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Multi-stakeholder Collaboration to Enhance the Scaling Impact of *Jarwo Super* Technology: An Innovation Platform Perspective

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ABSTRACT

An innovation platform approach can be used to accelerate research and development (R&D) diffusion on an agricultural innovation system (AIS). This study examines the collaboration of multi-stakeholders in the development and diffusion of the Jajar Legowo (Jarwo) Super technology through the innovation platform perspective. There have been few studies in the area to look at the structure of the technology diffusion process to achieve a scaling impact. This study will fill the gap by looking at the design of the multi-stakeholders network and the platform's working mechanism to get an understanding of the diffusion of Public Research Organization (PRO)'s research results at a systemic level. The analysis of this research is equipped with the application of a co-word analysis. This tool is used to map issues based on the actor's function, namely the role in the development and diffusion of Jarwo Super technology. The study's results will contribute to the theoretical development of an innovation platform in AIS. It also provides a basis for policymakers and related stakeholders on how innovation platforms can strengthen agricultural development programs in a broader organizational context.

I. INTRODUCTION

Rice has been the leading staple food in Indonesia. Based on Statistics Indonesia (BPS, 2019), Indonesian rice consumption in 2019 reached 103.74 kg per capita, some of which was dominated by household consumption (77.50 kg per capita). However, the national rice production is still tiny compared to the demand of Indonesia's population. Based on the strategic plan of the Directorate of Food Crops, Ministry of Agriculture (MoA), national rice production is targeted to achieve 82.08 million tons in 2019 from the total production of 70.84 million tons in 2014 (Directorate General of Food Crops Ministry of Agriculture, 2018).

The Indonesian Government has made various efforts to increase rice productivity, for example conducting technology development. Public Research Organizations (PROs), particularly the Indonesian Agency for Agricultural Research and Development (IAARD) - under MoA, have conducted R&D activities to support rice production. It includes the development of new

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site-specific rice varieties (VUB), improvement of rice cultivation techniques, post-harvest, and the related governing system.

In 2016, the IAARD tested the Jarwo super technological package in a 10-ha demo plot (*demplot*) in Aceh to evaluate the technology results. Jarwo Super is a rice cultivation technology for irrigated land using the *jajar legowo* planting system. As a technological package, Jarwo Super implementation includes several technologies: 1) site-specific based new superior varieties (VUB); 2) bio-decomposers to support the tillage; 3) bio-fertilizer and balanced fertilization; 4) integrated pest control; and 5) machinery support (transplanter for rice planting and combined harvester for harvesting). These technologies were developed by research units under IAARD. They are integrated to increase rice productivity by 10 tons/ha per year (Badan Penelitian dan Pengembangan Pertanian, 2016; Ishaq, 2018; Sirnawati, 2019). Following the success of the *demplot* (testing program) in Aceh, the *Jarwo Super* was scaled up as a National Program by the Directorate of Food Crops, MoA in 2017, to be implemented in 10.000 ha irrigated land around Indonesia (in selected regions which have high rice productivity).

Nonetheless, farmers often face challenges to the diffusion of agricultural R&D results to be successfully adopted by farmers. Sirnawati (2019) explained that the critical factor influencing the adoption of Jarwo Super technology is the social-economic condition of the farmers. This includes the frequency of the farmer groups joining the training and their limited access to financial support (i.e., credit). The study suggests the flexibility of the technology diffusion mechanism according to farmers' conditions.

Another study underlines that the challenge in agricultural technology diffusion is more comprehensive than how research advisory services and farmers are organized. It requires the engagement of multi-stakeholders, both state and non-state actors, to ensure that the diffusion can boost agricultural productivity (Sanyang et al., 2016)agricultural research and development (R&D.

The process of accelerating the diffusion of R&D results on an AIS (agriculture innovation system) can be realized through an innovation platform approach. This approach is argued to increase the impact of utilizing R&D results through multi-stakeholder collaboration schemes (Sartas et al., 2018). The innovation platform seeks to strengthen the AIS by building actor interactions, encouraging institutional and policy changes, and effectively utilizing resources and opportunities to solve the problems (Davies et al., 2018). Innovation platforms have become a development tool to support stakeholders in the complex systems for agricultural development in developing countries. Platforms' approach to sustainable intensification provides a more holistic picture of different types of agricultural innovation. It offers a better starting point for identifying site-specific entry points for productivity innovation, natural resources management (NRM), and institutional innovation (Ayunda et al., 2021).

