Hilirisasi"

since 2010 as one of the strategic programmes of Ministry of Agriculture. The PKAH locations were selected based on market size, competitive advantages, economic value, production area distribution, and agro ecology suitability. For a period of 2010-2013 there has been 18 horticulture area in 9 regencies. Its best practices was implemented in East Java.

The main programme of PKAH is to give assistance to farmers' group (GAPOKTAN) including technological and institutional assistance. Technological assistance are: Seeds and Cultivation Technology, Off Season Technology, New Seeds Varieties, Pest Control, Fertilisation, GAP application, and others. Meanwhile, institutional assistance include: cultivation, marketing, processing, and production.

No																							
Cases	Research incentives for national innovation system (<i>InSINas/Insentif Riset Sistem Inovasi Nasional</i>)																						
Line ministry	Ministry of Research, Technology and Higher Education																						
Working unit	Directorate General of Research and Development Advancement																						
Focal point																							
Period	2012-present																						
Programmes and incentives	<p>Research Incentive for Nasional Innovation System (<i>InSINas/Insentif Riset Sistem Inovasi Nasional</i>): grant for basic and applied research through consortiums and non-consortium which involve R&D organisations, higher education institutions, and business sector.</p> <p>InSINas is prioritised for 7 subjects:</p> <ul style="list-style-type: none"> ▪ food security, ▪ energy, ▪ transportation, ▪ ICT, ▪ defense, ▪ health and medicine, and ▪ advanced materials. <p>Mechanism:</p> <ul style="list-style-type: none"> ▪ Consortium: partnership of at least 3 institution: research and development agency (R&D), higher education (HE) and industry ▪ Non-consortium: at least 3 researchers from at least one research organisation <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>No</th> <th>Scheme</th> <th>Type of research</th> <th>Period</th> <th>Type of grantee</th> <th>Partnership</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Non-consortium</td> <td>Basic/applied</td> <td>1-3 years</td> <td>R&D, HE, industry</td> <td>Not required</td> </tr> <tr> <td rowspan="3">2</td> <td rowspan="3">Consortium</td> <td rowspan="3">Basic/applied</td> <td rowspan="3">1-3 years</td> <td>R&D</td> <td>At least 2 partners: HE & industry</td> </tr> <tr> <td>Industry</td> <td>At least 2 partners: R&D & HE</td> </tr> <tr> <td>HE</td> <td>At least 2 partners: R&D & Industry</td> </tr> </tbody> </table> <p>InSINas 2015:</p> <ul style="list-style-type: none"> ▪ Total fund provided: Rp 77.25 billion, Rp 36.825 billion are for agricultural research. 	No	Scheme	Type of research	Period	Type of grantee	Partnership	1	Non-consortium	Basic/applied	1-3 years	R&D, HE, industry	Not required	2	Consortium	Basic/applied	1-3 years	R&D	At least 2 partners: HE & industry	Industry	At least 2 partners: R&D & HE	HE	At least 2 partners: R&D & Industry
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	<ul style="list-style-type: none"> ▪ 151 out of 272 researches (55.51%) being funded are related to agriculture. ▪ There are 46 organisations received InSINas for agricultural research: <ul style="list-style-type: none"> a. 3 business sector: all from PT RPN three different research centres b. 35 higher educations: Bogor Agricultural Institute, Bandung Technological Institute, Surabaya “10 Nopember” Institute of Technology, State Polytechnic of Jember, Payakumbuh Agricultural Polytechnic, STKIP PGRI of West Sumatera, Airlangga University, Andalas University, Brawijaya University, “Bung Hatta” University, Diponegoro University, Gadjah Mada University, Halu Oleo University, Hasanuddin University, University of Indonesia, Jember University, Soedirman University, Khairun University, Lambung Mangkurat University, Lampung University, Ma Chung University, Merdeka Madiun University, University of Muhammadiyah Malang, University of Muhammadiyah Purwokerto, Mulawarman University, State University of Papua, Padjadjaran University, Riau University, “11 Maret” State University, Sriwijaya University, Syiah Kuala University, Tadulako University, Tanjungpura University c. 4 R & D: BPPT Engineering, BATAN, LIPI - Biotechnology, LIPI - Chemistry d. 7 government R & D, including Agency for Agricultural Research and Development – Ministry of Agriculture , Agency for Marine and Fisheries Research and Development – Ministry of Marine Affairs and Fisheries, Centre for Material and Technical Product – Ministry of Industry ▪ Out of 151 agricultural researches funded by InSINas, there are only 9 research consortiums (BPPT Engineering: 3 researches, LIPI: 1 research, PT RPN: 1 research, IPB: 1 research, ITB: 1 research, UGM: 1 research, Ma Chung University: 1 research).
Enabling factors	<ul style="list-style-type: none"> ▪ Research, Technology and Higher Education Regulation No. 14/2015 on National Standard for Higher Education, Guidance and Implementation of Industrial Technology Development ▪ Research, Technology and Higher Education Decree No. 498/M/Kp/VIII/2015 on The Establishment of Research Incentives National System Innovation Programme
Challenges	<ul style="list-style-type: none"> ▪ Mapping on public technological need as well as industrial technological need is not available. ▪ There is no national integrated database on research and development. ▪ State budget structure.
Impact	<ul style="list-style-type: none"> ▪
Engagement strategy	
Other engagement	
Sources	<ul style="list-style-type: none"> ▪ http://www.unp.ac.id/sites/default/files/Panduan_insinas_2015.pdf ▪ https://insentif.ristek.go.id/_assets/docs/insinas_repo_1441095386.pdf

