LIPI
STI POLICY AND MANAGEMENT
Journal homepage: http://www.stipmjournal.org
STIPM STI Policy and Management

Innovation Platforms Practices for Improving Sustainable Intensification in Several countries and its implication to Indonesia: An Integrative Review of Agricultural Innovation Systems

Winda Anestya Ayunda[a,*], Indah Purwaningsih [a], Lutfah Ariana[a], and Husein Avicenna Akil [a]
[a] *Research Center for STI Policy and Management at the Indonesian Institute of Sciences (P2KMIptekin-LIPI)*
E-mail: windaanestya@gmail.com

ARTICLE INFO

Article History:
Received : 08 April 2021
Revised : 18 June 2021
Accepted : 18 June 2021
Available online : 15 July 2021

Authorship Contribution:
The Main Conributors are Winda Anestya Ayunda and Indah Purwaningsih, herein after as member of contributors.

Keywords:
Innovation Platforms, Sustainable Intensification, Indonesian agriculture systems, Policy and development investments

ABSTRACT

The unsuccessful implementation of Innovation Platforms (IPs) occurs frequently, leading to missed opportunities where improvements could have been made on various aspects of a Sustainable Intensification. This integrative review aims to report research on the scope of productivity innovation, Natural Resource Management (NRM) innovation and institutional innovation of IPs to achieve sustainable intensification in several countries. A comprehensive database search using the search term through a range of electronic database, including Google Scholar and Scopus from the earliest retrievable records of each database to June, 2020. The search terms used in review were "innovation platforms" and "sustainable intensification". A total of 9 studies were included in the review. Based on the result, we propose modifications to the framework to assess both the implementation and evaluation of IPs in Indonesian agriculture systems. We also reflect on some challenges and opportunities for further research, policy, and development investments in sustainable intensification.

I. INTRODUCTION

Along with national development, land degradation intensified, which increasingly threatens the sustainability of the agricultural system. The Ministry of National Development Planning (Bappenas), the World Bank and OECD highlighted a number of natural resource management issues related to Indonesia's agriculture.

Among the problems identified for the national Medium Term Development Plan (RPJMN) 2015-2019, including: excessive use of legal and illegal chemicals; pollution and soil fertility problems; nitric pollution of a water body; conversion of forest land to agriculture related to soil erosion, carbon loss and nutrients, loss of water quality and downstream sedimentation (Endah, 2015). This challenge is still an issue mentioned in the national Medium Term Development Plan (RPJMN) 2020-2024. Food production requires

* Corresponding Author. 085324080330
E-mail: windaanestya@gmail.com

DOI: 10.14203/STIPM.2021.296

increased availability and reliability of production infrastructure including irrigation as well as increased availability, access and quality of food consumption to maintain the sustainability of productivity of agricultural resources adaptive to climate change, precision agricultural systems, land management and irrigation water to deal with the increasing need for land and water as a result of increased economic activities and food needs.

Sustainable intensification is a step towards the urban, post-agrarian economy, and is an important element in achieving food security. Food and Agriculture Organization (FAO) defines sustainable intensification as increasing food production from existing agricultural land while minimizing pressure on the environment. This is a response to the challenge of increasing food demand from growing populations, in situations where land, water, energy, and other inputs are in short supply, overexploited and used unsustainably. Every effort to intensify food production must be balanced with a shared focus to make it sustainable. Failing to do so will damage our capacity to continue producing food in the future (FAO, 2020)

Sustainable intensification is hampered by several factors like poor functions of institutions such as policies and markets, limited capabilities and financial resources, and ineffective interactions and collaborations between stakeholders (Schut, 2016). The innovation platform might address these challenges to achieve sustainable intensification in an Agricultural Innovation System (AIS) (Sartas, et al., 2018). Schut (2016) identified key components of IPs and discussed their relation to achieving agricultural development outcomes and impact. He presented data of three main themes of IPs, namely: multi-stakeholder processes, content matter and platform support functions (Schut et al., 2016). At the same time, Schut (2016) also identified sustainable intensification demands three elements to fulfil, including (1) productivity innovation (2) natural resource management (NRM) innovation and (3) institutional innovation. These three elements are part of the innovation platform's content matter.