An innovation platform is a space to solve specific problems through a learning process and change (Schut et al., 2016). These multi-stakeholders represent particular organizations with different backgrounds and interests, such as farmers, industry, researchers, government, and others. The multi-stakeholders identify problems, opportunities, and solutions (innovations) to the problems. The problems may relate to technology, organization, or institution in a value chain or across value chains (Schut et al., 2016; Davies et al., 2018).

The successful adoption of agricultural R&D results in an innovation platform is ultimately expected to have a broad impact, not limited to the platform (Duncan et al., 2015). The alignment of innovation platform activities with broader political agendas or government policies can facilitate the process of scaling innovation so that it can be utilized on a wider scale (Totin, van Mierlo, Klerkx, 2020), either across regions (scaling out) or being institutionalized at a higher level with a systemic impact (scaling up) (Schut et al., 2016). According to Wigboldous (2016), "scaling" can be interpreted as maintaining the proportion of a set of variables from objects on the same scale. It can also be interpreted that

scaling only considers changes in one variable without being affected by the conditions of other variables.

As the literature grows, there is no standard model for an innovation platform (Klerkx et al., 2012). However, as an entity in the innovation system, the innovation platform is a space that has a clear structure and working mechanism. It can be informally initiated but then develop into a more formal structure, as in the form of a public-private partnership, with the ultimate goal of becoming an independent entity (Schut et al., 2017). This standard form is also optional if the platform's purpose is to conduct trials for farmers and community development (Schut et al., 2016). During the technology diffusion and adoption process, the innovation platform integrates knowledge with local wisdom to have a broad impact.

This study examines the collaboration of multi-stakeholders in the process of development and diffusion of Jarwo Super technology through the perspective of an innovation platform. The case of Jarwo Super is selected to be conceptually examined using an innovation platform framework due to some factors. The technology development and diffusion are conducted to address rice productivity problem involving the role of multi-stakeholder. The IAARD leads the multi-stakeholder process as a PRO. Also, the technology diffusion is scaled nationally to have a broad impact. As there have been few studies in the area to look at the structure of the technology diffusion process to achieve a scaling impact, this study tries to fill the gap by looking at the multi-stakeholders network and the working mechanism of the platform to get an understanding on the diffusion of PRO's research result at a systemic level.

The study's results will contribute to the theoretical development of an innovation platform in AIS, particularly the structure and working mechanism of an innovation platform when it is built upon a national program led by a PRO. It also provides a basis for policymakers and related stakeholders on how innovation platforms can strengthen agricultural development programs in a broader organizational context.

II. ANALYTICAL FRAMEWORK

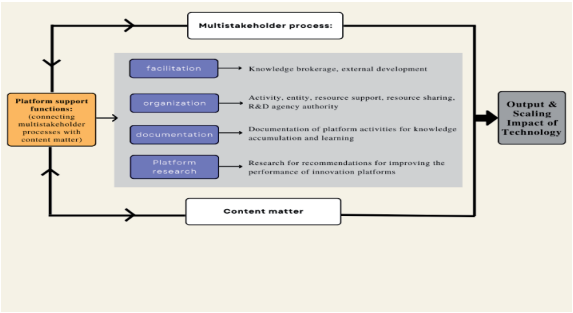
The innovation platform promotes agricultural innovation by facilitating collaboration and interaction within networks of multi-stakeholders. Three components of an innovation platform contribute to achieving the agricultural development impact: the multi-stakeholder process, content matter, and platform support functions (Schut et al., 2016). Schut et al. (2016) explain further that the platform works by the support functions. Initially, the platform support may facilitate the multi-stakeholders process of learning and experimentation to the specific problem (content matter). The problem might be related to technology, NRM, institutional, or complex ones. Understanding the problem, the platform supports the multi-stakeholder in finding the solution through several functions (facilitation, organization, documentation, and platform research) to achieve the impacts of the problem solution.