No	
Cases	Technology Business Incubation (IBT/ <i>Inkubasi Bisnis Teknologi</i>) Year 2016
Line ministry	Ministry of Research, Technology and Higher Education
Working unit	Directorat Generale of Innovation Strengthening
Focal point	Directorat of Technology-Based Start-up Company (<i>Direktorat Perusahaan Pemula Berbasis Teknologi</i>)
Partnership	Business incubators
Period	Since 2016
Programmes and incentives	<u>Objectives:</u> <ul style="list-style-type: none"> ▪ To increase commercialisation of Indonesia's research and development outputs ▪ Boosting technology-based startup companies

	<ul style="list-style-type: none"> ▪ Supporting technology-based business incubator in developing new small and medium enterprises <p><u>Expected outcomes:</u></p> <p>25 startups assisted by selected business incubators</p> <p><u>Focus area:</u></p> <ol style="list-style-type: none"> 1. Food 2. Health and medicine 3. Energy 4. Transportation 5. Defence and security 6. Information and communication technology 7. Advanced material 8. Maritime <p><u>Services:</u></p> <ol style="list-style-type: none"> 1. Business infrastructure (office, internet, meeting spaces, telecommunication infrastructure, office supplies) 2. Business development services (consultation and training, business plan development and feasibility studies, business legal assistance, product standardisation, product certification, intellectual property rights, human resource development, business mentoring, product testing, business management, market research and testing, promotion) 3. Fund raising (access to capital from banking and non-banking institution, access to capital from government agencies) 4. Networking and business collaboration (regular business meetups, collaboration with R&D agencies and technology transfer offices, business partnership with private sectors, exhibition and promotion) <p>Period of incubation: 2 years</p> <p><u>Progress per June 2016:</u></p> <p>If on schedule, selected startup companies has been announced and the incubation program has just started.</p>
Enabling factors	N/A
Challenges	This programme has just started
Engagement strategy	N/A
Other engagement	N/A
Impact	There are no measurable impact yet
Sources	http://ristekdikti.go.id/pengumuman-program-insentif-inkubasi-bisnis-teknologi-ibt-2016/

No	
Cases	Incentive for technology applied in industry (<i>Program Insentif Teknologi yang Dimanfaatkan di Industri</i>)

Line ministry	Ministry of Research, Technology and Higher Education
Working unit	Directorat Generale of Innovation Strengthening
Focal point	Directorat of Industry Innovation
Partnership	Between industry and government R&D agencies (required by the programme)
Period	Since 2016
Programmes and incentives	<p><u>Eligible grantee:</u> Industry or private sectors who has R&D collaboration with government agencies/universities/other industry in R&D. This R&D collaboration must achieve prototyping phase.</p> <p><u>Focus area:</u></p> <ol style="list-style-type: none"> 1. Food 2. Health and medicine 3. Energy 4. Transportation 5. Defence and security 6. Information and communication technology 7. Advanced material <p><u>Incentives will cover funding for:</u> Testing cost in production scale, standardisation, certification, technology transfer process, registration, technology audit, production permits and other activities related to trial production for the technology.</p> <p>For Batch I 2016, there are 16 companies/industries receiving this incentive. There is one grantee related to agriculture, that is: CV. Gemilang Karya Sentosa for seeds production technology development. The amount of funded: IDR 293,400,000.</p> <p>Currently (per June 2016), Batch II is ongoing process and the grantee will be announced at 1 July 2016.</p>
Enabling factors	N/A
Challenges	This programme has just started
Engagement strategy	N/A
Other engagement	N/A
Impact	There are no measurable impact yet
Sources	http://ristekdikti.go.id/pengumuman-sk-pemenang-insentif-batch-i/