In an agricultural innovation system, the diffusion of research results can be accelerated through an innovation platform approach. This approach is believed to increase the impact of R&D results through a multi-stakeholder collaboration scheme (Sartas et al., 2018). The innovation platform aims to strengthen the agricultural innovation system by building actor interactions, encouraging institutional and policy changes, and effectively utilizing resources and opportunities in finding solutions to problems (Davies et al., 2018).

This study reflected on challenges and opportunities for further research, policy, and development investments in sustainable intensification. Integrative literature reviews were conducted using a systematic approach to answering the question: "What kind of relevant framework is needed to assess IPs implementation and evaluation of agricultural system in achieving sustainable intensification in Indonesia?

II. ANALYTICAL FRAMEWORK

2.1 Innovation Platforms Practices for Improving Sustainable Intensification

Sustainable intensification of agricultural systems in developing countries is considered important to meet increasing food demand. Pressure on high agricultural land, soil fertility, and low yields are necessary to create sustainable intensification in order to increase food security and economic development. The literature on sustainable intensification showed a strong focus on productivity innovations. For example, the use of new varieties or fertilizers to increase yields. Natural Resource Management (NRM) innovation deals with issues related to environmental sustainability, such as soil fertility, deforestation, water availability, and climate change. The importance of institutional innovation to support sustainable intensification is also recognized in literature such as organizational or institutional changes, which create an environment that allows access to land, finance, and markets (Schut, 2017). These three elements are part of the content matter which is one of the three key components that affect the success of

the innovation platform in achieving agricultural development (Multi-stakeholder, content matter and Platform support functions)

Recognizing this concept can help stakeholders, especially governments, create structured policies for food security. The applications of IPs in other countries, can be a reference model to be applied in Indonesia. However, the formulation of policies and development investments that is continuously intensified according to Indonesian context requires a critical analysis of the literature. It is important to compare and to clarify the sustainable intensification components. The terminology and components of an inconsistent innovation platform can lead to inconsistent evaluation of sustainable intensification results. Consistent definitions are needed to clarify and to analyze the importance of concepts to improve knowledge, to solve problems, and to facilitate communication among researchers.

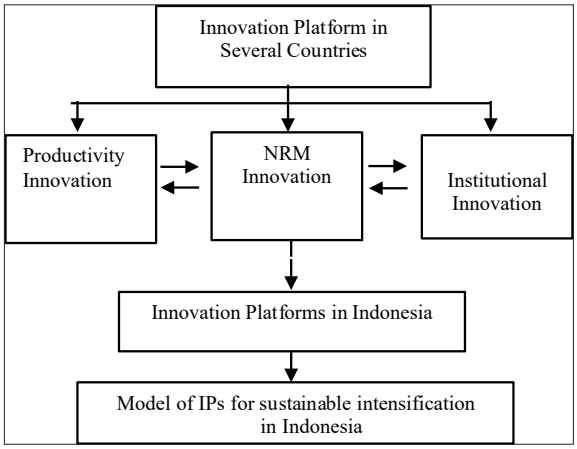

Figure 1. Analytical Framework (Constructed by Author)

III. METHODOLOGY

3.1 Integrative Review Process and literature search

An integrative review process was conducted according to the framework developed by Whittemore and Knafls (2005) comprising five stages which include problem identification, literature search, data evaluation, data synthesis, and presentation. Compared to a systematic review, integrative reviews generate new insights about phenomena, allow for the inclusion of different methodologies and data levels, and have the ability to inform future research trajectories. (Rachel et al., 2016)

The search of the academic literature was supported by the following online databases: Scopus and the search engine Google Scholar. The keywords used were ”innovation platforms” and “sustainable intensification”. We used two keywords which were the biggest terms in this theme to focus on filtering all articles that discussed the role of the innovation platform in achieving sustainability intensification in these two large databases. We also used Boolean connectors in title, AND, OR, and NOT to construct the search strategy. Figure 2 shows the flow of systematic literature review.