Based on the relation of the key components of the innovation platforms, the working mechanism of the platform thus is represented through the support functions. The support functions are required not only to support but also to learn to accomplish problem-solving (Hermans et al., 2017; Schut et al., 2016).

The first function, facilitation, supports the collaboration between the stakeholders, empowers them, and links the innovation platform to the broader networks, including the market and policymakers in the organization function will ensure the logistical and financial support of the platform's programs and activities. This function also supports the governance of the innovation platform, including administration and accountability. The activity and dynamic process of the innovation platform should be systematically captured and reported. Thus, the documentation function is significant within an innovation platform to monitor and evaluate the platform's working as a reflection of the learning process to develop a concrete solution to the problems. The last function, research on the platform process, is important to prepare recommendations to improve the performance of the innovation platforms in the future to achieve

the development impact (Rooyen et al., 2013; Schut et al., 2016).

This study examines the four support functions of the innovation platform to see the working mechanism of the multi-stakeholder collaboration to enhance the scaling impact of Jarwo Super technology in Indonesia (Figure 1).



Source: modified from Schut et al.(2016)

Figure 1 Analytical framework of the Innovation Platform's working mechanism to enhance the Scaling Impact of Jarwo Super technology

III. METHODOLOGY

The research is equipped with the application of a co-word analysis. This tool is used to map issues based on the actor's function, namely the role in the development and diffusion of Jarwo Super technology. In this paper, researchers take a network perspective on collaboration. The researchers focus on the structure of actors involved in the development and diffusion of the Jarwo Super technology.

This study limits its scope by taking two provinces that adopt Jarwo Super technology, West Java and Banten. The case studies were selected based on several considerations. West Java and Banten have relatively higher rice productivity than other regions in Indonesia. Also, West Java is one of the regions that the government selected to implement Jarwo Super technology as a National Program in 2017. Meanwhile, Banten has implemented the technology successfully with higher rice productivity as the output despite needing to be selected to implement the Program. In addition, the importance of the institutional context of the support by the Local Government that linked wider parties (i.e., Bank/financial institution, National Military) in the process mattered to the technology implementation.

Data collection was conducted through in-depth interviews with several key informants who participate in the Jarwo Super innovation platform. The interviews were conducted from June to August 2020 through online video meetings lasting 1.5 – 2 hours per informant(s). Informants were purposively selected both based on the Multi-Chanel Dissemination Structure (MCDS) developed by the IAARD and snowballed. MCDS is a policy scheme starting from research, assessment, development, and application, as well as feedback on the technology that has been developed. There were around 25 informants from several entities. First, technology developers under IAARD as the PRO: The Indonesian Center for Rice Research (ICRR), the Research Center for Food Crops (RCFC). Second, the Assessment Institute for Agricultural Technology (AIAT) is the disseminator under the IAARD. Third, the technical units under the MoA as the policy makers: The Secretary of IAARD, Director of PVTPP, Director of Cerealia and Director of Seeds under the Technical Directorate of Food Crops, Head of Agricultural Technology Transfer Management Center (ATTMC). Forth is the Director of the Centre for Agro-Socioeconomic Research and Development (CASERD), MoA conducted social research on agriculture. Last is the local government (including the West Java Provincial Agriculture Service, Indramayu District Agriculture Service, and Cianjur District Agriculture Service) and the extension workers in the regions.

The transcripts of interview results were coded based on the conceptual framework to see the involved actors and their role in the process of technology development and diffusion, as well as the policy-making process. It was then analyzed by using VOSviewer as the network analysis software tool to map the actor's relationship and their intersections.

Data triangulation was conducted with the support of secondary data to ensure validity and to get a robust result. The secondary data involved reports, strategic planning documents, regulations, and previous studies related to Jarwo Super technology.