No	
Cases	Business incubation
Line ministry	<ul style="list-style-type: none"> ▪ TBIC (Technology Business Incubation Center) Centre for Science and Technology Research (Puspipstek/<i>Pusat Penelitian Ilmu Pengetahuan dan Teknologi</i>) under the coordination of Ministry of Research, Technology and Higher Education

	<ul style="list-style-type: none"> ▪ Ministry of Industry 																																						
Working unit	TBIC (Technology Business Incubation Center) Puspiptek																																						
	Directorate General of Small and Medium Industry, Ministry of Industry																																						
Focal point	<ul style="list-style-type: none"> ▪ 																																						
Period	2015 (October)-present																																						
Programmes and incentives	<p>Puspiptek operates a total of 49 laboratories, and communicate closely with Indonesian Institute of Science (LIPI), Agency for Assessment and Implementation of Technology (BPPT), National Nuclear Energy Agency (BATAN), and two different ministries: Ministry of Research, Technology, and Higher Education and Ministry of Environment and Forestry.</p> <p>Puspiptek currently provides two schemes of incubation:</p> <ol style="list-style-type: none"> 1. Technological business incubation aims to increase technological start-ups from Puspiptek research centres and other R & D organisations. Since TBIC conducts in-wall and co-incubation, it prefer partners who are physically near to TBIC office in Serpong. Co-incubation model allows TBIC to work closely with its partner and allocate more resources on capacity building and market development. 2. Product incubation which will soon be initiated by Indonesia Life Science Centre (ILSC). Product incubation are for consortiums involving R & D organisations and industry, as industrial qualified laboratories are needed for life science development to meet industrial criteria. PT Biofarma has agreed to join research consortium for vaccine. <p>TBIC now has 20 tenants from 5 different partners. Each tenant has their product.</p> <table border="1"> <thead> <tr> <th>No.</th> <th>Co-incubation Partner</th> <th>Tenant</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td rowspan="6">incuBie (IPB incubator unit)</td> <td>Domiqado</td> <td>Web-based gifts shop for crafts and digital products.</td> </tr> <tr> <td>2.</td> <td>Webkece</td> <td>Cloud-based website designing service.</td> </tr> <tr> <td>3.</td> <td>Ke'if SB</td> <td>Technological innovation for industrial scale kefir production.</td> </tr> <tr> <td>4.</td> <td><i>Pawon Selera</i></td> <td>High pressure processing and active packaging for ready-to-serve food.</td> </tr> <tr> <td>5.</td> <td>PalaBoo Madu</td> <td>Bogor special beverage made from nutmeg and honey.</td> </tr> <tr> <td>6.</td> <td>Mangano</td> <td>Indonesian traditional food in ready-to-serve package.</td> </tr> <tr> <td>7.</td> <td rowspan="4">LIPI Technology Incubator</td> <td>DNR International</td> <td>Zirconia for high-temperature ceramic materials.</td> </tr> <tr> <td>8.</td> <td>Mulia Graha Estetika</td> <td>Vertical board for growing plants.</td> </tr> <tr> <td>9.</td> <td>CV Media Sarana Usaha</td> <td>Nanotechnology application.</td> </tr> <tr> <td>10.</td> <td>FiLa (<i>Fisika Laboratoria</i>)</td> <td>High energy ball mill for nano particle production.</td> </tr> </tbody> </table>			No.	Co-incubation Partner	Tenant	Description	1.	incuBie (IPB incubator unit)	Domiqado	Web-based gifts shop for crafts and digital products.	2.	Webkece	Cloud-based website designing service.	3.	Ke'if SB	Technological innovation for industrial scale kefir production.	4.	<i>Pawon Selera</i>	High pressure processing and active packaging for ready-to-serve food.	5.	PalaBoo Madu	Bogor special beverage made from nutmeg and honey.	6.	Mangano	Indonesian traditional food in ready-to-serve package.	7.	LIPI Technology Incubator	DNR International	Zirconia for high-temperature ceramic materials.	8.	Mulia Graha Estetika	Vertical board for growing plants.	9.	CV Media Sarana Usaha	Nanotechnology application.	10.	FiLa (<i>Fisika Laboratoria</i>)	High energy ball mill for nano particle production.
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	11.	Business and Technology Innovation Centre) MITI (<i>Masyarakat Ilmuwan dan Teknolog Indonesia</i>)	CNDTPI (Centre for Non-Destructive Testing and Process Imaging)	eCVT (electronic continuously variable transmission) system for industrial process imaging-laboratory scale.	
	12.		CEST (Centre for ELEctronic Science and Technology)	Measurement and data acquisition system for electrical tomography.	
	13.		CIPD (Centre for Innovation and Product Development)	Electro Capacitive Cancer Treatment (ECCT).	
	14.		Alzyme	Technology for genetic sex determination of the date palm seeds.	
	15.	BPPT Technology Incubator Centre	Grasindo	Commercialisation for eugenol derivatives.	
	16.		Nahecho	Online marketing for natural herbal cloth marketplace improvement (along with direct shop).	
	17.		Nanotech Herbal Indonesia	Nano chitosan as natural material for wound-healing and cosmetics	
	18.	ITI Incubator	Alien Lox	Bluetooth and Android-based motor-lock control.	
	19.		<i>Jamur Sehat Sejahtera</i>	Mushroom (<i>Volvariella volvacea</i>) cultivation using light-steel greenhouse.	
	20.		PLC Micro	PLC Micro for robotic education.	
	Enabling factors	<ul style="list-style-type: none"> ▪ Puspiptek often collaborate with TBIC co-incubation partners. ▪ Research, Technology and Higher Education Ministerial Decree No. 20/M/Kp/IV/2014 on Revitalization of Centre for Science and Technology Research and Development of Indonesia Science Techno Park 			
	Challenges	Limited resources and budget.			
	Impact				
	Engagement strategy	<ul style="list-style-type: none"> ▪ Cooperate with Chamber of Commerce and Industry (KADIN/<i>Kamar Dagang dan Industri</i>) for technological marketing and networking with the industries. ▪ TBIC works with the local government (South Tangerang Regency and Bogor Regency) conducting capacity building for community nearby and designing innovation centre in South Tangerang. ▪ TBIC has started to engage with Ministry of Rural Development and Transmigration to encourage technology commercialisation in local areas. 			
	Other engagement				
	Sources	<ul style="list-style-type: none"> ▪ 			