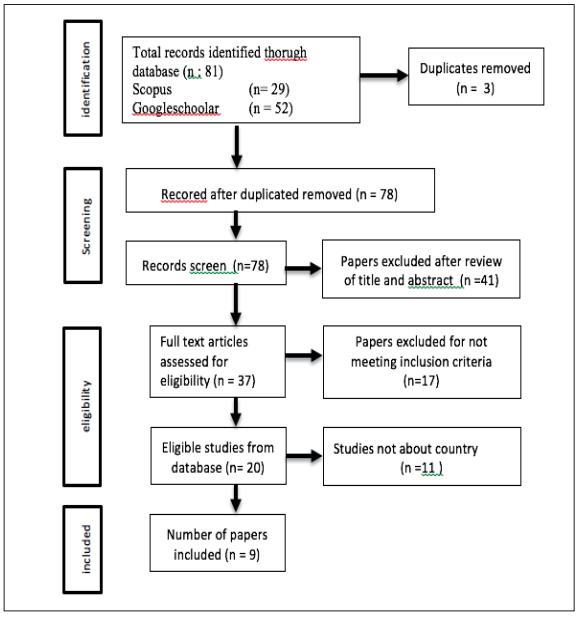

Figure 2. Flowing chart showing the study analysis that led to the final sample size

3.2 Exclusion and inclusion criteria

The inclusion criteria were as follows: Studies to June 2020. Articles were analyzed based on their relevance and approopriability to the review. Selected papers explained the case of the application of innovation platforms in a specific country. These cases were discussed using frameworks or generating a specific framework. The article also links the application, or evaluation of IPs to

sustainable intensification. The search strategy initially identified 81 papers. After removal of duplicates and screening (Figure 2), we identified 37 potential papers to be included by title and abstract. The next step assessed 37 papers that were identified based on inclusion and exclusion criteria which left 20 articles. From 20 articles, only 9 articles discussed the application of IP in several countries. while 11 other articles purposed IP more to document analysis, not to raise the issue of IPs and analyze its application from a case that can be used as a lesson.

3.3 Data extraction and synthesis

Initially, data from nine studies were extracted according to: author, year, purpose, scope of the IPs, method, and significant results (Table 1 presents a shortened version). These findings, further integrated using several agricultural issues, were the focus of the innovation platforms. The first is productivity innovation, in the form of new technology or management process of the research results used to increase agricultural productivity. Another was natural resource management (NRM), innovations relating to environmental issues, such as soil fertility, water availability, and climate change. The last was institutional innovation, aimed at creating an environment that allows access to land, finance, and markets. These three forms of innovation needed to be integrated to solve complex farming problems. Figure 2 outlines how articles were selected for inclusion through a flow chart for the integrative review (Rachel et al., 2016). The nine final studies were chosen for inclusion involved studies of IPs in 12 countries.

IV. RESULTS

The concept of IPs for sustainable intensification was first introduced in Sub Saharan Africa. In Sub Saharan Africa, for example, Rwanda with financial and land limitations has been able to produce up to 600% increase of food production after two years of implementing an IP called Cassava Innovation Platforms/KIAS (Adam et al., 2018). Multi-stakeholder cooperation between the international government and farmers was the key to the success of IPs implementation in Rwanda.