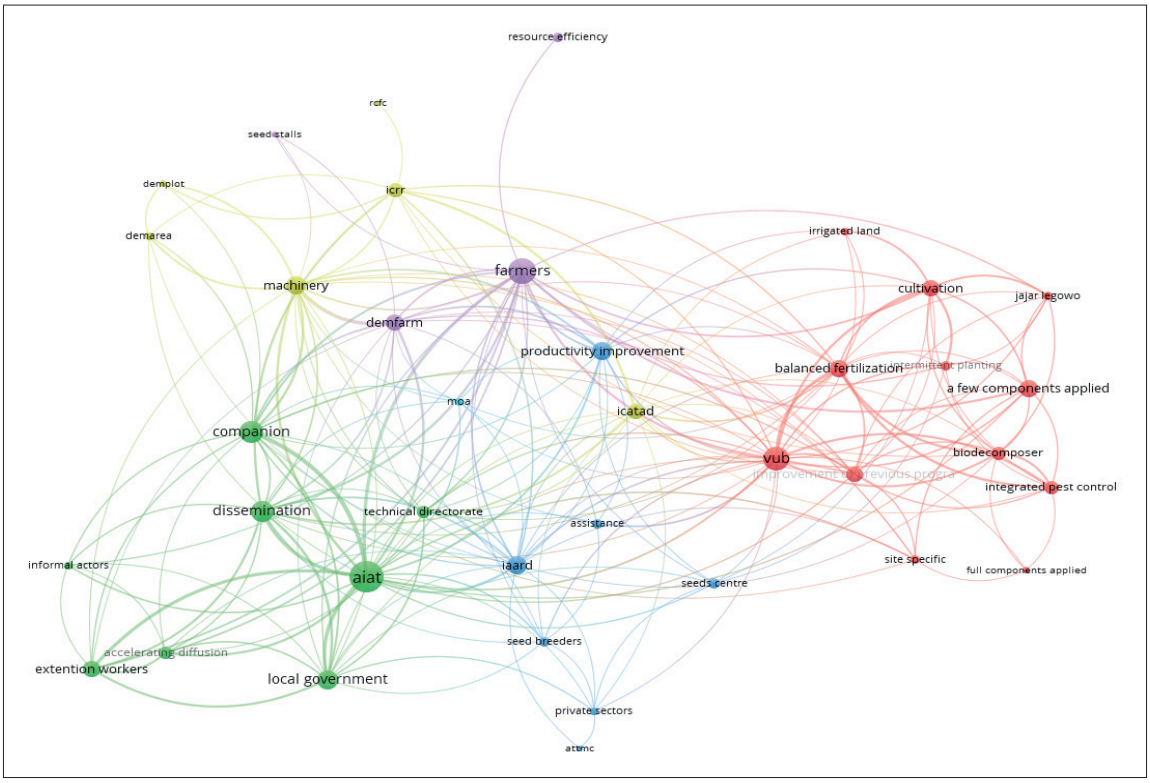


Figure 2. Interaction and collaboration between actors in the Jarwo Super Innovation Platform

IV. RESULTS AND DISCUSSION

A. Network Structure Of The Jarwo Super Innovation Platform

Interaction and collaboration between stakeholders are needed in the continuous intensification of agricultural innovation. This multi-stakeholder collaboration aims to describe, explain and prioritize problems and explore, design, and test proposed solutions (Schut et al., 2016). In this chapter, we will explain how the network mapping and the interaction of actors in the development and diffusion of Jarwo Super technology. Furthermore, in understanding the concept of an innovation platform, it is important to know what issues and focus are often raised regarding Jarwo Super and how the relationship between the involved actors and the position of functions in the innovation platform network.

Figure 2 shows the distribution of the main actors and issues in the innovation platform related to the development and implementation of Jarwo Super. This mapping is the result of exploring the perceptions of actors involved in the Jarwo Super Innovation Platform (policymakers, R&D actors, disseminators, and local government).

Based on Figure 2, three main clusters become the focus of the theme regarding Jarwo Super technology, namely 1) definition of Jarwo Super technology, 2) Main actors related to policymaking, and 3) Main actors related to dissemination.

Cluster Definition of Jarwo Super technology

The first cluster focuses on the Jarwo Super technology components. With the aim of rice productivity development, Jarwo Super is developed as a technology package consisting of several components. There are VUB, balanced fertilization, pest control, bio-decomposers, and the application of agricultural machine tools. Of all the components, VUB is the most dominant. However, the mapping results also explain that the Jarwo Super technology is mostly implemented through only part of its technology components. This partly implemented technology relates to

location-specific issues (themes) and diverse regional cropping patterns.