No	
Cases	Science and techno park

Line ministry	<ul style="list-style-type: none"> ▪ Ministry of Agriculture ▪ Ministry of Marine Affairs and Fisheries ▪ Ministry of Research, Technology and Higher Education ▪ Ministry of Industry 																		
Working unit	<ul style="list-style-type: none"> ▪ Indonesian Agency for Agricultural Research and Development (IAARD) – Ministry of Agriculture ▪ Agency for Human Resource Development on Marine and Fisheries – Ministry of Marine Affairs and Fisheries ▪ Directorate General of Research, Technology, and Higher Education Institutional - Ministry of Research, Technology and Higher Education 																		
Focal point	Director of Science and Technology Areas and Other Supporting Facilities (<i>Direktur Kawasan Sains dan Teknologi dan Lembaga Penunjang Lainnya</i>) - Ministry of Research, Technology and Higher Education																		
Period																			
Programmes and incentives	<p>By 2019:</p> <ul style="list-style-type: none"> ▪ Establish 100 Science and Technology Parks (STPs) ▪ Have 58 mature STPs <p>Scheme for STPs:</p> <ul style="list-style-type: none"> ▪ Facilitate capacity building and training on STPs function ▪ Facilitate STPs' master plan design <p>Agricultural Research Centre (BBIA) obtain an additional ceiling funding of IDR 5 Billion for the development of ATPs and ASPs.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 5%;">No.</th> <th style="width: 25%;">STP's Name/ Province</th> <th style="width: 25%;">Focus</th> <th style="width: 25%;">Partner(s)</th> <th style="width: 20%;">Progress (by May 2016)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td>Pelalawan Technopolitan/ Riau</td> <td>Agriculture/ palm oil processing, more sector will be covered in the future</td> <td>Regional technical execution unit (UPTD), BTP, LIPI, Ministry of Environment and Forestry, 24 palm oil companies. *Currently, there is no partner focussing in palm oil processing.</td> <td>Width: more than 3700 hectares. Has been built since 2012, this technopolitan is planned to undergo 15 years of development to be green technopolitan. Physical development such as roads and infrastructures for higher education and research area.</td> </tr> <tr> <td style="text-align: center;">2</td> <td>Pekalongan Fisheries Techno Park/ Central Java</td> <td>Small-medium aquaculture, fisheries canning</td> <td>Pekalongan municipality, Marine and Fisheries Regional Office, Soegijapranata Catholic University,</td> <td>Width: around 5 hectares (3 ha for the fishpond, 2 ha for management area). This techno park incorporates IMTA (<i>Integrated Multi-Tropic Aquaculture</i>) as part of the attempt to control environmental</td> </tr> </tbody> </table>				No.	STP's Name/ Province	Focus	Partner(s)	Progress (by May 2016)	1	Pelalawan Technopolitan/ Riau	Agriculture/ palm oil processing, more sector will be covered in the future	Regional technical execution unit (UPTD), BTP, LIPI, Ministry of Environment and Forestry, 24 palm oil companies. *Currently, there is no partner focussing in palm oil processing.	Width: more than 3700 hectares. Has been built since 2012, this technopolitan is planned to undergo 15 years of development to be green technopolitan. Physical development such as roads and infrastructures for higher education and research area.	2	Pekalongan Fisheries Techno Park/ Central Java	Small-medium aquaculture, fisheries canning	Pekalongan municipality, Marine and Fisheries Regional Office, Soegijapranata Catholic University,	Width: around 5 hectares (3 ha for the fishpond, 2 ha for management area). This techno park incorporates IMTA (<i>Integrated Multi-Tropic Aquaculture</i>) as part of the attempt to control environmental
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				damage, since Pekalongan has been suffered from high residue of artificial dye from batik industries.). Research on microbes for environment rehabilitation and fish feed will be developed later. Under BPPT ad-hoc supervisory team, this techno park is targeted to be fully functioned within 3 years (in 2019).
3	Cimahi Techno Park/ West Java	Food and digital creative industries		This techno park will focus on 4 clusters of creative industries: food processing, fashion, craft, and animation. Later, its service will be combined with the capacity building for SMEs, particularly for technological start up.
4	Central Lampung Techno Park/ Lampung	Food/fisheries		
5	Grobogan Techno Park/ Central Java	Food/agriculture		
6	Baron Techno Park/ Yogyakarta	Energy, agro-tourism and education		
7	Bantaeng Techno Park/ South Sulawesi	Seed		
8	Penajam Paser Utara National Science and Techno Park/ East Kalimantan	Maritime		
9	Science & Techno Park BIT – Puspiptek/ Banten	Technology		
List of Agro Science Park				
Location			Main Commodity	