4.1 IPs in Several Countries based on Content Matter of Innovations Platforms

IPs in Five countries Burundi, Rwanda, DR Congo, Ethiopia, and Burkina Faso, are part of the 'action areas' of the CGIAR Research Program on Integrated Systems for the Humid Tropics (Humidtropics). The program aims to increase income and improve nutrition for rural households, increase farm productivity, promote sustainable natural resource management, empowering women and youth, and enhancing innovation capacity, by conducting systems-oriented Research for Development (R4D) through IPs (Adam et al., 2018). The Sub-Saharan Africa countries reflect similar issues about the weaknesses of their agricultural innovation: little know-how of agricultural production techniques, limited knowledge on Integrated Soil Fertility Management (ISFM) practices, high pressure of diseases and pests, and lack of improvisation of seed varieties. Most of the identified articles were from sub-Saharan Africa reflecting the fact that Innovation Platforms have been widely used in this region (Pound & Posthumus, 2007).

Productivity Innovation

Schut (2016) mentioned there are three roles of IPs for productivity innovation include: (1) increasing access to high quality agricultural inputs (all locations), (2) capacity building to improve agricultural practices, and (3) pest and disease control. Problems with access to seeds and fertilizers can be seen from the low proportion of farmers using chemical fertilizers. Furthermore, capacity development through farmer field schools, the identification and adaptation of technologies with farmers, and improved agricultural extension were mentioned as potential innovations. Adam (2018), conducted a review by examining the successful application of two IP models in Rwanda, namely Cassava Innovation Platforms / KIAS and Huguka Mudende. Each of the two studied AIPs had a niche crop or product that its time and resources were concentrated on

producing. The success story of those IPs is more about quality than about volume of production, given that market prices are heavily influenced by product quality (Adam et al., 2018)

Research Associates (RAs) in Cocoa Research Institute of Ghana (CRIG), identified price formation mechanisms as the key entry point for the IP which had an impact on increased production (Hounkonnou et al., 2016). Ayantunde (2016) in their review on innovation platforms, rightly observed that productivity increase though improved technologies does not necessarily translate into improvement in livelihood of the poor rural areas without proper consideration of socio-economic, policy and institutional contexts. Therefore, to enhance technology uptake and sustainable intensification of agricultural systems, it is essential to include all relevant stakeholders in the process of agricultural innovation (Ayantunde, 2016)

Natural Resource Management (NRM) Innovations.

Every country might have different natural fertilizers, which in turn demands a specific NRM. Burundi has poor soil fertility, acidity and shortness of agricultural land, while Rwanda has limited area for integrated agriculture (Schut et al., 2016). Several countries take different strategy to solve their problem.

Some government focuses on providing agricultural area and infrastructure according to the seed varieties demand. For example, IPs in Rwanda and Burundi uses rented land to farm that has been acquired from the Cooperative for Development Agriculture, Livestock and Forestry (CODAF), On the other hand, IPs member in Rwanda have had trainings targeted at reducing soil erosion (Adam et al., 2018) . In all countries, NRM innovations are carried out by researchers, planners and policy makers.

The results show measurable benefits to farmers that have accrued from the adoption of the NRM practices such as reduction in soil erosion, less termite infestation and increased income from the sale of fodder. One unanticipated outcome was that farmers were able to sell seeds and thus gain income from the feed intervention. The results of these experiments were sold to government and NGO projects for scaling up. The literature study shows that sustainable intensification requires short and middle term productivity and institutional innovations, combined with middle to long term NRM innovations. An integrated natural resource management (NRM) could be done through IPs management by providing the relevant actor's chances to collaboratively identify natural resources-related problems as well as the solutions at local level [Schut et al., 2018)

Institutional Innovation

The first type of IP operates at the community level and serves as a space for joint problem analysis, agenda setting, and experimentation. We need to know, the local adjustment and selection of various innovations for sustainable agricultural intensification (Lamers et al., 2017) who chose a national partner with a strong network and reputation to assist in program facilitation. Together, these institutions chose a number of actors who are considered to be able to direct the activities of IPs in the community. Throughout the process, IPs continue to meet and to discuss progress, as well as the next steps of the innovation process. Assessment of the functioning of two IPs in Koubri and Ouahigouya, Burkina Faso, showed that an institutional innovation systems approach is relevant and important for effective linkages between different actors for better access to technical and financial services, and for building capacity of the members (Ayantunde et al., 2016)

According to Glover et al., (2017), a new technology or new innovation requires a process of adaptation, "unpacking", "repacking" and a process to rearrange it to suit user needs. Despite the wide use of the innovation platforms, it is poorly defined in the literature as definitions of the innovation platforms are varied from broad to specific and due to lack of standardized definition of innovation platforms

Table 1.
Summary of included studies.