Another interesting thing is that VUB has quite a close relationship with R&D activities and actors. These actors are from several entities, not only the technology developer (Seed Centers, ICRR) but also policymakers and technology users (technical directorates and local governments). This issue indicates that VUB has been the main focus of the Jarwo Super development and implementation.

A Cluster of Main Actors related to policymaking and technology development

The second cluster is related to actors in the policymaking process. The IAARD is the central actor in arranging the development and implementation of Jarwo Super technology as an R&D result. IAARD interacts greatly with MoA, ICRR, and Seed Center in its activities. Even though it has a smaller cluster than the other clusters, the network that connects IAARD shows that this actor facilitates relationships between several major actors in the MoA's structure, including ICRR, which is an actor producing technology and innovation of rice plants (VUB), the Director General of Food Crops that functions to replicate and to implement the technology and the ATTMC which serves the technology commercialization, especially to bridge with the private sector (industry). Unfortunately, the Private sector and ATTMC have little connection in Jarwo Super's network of activities. This is due to the results of observations in the field, which show that the industry is less involved in the technology development process and the downstream of Jarwo Super technology to the community.

The Cluster of Main actors related to dissemination

This cluster reveals how the disseminator appears as the perpetrator of the application of Jarwo Super. The mapping results depict that AIAT is the main actor in disseminating of Jarwo Super. AIAT directly interacts with the local government and extension workers. In addition, the role of extension workers appears to support the main activity in this dissemination through mentoring. In this cluster, AIAT collaborates with local government and extension workers in carrying out the dissemination process. The network analysis of the three main clusters results from the interpretation of the actors involved in the implementation of Jarwo Super activities.

The three clusters show how efforts are being made to address the challenge of increasing productivity in the rice sector. The role of farmers appears with a significant degree of centrality because they are the main actor (users) in the implementation of Jarwo Super technology. This mapping also appears that this program is conducted through government assistance to improve resource efficiency and increase agricultural productivity.

B. THE WORKING MECHANISM OF THE INNOVATION PLATFORM IN SCALING JARWO SUPER

In this part, two important things are the subject of analysis, namely the main actors and activities to explore the working mechanism of the innovation platform. Before carrying out a functional support analysis, the first thing to do is to limit the actors in the Jarwo Super Innovation Platform, including agencies/ organizations/ individuals involved in the formulation, implementation, mentoring, and utilization of Jarwo Super (Figure 3). This illustration aims to provide an overview of the required functions in the platform, the key role of each function, and the actors responsible for diffusing the Jarwo Super technology for a scaling impact.

1. Facilitation function

The facilitation function refers to the empowerment of stakeholders in an innovation platform, how the innovation platform supports collaboration between them and connects them to a wider market network, and even impacts policy changes (van Rooyen et al., 2013). Based on field data, we grouped the facilitation function into three roles, including policy formulation, dissemination and replication, and monitoring. The actors involved are IAARD, the Technical

Directorate of Food Crops, and ATTMC. The three actors, through the facilitation function, support all implementing units to conduct research and dissemination as well as delivery and assessment in the form of identifying technology needs by taking into account the needs of farmers. They also act to link the central government with local governments.

Policy Making

IAARD prepares the policy strategy of Jarwo Super. The first implementation began in 2012 when IAARD implemented a Field School (SL) program involving farmer groups and 2.3 million hectares of land. One farmer group gets 25 hectares of land to be used as a field laboratory. Furthermore, from the field laboratory study, IAARD looked for a new concept to continue the SL program named Jarwo Super. In formulating policies, IAARD refers to studies and recommendations from implementing units such as ICRR, ICATAD (the Indonesian Center for Agricultural Technology Assessment and Development), and IAARD. Policy formulation in this function leads to developing agricultural innovation (technology, models, institutions) and agricultural policy recommendations, including the Jarwo Super technological package.