Natar PP, South Lampung, Lampung	Rice, Corn, Soybean, Cocoa, Cow, Fowl, Chilli
Jakenan PP, Pati, Central Java	Rice, Corn, Soybean, Cane, Cow
Sidondo PP, Sigi, Central Sulawesi	Rice, Cocoa, Cow, Shallot
Banjarbaru PP, South Kalimantan	Rice, Corn, Soybean, Cow
Maros PP, Maros Regency, South Sulawesi	Rice, Corn, Soybean, Chilli, Cow

PP: Pilot Plantation

List of Agro Techno Park

Name of ATP	Regency/City/Province	Main Commodity
ATP Jantho City	Aceh Besar Regency, Aceh	Rice, Soybean, Vegetable
ATP Guguak	Lima Puluh Kota Regency, West Sumatra	Sweet Potato, Orange, Cow
ATP Tanjung Lago	Banyuasin Regency, South Sumatra	Rice, Corn, Soybean, Vegetable, Livestock
ATP Cigombong	Bogor Regency, West Java	Agriculture and Livestock
ATP Cikajang	Garut Regency, West Java	Rice, Corn, Soybean, Garut Sheep
ATP Sedong	Cirebon Regency, West Java	Rice, Tropical Fruit, Goat/Sheep
ATP Lebaksu	Tegal Regency, Central Java	Rice, Corn, Cow
ATP Nglanggeran	Gunung Kidul Regency, DI Yogyakarta	Rice, Corn, Ornamental Plants, Goat
ATP Pringkuku	Pacitan Regency, East Java	Rice, Chilli, Orange, Beef Cattle
ATP Solokuro	Lamongan Regency, East Java	Rice, Corn, Shallot, Goat, Cow
ATP South Tapin	Tapin Regency, South Kalimantan	Rice, Corn, Soybean, Horticulture, Fowl
ATP Pelaihari	Tanah Laut Regency, South Kalimantan	Rice, Corn, Rubber, Palm Oil, Vegetable
ATP Garing Hatampung	Palangkaraya City, Central Kalimantan	Horticulture, Plantation, Livestock
ATP Batui	Banggai Regency, Central Sulawesi	Rice, Cocoa, Cow
ATP Barebbo	Bone Regency, South Sulawesi	Rice, Cocoa, Cow
ATP Mollo	South Timor Tengah Regency, East Nusa Tenggara	Corn, Cow, Horticulture