Authors, year	Country Sites	Methods of Analysis	Purpose	Scope of the IPs
Schut et al., 2016	Burundi, Rwanda , DR congo	qualitative (FGD and Interview with stake holder)	to identifies the constraint network analysis of institutional innovation.	Productivity; natural resource management (NRM); institutional
Iddo Dror,et al., 2016	Ethiopian	Case study	To capture the implementing of improving rainwater management practices to enhance the natural resource base for existing farming systems.	Soil and water conservation (SWC) practices
Adam et al., 2018	Rwanda	FGD key informant interviews (KIIs)	To document two successful studied of AIPs in Rwanda (Cassava Innovation Platforms & Huguka Mudende)	Gender and equitable benefit-sharing mechanisms through AIPs in Rwanda
Lamers et a., 2017	Burundi, Rwanda, DRC	Participatory observation, & semi structured key informant interviews	to explores the involvement of interactions between stakeholders across different levels in agricultural innovation processes (from the farm level to supranational level)	Facilitating connections between levels in agricultural innovation processes
Pound & Posthumus, 2007	Zimbabwe,Mozambique, Kenya, Madagascar, and Burkina Faso	case study	to reflects the outcomes of the ABACO project	Conservation agriculture (CA)
Hounkonnou et al., 2016	Benin , Ghana, Mali	Comparative analysis	to synthesises the experiences of IPs that engaged in open-ended experimental action to improve the institutional context for smallholder farm development in West Africa.	High Yielding Varieties (HYVs) convened by CoS-SIS
Hermans et al., 2017	Burundi, Rwanda and DRC	Social Network Analysis and Exponential Random Graph Modelling (ERGM)	to explore the capacity to innovate and scaling potential of three Multi stakeholder platforms (MSPs)	Scaling potential of MSPs Network
Sartas, et al., 2018	Burundi, Rwanda, DR congo	Social network analysis and logistic models	Studies the changes of the characteristics of multistakeholder innovation networks targeted by MSPs	Characteristics of the multi-stakeholder platforms and funding of Innovation Platforms
Ayantunde et al., 2016	Burkina Faso	Systematic monitoring and evaluation (M&E) of its key processes and outcomes (Klerkx et al., 2012	to analyze IP performance in terms of consistency of participation in stakeholder groups, (problem relevance, information exchange, conflict resolution, participation in decision making, facilitation, and perceived benefits).	Stakeholder's consistency in performance of IPs

V. DISCUSSION

5.1 Innovation Platforms in Indonesia.

In Indonesia, the term of innovation platform still sounds unfamiliar. However, there are some agricultural programs practicing the elements of multi-stakeholder's innovation platforms in Indonesia.

The Ministry of Agriculture and FAO have implemented innovation platforms to help farmers in NTT and NTB provinces to help them adapt to climate change using a special technique called Conservation Agriculture (CA). Conservation agriculture is a sustainable land management system that can improve soil quality and at the same time increase crop productivity, store carbon in the soil, and reduce greenhouse gas emissions. Nevertheless, the implementation of CA is less desirable. Significant weed growth resulted in a decrease in productivity during the initial implementation period, while small landholders generally did not consider the long-term positive effects of technological innovations introduced. The small landholders were more influenced by short-term benefits in their decision making principles. Studies are needed to adapt this conservation farming model to meet the social and economic conditions of small farmers. Government's support in the form of training, advocacy and assistance with production facilities is needed to accelerate the adoption of this model at the farm level.