When the technology components have been proven to increase production at the farmer level, it will be continued to the more intense aspect of dissemination (replication) through the Technical Directorates and the Director General of Food Crops for further development. In the case of Jarwo Super, the IAARD coordinates with the Director General of Food Crops, particularly the Directorate of Cerealia, to arrange the scaling of the technology into a National Program in 2017. This case confirms that aligning innovation platform activities with broader political agendas or government policies can facilitate scaling innovation to be utilized on a wider scale (Totin et al., 2020)practices and busines models . However, efforts to understand how these innovation platforms operate to scale innovations are insufficient. Such knowledge is critical for improving the design of agricultural innovation systems, specifically within the context of a rising interest in the innovation platform approach to support the transformation of agriculture across Africa. This paper investigates the scaling approaches employed by innovation platforms established in Rwanda. The study focused on four innovation platforms created as part of the Sub-Saharan Africa Challenge Program and analysed their activities and the resulting scaling outcomes. The findings show that two approaches can be effectively combined during the intervention; (1. Furthermore, the fact that the innovation platform is initiated by a PRO embedded in a line ministry brings several benefits. Not only is the platform neutral (Hendrickx, S. et al., 2015) in the sense that the technology has been proven before being scaled up, but the PRO as the leader is easier to coordinate with the technical directorates as the policy maker to integrate the National Program.

Dissemination and Replication

Starting in 2016, ICRR conducted in-house studies on Jarwo Super. Until then, ICRR has acted as a coordinator in disseminating of the Jarwo Super program. ICRR also conducts dissemination in the form of dissemination of innovative products of rice technology with the SDMC scheme. In other words, it is using various media, materials, or materials that are by the target area of the application of Jarwo Super.

When Jarwo Super was scaled up as a National Program in 2017 to be implemented in 10.000 ha irrigated lands around Indonesia, AIAT had a significant role in succeeding in the dissemination. The existence of the AIAT in each province also greatly contributes to the acceleration and dissemination of Jarwo Super technology, especially in introducing and disseminating new high-yielding varieties. AIAT also plays a role in site-specific technology assembly, adaptation testing, and multi-site various VUBs. The development of the Source Seed Management Unit (UPBS) is expected to be able to support the availability of source seeds, especially basic seeds (Foundation Seed/FS) and staple seeds (Stock Seed/SS) in farmers (Ishaq, 2016).

In addition to ICRR, ATTMC also plays a role in the dissemination process, namely, in accelerating the provision of sowing seeds. AIAT

guides breeder farmers to multiply the spread of seeds to support the acceleration of seed distribution to users of the IAARD through the SDMC approach.