Enabling factors	STPs programme is part of national development agenda
Challenges	<p>STPs:</p> <ul style="list-style-type: none"> ▪ Different understandings among stakeholders about STPs ▪ Several existing STPs do not have master plan. Thus, they are not optimally functioned. ▪ Late disbursement fund for STPs has hinder smooth coordination between central and local government. ▪ There is no monitoring and evaluation mechanism for STPs maturity assessment. ▪ Budget cuts³
Impact	
Engagement strategy	<p>Engage with local government bodies, local universities and research organisations as well as local business sector where the STPs are established.</p> <p>Science Park in West Papua-Manokwari focuses on sago and wood:</p> <ul style="list-style-type: none"> ▪ West Papua Regional Development Plan Agency (Bappeda) ▪ Papua University (UNIPA) ▪ West Papua Regional Government Agencies ▪ Masyarakat Sagu Indonesia ▪ Agency for Assessment and Application of Technology (BPPT/Badan Pengkajian dan Penerapan Teknologi) ▪ Perum Perhutani ▪ Pendidikan Industri Kayu (PIKA) Semarang ▪ Research and Development Agency, Ministry of Environment and Forestry ▪ Gajah Mada University (UGM) ▪ Chamber of Commerce and Industry (KADIN) ▪ Sago Exellent Science Centre (PUI Sagu) <p>Science Park in North Kalimantan-Tarakan focuses on farming and livestock:</p> <ul style="list-style-type: none"> ▪ Borneo Tarakan University (UBT) ▪ Tarakan municipality <p>Solo Techno Park in Central Java focuses on manufacture:</p> <ul style="list-style-type: none"> ▪ ATMI Solo ▪ Surakarta municipality ▪ BappSurakarta Regional Development Plan Agency (Bappeda) ▪ Symbion Techno Park (Denmark) ▪ Ideon Techno Park (Lund-Swedia) <p>Sragen Techno Park in Central Java:</p> <ul style="list-style-type: none"> ▪ Sragen municipality <p>Agro Techno Park in Perabumulih, South Sumatera focuses to be national and regional technology transfer and agriculture pilot model (cow livestock):</p> <ul style="list-style-type: none"> ▪ PT Karya Anugrah Rumpin (PT KAR) ▪ South Sumatera municipality

³ Kompas 15 June 2016, "Pemotongan Perlambat Hilirisasi".

	<p>Kaur Techno Park in Bengkulu focuses on mocaf (modified cassava flour) and coffee:</p> <ul style="list-style-type: none"> ▪ Bandung Techno Park ▪ Kaur municipality ▪ Bengkulu University ▪ CV Citra Cipta Consultant <p>Sumbawa Techno Park in West Nusa Tenggara focuses on food and mining:</p> <ul style="list-style-type: none"> ▪ Sumbawa University of Technology (UTS) ▪ Sumbawa municipality <p>Riau Science and Techno Park focuses on energy and food (fisheries and microalgae, coconut, sago, pineapple):</p> <ul style="list-style-type: none"> ▪ Kampar regency ▪ Bandung Techno Park ▪ Sumbawa Techno Park ▪ Riau University <p>Maritime Science Technology Park (MTSP) in Jepara, Central Java:</p> <ul style="list-style-type: none"> ▪ Research and Development on Brackish Water Agency (BBPBAP/<i>Balai Besar Pengembangan Budidaya Air Payau</i>) under the Ministry of Marine Affairs and Fisheries ▪ Marine Affairs and Fisheries Agency of Central Java ▪ Coastal Fisheries Port (Pelabuhan Perikanan Pantai) Karimunjawa ▪ Marine Station at Awur Bay ▪ Diponegoro University (Undip) ▪ R&D Agency of Central Java ▪ Bandung Techno Park
Other engagement	
Sources	<ul style="list-style-type: none"> ▪ Ministry of Research, Technology, and Higher Education Strategic Plan 2015-2019 ▪ Ministry of Research, Technology, and Higher Education Accountability and Performance Report 2015

No	
Case	National Interest Account
Line Ministry	Coordinating Ministry of Economic Affairs Ministry of Trade Ministry of Industry Ministry of Cooperatives and SMEs Ministry of Finance
Working unit	Directorate General of National Export Development (DGNEP/Dirjen PEN- Ministry of Trade) Fiscal Policy Agency (Ministry of Finance) Directorate General of Agro Industry (Ministry of Industry) Deputy of Finance (Ministry of Cooperatives and SMEs)
Focal point	Nus Nuzulia/ Directorate General of National Export Development- Ministry of Trade