In addition, Indonesian Agency of Agricultural Research And Development (Balitbangtan) has produced a technology package to support rice cultivation called Jajar Legowo Super. This technology is also a form of innovation platform to increase the productivity of irrigated rice fields. The function of innovation platform from Jarwo Super is believed to accelerate the performance of the agricultural sector in various regions, especially rice production which can reach 10 tons of GKG / ha per year. The Jarwo Super innovation platform that has been implemented by Balitbangtan since 2016 as a technology package requires a good combination of technology, knowledge to apply the technology and institutional support (formal and informal) to produce sustainable output. However, whether the IP has been implemented in accordance with the IPs concept for sustainable intensification requires futher research.

The other IP practice in Indonesia is Integrated Cropping Calendar System (KATAM), whichis a tool developed and implemented by the Ministry of Agriculture to increase food production while helping farmers adapt to climate change. Extending from cropping calendar atlas in 2007, the Agency for Agricultural Research and Development MoA collaborates with the Agency for Meteorology, Climatology and Geophysics (BMKG) to develop dynamic KATAM in 2010 to address climate fluctuations problem. This improved technology of KATAM provides not only prediction on appropriate planting time, but also recommendation on appropriate rice variety and fertilizer. It also helps farmers minimize climate risks by informing potential climate-related hazards, including floods and drought. Nonetheless, farmers' awareness and understanding on this tool implementation is a challenge. To overcome this problem, the MoA makes use of agricultural extension in each province to disseminate KATAM. The extension workers provide modules and training to farmers through "Climate Field School". This initiative tries to promote two-way communication with farmers, practicing the tools by understanding the farmers problems and direct experimentation (Kaneko & Kawanishi, 2016).

Conceptualizing IP models for Sustainable Intensification in Indonesia

The three programs that represent the practice of innovation platforms in Indonesia were developed to increase the crop productivity, particularly rice as one of the Indonesian staple foods. Despite productivity improvement, the Indonesian government intends to gain sustainable intensification. CA, Jarwo Super, and KATAM aim to address natural resources management (NRM) issue while improving crop productivity.

However, CA, Jarwo Super and KATAM face similar challenges. Lack of farmers' awareness and knowledge on the program has discouraged the implementation. Besides, low institutional support cannot provide such an environment for better access to either technical and financial