Monitoring

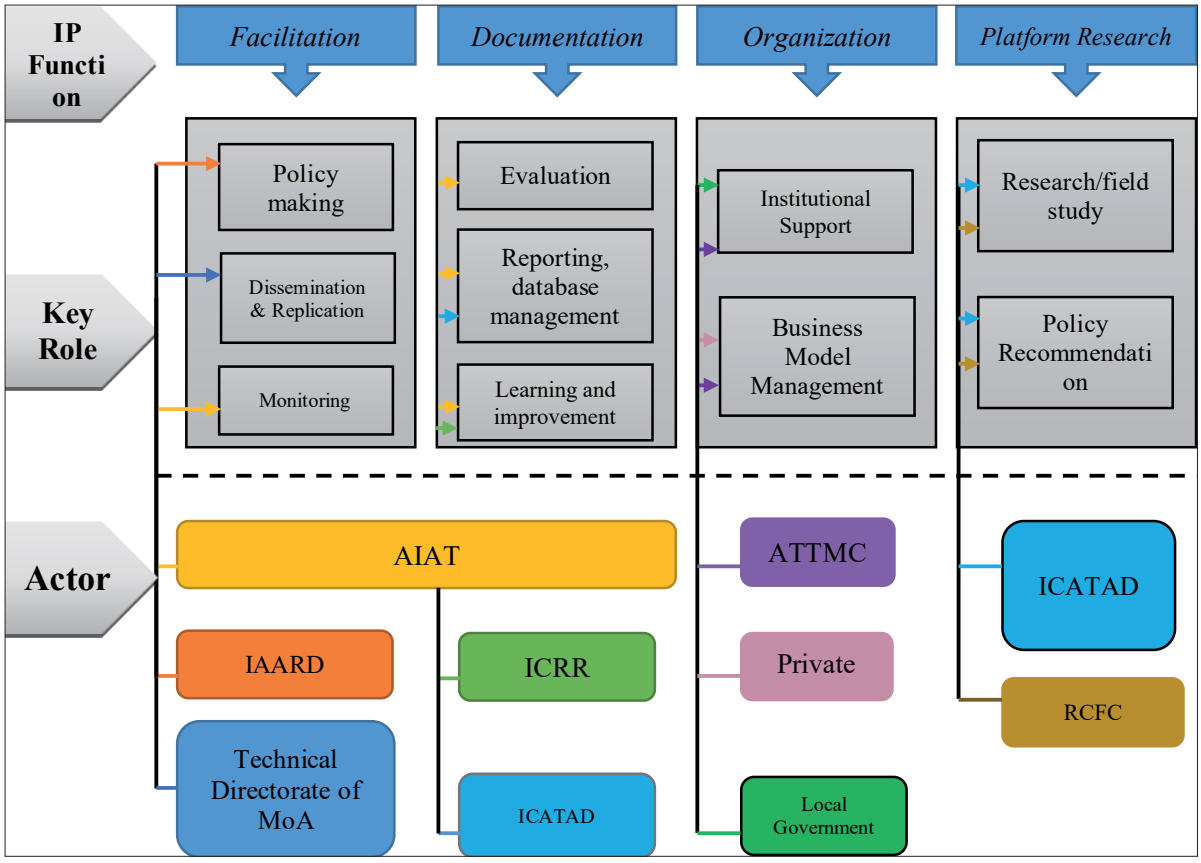
In addition to distributing VUB to farmers, AIAT also has a role in monitoring the implementation activities of local governments and extension workers from each region to see the condition of the planting and also what problems occur. Through monitoring activities, AIAT gets feedback on how technological innovation can complete solutions and achieve the goals of the Jarwo Super innovation platform, not only in terms of security for sustainable food sufficiency but also how to achieve sustainable agricultural innovation. Usually, this is done during the implementation of Jarwo Super technology through demonstration plots or demonstration farms.

2. Documentation Function

In the process of knowledge accumulation, a knowledge hub is needed for learning. In achieving the knowledge hub, the implementation of Jarwo Super requires three main activities, namely dissemination, reporting, and recording of the results of field studies (Reporting and database management) and Learning and improvement.

Evaluation

The IAARD and the Technical Directorate of Food Crops collect data on the challenges and constraints of rice cultivation in each region through some implementing units (RCFC, ICATAD, and AIAT). AIAT evaluates the implementation of Super Jarwo technology in the regions. Some of the evaluation results that can be obtained, such as not all components of Jarwo Super are applied. For example, alsintan (transplanter and combined harvester) has not



Description : color represents the stakeholders who play the role

Source: This study

Figure 3. Key Actors and Activities in the Jarwo Super Innovation Platform

been optimally applied because it is still in conflict with social problems (Indramayu) and topography in the hilly southern area (Cianjur). The influence of absorptive capacity and VUB preferences is also an evaluation obtained by AIAT. The results of this evaluation are submitted to IAARD to improve future technology development.

Reporting & Database management

In addition to dissemination, an important role in the documentation function is the systematic understanding and reporting of events, both process dynamics and the impact of technology application (Schut, 2016). As such, documentation becomes a tool for reflection on the dynamics of the innovation platform (multi-stakeholder processes) and the platform's ability to develop concrete solutions to problems. In the technical implementation of Jarwo Super, this activity begins with collecting monitoring results which are then compiled and reported in the form of progress and achievements to ICATAD (Indonesia: BBP2TP) and IAARD for further study. Achievements and progress are usually obtained from evaluating the adoption rate in several areas in each district and sub-district.

Learning and improvement

AIAT bridges PRO as technology producers, with farmers and stakeholders as technology users. Learning activities from upstream aspects include; a specific technology package, including supporting factors such as institutional input, capital, partnerships, labor (power) or agricultural machinery, farmer group empowerment, and policy support for dissemination programs. Meanwhile, the downstream aspect includes improving the quality and added value of the product and marketing the product to improve farmers' bargaining position. Thus the resulting technology package is comprehensive and can guarantee the development of the resulting technology package to a wider target area or population.