Duration	2009 (based on Law) 2015 (based on Economic Policy Package Phase I of September 2015)
Programmes	<p>National Interest Account (NIA)</p> <p>NIA is a programme to strengthen export financing. This programme has become one of ten Economic Policy Package Phase I of September 2015 that officially launched by the President Joko Widodo.</p> <p>NIA is a government policy that is non-viable commercially, but is considered necessary by the government.</p> <p>Through this programme, the government sets a specific transaction project to increase exports which is a cross-sectoral strategic policy of several related Ministries/Institutions (K/L). NIA is a flagship project which gives a stimulus to the national export programme, taking into account the core competitiveness, the economic multiplier effect and channeling leading Indonesian products in the export market.</p> <p>This programme involves Coordinating Ministry of Economic Affairs, Ministry of Trade, Ministry of Finance, Ministry of Cooperatives and SMEs, and Ministry of Industry. At the Ministry of Trade, the programme is dedicated exclusively to exporters from the five commodity sectors, namely textiles, furniture, processed wood, processed fish and footwear. Funds allocated for this programme is Rp 2 trillion, with interest rate of 5.75%.</p>
Incentives	<ul style="list-style-type: none"> - For private sectors: <ul style="list-style-type: none"> ✓ The Primaniyarta Award is an award for the most outstanding exporters in the field of exports. The award recipient will receive a special export financing scheme by the Indonesia Exim bank and Standard Chartered Bank (include: export capital financing, investment, guarantees, insurance and trade finance facilities) ✓ Within a period of 5 consecutive years there are 6 companies receiving the award: <ol style="list-style-type: none"> 1. PT. Bio Farma 2. PT. Growth Asia 3. PT. Indesso Aroma 4. PT. Megasurya Mas 5. PT. Musim Mas 6. PT. Smart Tbk - For the officials: <ul style="list-style-type: none"> ✓ Implementation of Balanced Scorecard (since 2007) as a tool for measuring the performance of officials becomes very important in efforts to stabilize the management system of planning, monitoring and evaluation of the implementation of policies, programmes, achievement of goals and targets set (Strategic Plan Ministry of Trade pp.129) ✓ Product development in the form of design development, adaptation, product, brand development, and provision of information on export products (as an incentive and reduction of dependency on exports to certain products) ✓ Contribute to three strategic plans of Directorate General of National Export Development: <ol style="list-style-type: none"> 1. The increasing diversification of export markets <ul style="list-style-type: none"> - Reducing dependence on export markets for certain countries such as USA, China, Japan, India, and Singapore. - To open other prospective markets: Middle East, South America, and Africa

	<ul style="list-style-type: none"> - Provision of a book containing information on the market in the form of market intelligence and market brief 2. The increasing diversification of export products In the next 5 years National Trade Committee will be set up with the aim of implementing activities in the field of trade and the establishment of Indonesian Promotion Office as a means to expand market access for goods and/or services of domestic production. (Strategic Plan Ministry of Trade, pp. 125- 126) 3. The improvement of image of exporter and the Indonesian export products <ul style="list-style-type: none"> - DGNEED to provide services for trade relations, both for Indonesian exporter and overseas buyers (online: providing virtual exhibition, offline: international exhibition) - The high frequency of promotional activities - Making TVC (television commercial) in 2013 with the CNN, BBC, CNBC, and Bloomberg - Campaign on international events
Enabling factors	<p>Influencing Policies</p> <ul style="list-style-type: none"> - Law 2/2009 (Undang Undang) on Indonesia Exim Bank Indonesia Exim Bank can provide financing for the transaction / project that is commercially difficult to implement, but is considered necessary by the government through the National Interest Account (NIA). This law marks the implementation of National Interest Account. Indonesia Eximbank also has Export Oriented People's Business Credit (KURBE) intended for export-oriented SMEs and supporting exports - Finance Minister Regulation No. 134/PMK.08/2015 on Assignment to the Indonesian Export Financing Agency. <p>Influencing Context (general)</p> <ul style="list-style-type: none"> - Rupiah's depreciation contributes a deeper trade balance deficit due to the difference between the value of exports and imports that is widening - Funding provided in State Budget/APBN (IDR 2 Trillion) - Became one of ten Economic Policy Package <p>Ministry of Trade's performance targets on 2019</p> <ol style="list-style-type: none"> 1. Implementation of Trade Attache <ol style="list-style-type: none"> a) Number of researches, development, and trade surveys: 24 times b) Number of organizing / participation in exhibitions, publications and trade promotion representatives from the Ministry of Trade abroad: 96 times 2. International Trade Advocacy Services <ol style="list-style-type: none"> a) The percentage of utilization of advocacy in the framework of the International Trade Agreement Negotiations: 100% 3. Increasing Growth of Non-Oil Exports (value added) and services <ol style="list-style-type: none"> a) The total growth of non-oil exports: 14,3% 4. Increased Diversification of Export Markets and Products <ol style="list-style-type: none"> a) Growth in exports of non-oil primary commodity products in 2019 (13.9%) b) The growth of non-oil exports of commodity products prospectively in 2019 (18.9%) c) The growth of non-oil exports to major markets in 2019 (13.5%) d) The growth of non-oil exports to the prospective market in 2019 (18%)
Challenges	<ul style="list-style-type: none"> - In order to be effective, NIA should ideally meet the following criteria: <ol style="list-style-type: none"> (i) shall be decided collegially by several ministries / agencies; (ii) can not be financed on commercial (high risk); (lii) have a long-term export development prospects; (Iv) boost value added and competitiveness of Indonesian