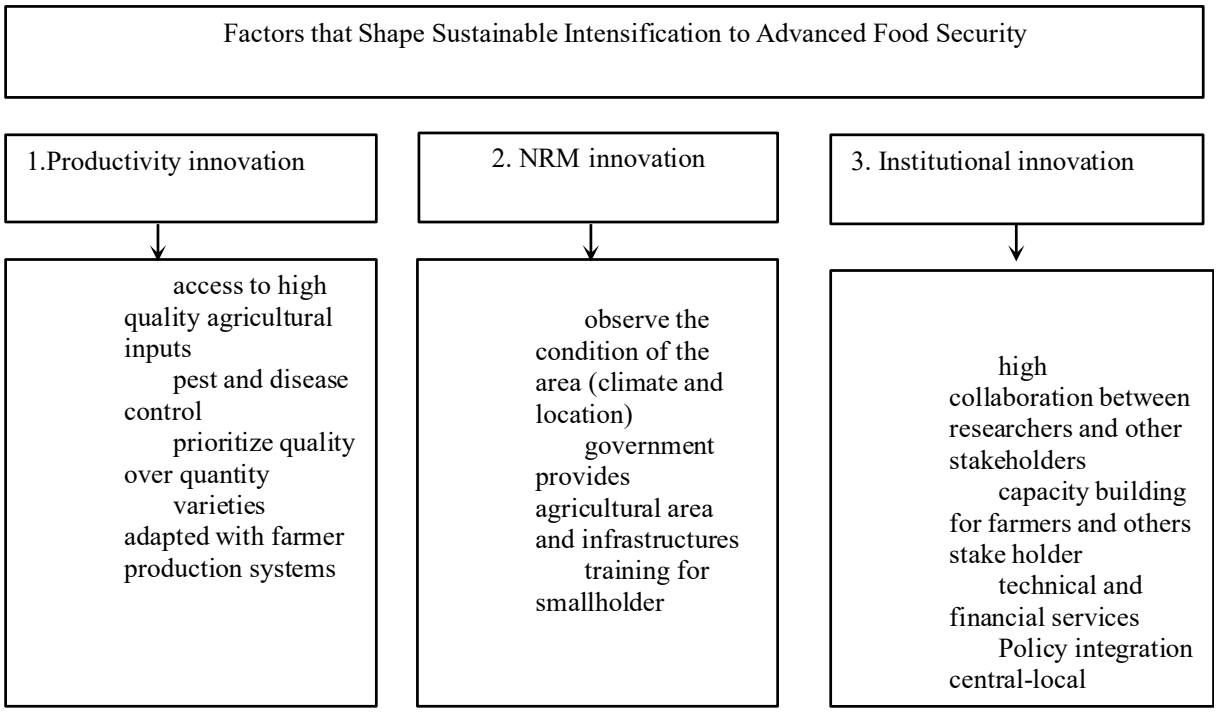

Figure 3. Conceptual model of IPs for sustainable intensification in Indonesia

services, or capacity building. Policy disparities between central and local government in the value chain eventually failed to solve the complex farming problem despite the new introduced technology.

Successful practices of IPs in Sub Saharan Africa countries indicate that integration between productivity innovation, NRM innovation and institutional innovation is the key to achieve sustainable intensification. Institutional changes should be created to support the technical changes in solving farming problems.

The conceptual model (Figure 3) suggests factors that shape sustainable intensification to advance food security. These factors can be used in the definition of applying IPs in Indonesia. The conceptual model shows the relationship between each component and this proposed model could provide direction for the development and evaluation of the implementation of the innovation platform in sustainable intensification.

However, further research is needed to examine the applicability of this IP conceptual model.

VI. CONCLUSIONS

From the previous description, it can be concluded that innovation platforms were a development tool used increasingly to support the stakeholders in the complex systems for agricultural development in developing countries. The innovation platforms approach to sustainable intensification provides a more holistic picture between different types of agricultural innovation. It offers a better starting point for identifying site specific entry points for productivity innovation, NRM, and institutional innovation. Studies from several countries showed that close collaboration between stakeholder groups will have an impact on the formulation of policies that support success of agricultural systems. The involvement of different stakeholder groups provided better insight into the dimensions of the different constraints, causes, and types of innovation that are economically and institutionally feasible, and socially, culturally and politically acceptable. In Indonesia, the agricultural system has begun to be sustainable, not only from the economic perspective, but also from environmental, social and institutional perspective. IPs can be implemented to encourage the adoption of agricultural innovations and

stakeholder interactions within a value chain, in particular under the Ministry of Agriculture.

5.1 Policy Implications

The conceptual model of IPs for sustainable intensification can be used as a model reference for the formulation of central and regional government policies in supporting the successful application of IPs. Through this conceptual model, the innovation platform is not only understood as the introduction and implementation of technology components, but also to support the application of IPs as a learning platform with broader system changes. the conceptual models can also be used as a reference for aligning the innovation platform activities with a broader political agenda or government policy to facilitate a broader process of scaling the innovation platform.