The results of the study that the implementing units have recorded are then re-analyzed to be followed up by improving the policy on rice cultivation techniques and then being implemented through the provincial and local government, then through extension workers to farmers.

3. Organization Function

The main purpose of this function is the availability of resource support so that the platform can produce solutions to existing problems. The support of organizational functions in the Jarwo Super Innovation platform includes institutional support and business model management.

Institutional Support

Jarwo Super Innovation Platform was initiated to increase rice productivity by developing and implementing Jarwo Super Technology. MoA fully provided financial support for the technology supply and dissemination and the human resources process through the IAARD and the technical directorate.

ICRR and AIAT are research resources that formulate the components of the Jarwo Super program. ICRR distributes Jarwo Super which has been inaugurated through AIAT. AIAT, in collaboration with extension workers in each local government, acts as a companion to disseminate the program to farmers.

About the recognition of the business potential of the technology that has been disseminated, a site quality test has been carried out by involving ATTMC. ATTMC acts as an agency to determine the criteria for products ready to be commercialized. ATTMC also plays a role in finding markets and holding business meetings with business stakeholders who wish to expand or commercialize the technology through royalties for cooperation rights.

In addition, the local government also support the implementation of the Jarwo Super Program through coordination with relevant stakeholder, including the extension workers, farmers group, financial institution, and TNI. Local Government also utilizes the results of the field monitoring and evaluation, particularly on the issue of a

technology supplier, to calculate the demand to be proposed to MoA.

Business Model Management

In agricultural technology, business model management aims to develop innovative products. ATTMC carries out this stage throug a Technology Transfer Process through a licensing mechanism with the following stages: license application, eligibility verification, mediation, and signing of cooperation to obtain royalties.

The components of Jarwo Super technology have the potential for partners/organizations to cooperate in providing human resources and natural resources through ATTMC and the private sector. However, the management of the business model owned by Jarwo Super technology is still limited to the VUB component, which can be seen from the VUB downstream scheme (Inpari 32 and Inpari 33). While other components are still in the development stage.

4. Platform Research

This function is important because it provides recommendations to improve the performance of Jarwo Super technology into the next technological improvement that impacts development (Schut et al., 2016).

Research

Jarwo Super Technology is a refinement of the previous technology (PTT) based on the studies and developments between stakeholders (researchers). In this function, ICATAD and RCFC study whether this technology contributes to achieving development impacts. The results of this study provide policy directions to suggest a better organizational model to develop a more efficient agricultural technology.

Policy Recommendations

The Center for Research and Development of Food Crops which is part of the Agency for Agricultural Research and Development, has the task of carrying out the preparation of technical policies, plans, and programs for research, development, and innovation in the field of food crops. This aligns the function of the research platform with the innovation platform. Meanwhile, ICATAD receives evaluation results which are then submitted to IAARD for improvement of technology policy recommendations that should be implemented.

V. CONCLUSION

The development and diffusion of Jarwo Super technology involved multi-stakeholders collaboration to bring a scaling impact. The mapping of key actors and activities in the Jarwo Super shows the alignment between the actors' functions and roles by prioritizing the program's central vision. The required functions in the jarwo super innovation platforms are facilitation, organization, documentation, and platform research, whose key actors are involved in R&D and specialized units under the MoA. The innovation platform is led by the IAARD as a PRO, starting from problem identification to increase rice productivity, site testing, and finally to be scaled up as a National Program.

Integrating the goal of the innovation platform into existing regulation or policy can support the innovation platform to have a scaling impact. Moreover, when the innovation platform is led by a PRO that is either embedded in or well-coordinated with the line ministries, it will gain better institutional support from the government.

However, as indicated from the results, the involvement of the private sector is still limited, particularly in industry, to scale up the technology. Although agricultural R&D in Indonesia is still dominated by PRO, the involvement of industry in the process of both development and down streaming should be encouraged. Providing technology components as government assistance with few involvements of the industry will not make the technology utilization sustainable since the users' access to technology supply is limited. Since the innovation platform is developed to solve the problem fully, it demands the involvement of multi-stakeholder in all functions of the whole process so that the technology can have a scaling impact.

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