	products, (v) set specific and measurable (clearly define); and (vi) is carried out within a certain time period (limited)
Impact	<ul style="list-style-type: none"> - Any projects which have a high benefit on macro economy and national export interest, but not <i>feasible</i> and <i>bankable</i> commercially, could run through this programme Pilot Project of NIA: <ul style="list-style-type: none"> - Production of train by PT.INKA, obtain financing through a banking loan up to IDR 300 billion for exporting railway carriage - Scheme: The LPEI/Indonesia Eximbank will conduct financial analysis to provide export financing contracts based on business-to-business scheme between the actors of exports
Engagement strategy	-
Other engagement	

No	
Cases	Horticulture Agribusiness Area Development (PKAH/ <i>Pengembangan Kawasan Agribisnis Hortikultura</i>)
Line ministry	Ministry of Agriculture
Working unit	Indonesian Agency for Agricultural Research and Development (IAARD)
Focal point	Horticulture Research and Development Centre (HRDC/ <i>Pusat Penelitian dan Pengembangan Hortikultura</i>)
Partnership	<ul style="list-style-type: none"> ▪ Directorate General of Horticulture ▪ Agency for Agricultural Technology Assessment (BPTP/<i>Balai Pengkajian Teknologi Pertanian</i>) ▪ Local agricultural agency ▪ Farmers group ▪ Private sector
Period	Since 2010
Programmes and incentives	<p>Objectives:</p> <p>To increase production, product quality, horticulture productivity, employment rate and services' effectivity and efficiency.</p> <p>This programme is one of strategic programmes of Ministry of Agriculture. One of PKAH implementation best practice was in East Java. For period of 2010-2013, there were 18 horticulture area in 9 regencies focused on commodities: fruit (mango, orange and pineapple), vegetables (chilli, tomato and green vegetables) and decorative plants (chrysanthemum and tuberose).</p> <p>PKAH locations was selected depends on main horticulture commodities in related area. It was determined by:</p> <ul style="list-style-type: none"> ▪ market size, ▪ competitive advantages, ▪ economic value, ▪ production area distribution ▪ agro ecology suitability.

	<p>It was also determined by integration prospect between planting land aspect, packaging and supply chain that influencing to sustainable agribusiness area development.</p> <p>PKAH was implemented through biophysics, social-economy, culture and institutional approaches. By using those approaches, it aimed to be sustainable agribusiness area.</p> <p>The main programme of PKAH implementation is assistance to farmers' group (GAPOKTAN). It applies farmers empowerment model to Horticulture Agribusiness Area, through:</p> <ol style="list-style-type: none"> 1. Participative learning that gives opportunity to farmers to decide 2. Activities are regularly held in farmers' field and/or agribusiness working area with limited number of participants 3. Farmers as agribusiness actor could follow all the activities in a period of time 4. Specific location based curriculum 5. Intensive assistance <p>Apart from GAPOKTAN's assistance, PKAH programme also applied technological and institutional assistance to the GAPOKTAN.</p> <p>Technological assistance in PKAH among others are:</p> <ul style="list-style-type: none"> ▪ Seeds and cultivation technology ▪ Off season technology ▪ New seeds varieties ▪ Pest control ▪ Fertilisation ▪ GAP application ▪ Etc <p>Institutional assistance in PKAH was implemented through several activities, such as:</p> <ul style="list-style-type: none"> ▪ Cultivation ▪ Marketing ▪ Processing ▪ Production
Enabling factors	<ul style="list-style-type: none"> ▪ Synergy between researchers, extension workers and farmers/agribusiness actors capacity to utilise existing resources ▪ Comprehensive methods and approaches ▪ High commitment and integrity ▪ Good coordination from all stakeholders
Challenges	N/A
Engagement strategy	
Other engagement	
Impact	Profitable production depends on the commodities
Sources	▪

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