ACKNOWLEDGEMENT

This paper has been presented at International Conference on Green Agro-Industry and Bioeconomy (ICGAB) Malang (Virtual Conference) 6–7 July 2020

REFERENCES

Adam, R. I., Misiko, M., Dusengemungu, L., Mukakalisa, Z., Adam, R. I., Misiko, M., & Dusengemungu, L. (2018). Gender and equitable benefit-sharing mechanisms through Agricultural Innovation Platforms in Rwanda. *Community Development*, 1–18. https://doi.org/10.1080/15575330.2018.1496465

Ayantunde, A. A., Swaans, K., Some, H., & Pali, P. (2016). Assessing the performance of innovation platforms in crop-livestock agro-ecosystems in the Volta basin, *African Journal of Agricultural Research,* 11(33), 3141-3153. https://doi.org/10.5897/AJAR2016.11147

Endah, M. (2015). *Agricultural and Rural Development Planning: Problems and a Roadmap for the Future" Deputy for Natural Resources and Environment, / Ministry of National Development Planning Indonesia.* Bappenas [In Indonesian]

FAO. (2014). Building a Common Vision For Sustainable Food And Agriculture. Principles and Approaches. *Food and Agriculture Organization of the United Nations.* Rome. http://www.fao.org/3/a-i3940e.pdf

Hermans, F., Sartas, M., Schagen, B. Van, Asten, P. Van, & Schut, M. (2017). Social network analysis of multi-stakeholder platforms in agricultural research for development : Opportunities and constraints for innovation and scaling, *PLoS ONE* 12(2):1–21. https://doi.org/10.1371/journal.pone.0169634

Hounkonnou, D., Brouwers, J., Huis, A., Van, Jiggins, J., Kossou, D., Röling, N., & Traoré, M. (2016). Triggering regime change : A comparative analysis of the performance of innovation platforms that attempted to change the institutional context for nine agricultural domains in West Africa. *AGSY*. 165, 296-309. https://doi.org/10.1016/j.agsy.2016.08.009

Dror, I., Cadilhon, J-J., Schut, M., Misiko, M., & Maheshwari, S. (2016). Innovation Platforms for Agricultural Development : Evaluating the mature innovation platforms landscape. *Routledge*, 190 p. https://www.routledge.com/Innovation-Platforms-for-Agricultural-Development-Evaluating-the-mature/Dror-Cadilhon-Schut-Misiko-Maheshwari/p/book/9781138588905

Joseph, C., Eliud, A. B., Laurens, K., & March, S. (2013). Innovation Platforms to Shape National Policy. Innovation platforms to shape national policy. *Innovation Platforms Practice Brief* 2. Nairobi, Kenya:ILRI. https://hdl.handle.net/10568/34156

Kaneko, S., & Kawanishi, M. (2016). Climate change policies and challenges in Indonesia, 295-304. *Springers* https://doi.org/10.1007/978-4-431-55994-8

Lamers, D., Schut, M., Klerkx, L., & Asten, P. Van. (2017). Compositional dynamics of multilevel innovation platforms. *Agricultural Research for Development*, *44:*April, 739–752. https://doi.org/10.1093/scipol/scx009

Pound, B., & Posthumus, H. (2007). The merits and limitations of innovation platforms for promoting Conservation Agriculture in sub-Saharan Africa. *International Farming Systems Association (IFSA) Europe*. https://www.harper-adams.ac.uk/events/ifsa/papers/1/1.6%20Pound.pdf

Rachel K., Merylin, Vasiliki B., & Heather, B. (2016). The Benefits and Challenges of Academic Writing Retreats : An Integrative Review. *Higher Education Research & Development,* 35(6), 1210-1227 https://doi.org/10.1080/07294360.2016.1144572

Sartas, M., Schut, M., Hermans, F., Asten, P., & Leeuwis, C. (2018). Effects of multi-stakeholder platforms on multi-stakeholder innovation networks: Implications for research for development interventions targeting innovations at scale. *PLOS ONE* 13(6): e0197993. https://doi.org/10.1371/journal.pone.0197993.

Schut, M., Van, A. P., Okafor, C., Hicintuka, C., Mapatano, S., Nabahungu, N. L., & Vanlauwe, B. (2016). Sustainable intensification of agricultural systems in the Central African Highlands: The need for institutional innovation. *Agricultural Systems*, *145*, 165–176. https://doi.org/10.1016/j.agsy.2016.03.005