

# Research Article RURAL ADAPTABILITY MODEL TOWARD STAKEHOLDER, ECOSYSTEM, AND STRATEGY (RAMSES) AS THE CONCEPTUAL OF PURSUING AN INNOVATION IN RURAL AREA

\*Muchamad Ramses and Eko Agus Prasetio

School of Business and Management, Institute Technology Bandung, Bandung, Indonesia

Received 25th February 2023; Accepted 14th March 2023; Published online 30th April 2023

#### Abstract

Innovation in rural areas has a wide gap with urban areas. It is due to several inhibiting factors such as location, infrastructure, and human resources. In addition, the characteristics of rural areas tend to be varied. For this reason, a rural adaptation model is needed to catch up with innovation. This study uses the literature review method with 22 comprehensive articles that have topics related to rural innovation. As a result, an adaptation model is obtained through three main indicators, *i.e.*, stakeholders, ecosystem, and strategy, each of which has agents who have different tasks. All three have a relationship with each other which is described in the conceptual framework of Rural Adaptability Model toward Stakeholder, Ecosystem, and Strategy (RAMSES). As a result, with a strategy that varies from the results of stakeholder and ecosystem reviews, it is hoped that it can be used as a medium of adaptability in pursuing an innovation in rural areas, so that an idea and creativity can be commercialized and has use value in society (rural innovation).

Keywords: Rural innovation, Adaptability, Stakeholder, Ecosystem, Strategy.

## INTRODUCTION

Innovation is the key to upscaling economic growth and opening new job opportunities (Kratzer and Ammering, 2019). However, research on innovation is still limited to advanced technology through urban area settings and has not mentioned much about rural areas (Hjaltadottir et al., 2020). It is due to the many constraints on supporting factors, such as infrastructure (Bonfiglio et al., 2017; Lyons et al., 2017; Gebremariam and Tesfaye, 2018), demographics (Radulescua et al., 2014), and education level (Harpa, 2017; Yuan et al., 2019), which tends to be low compared to the urban areas (Hjaltadottir et al., 2020). However, it does not mean that rural areas do not have the potential to develop because the natural resources in this area are much more abundant than the urban areas (Martindale, 2021). Not surprisingly, innovations born from rural areas are usually innovations in maximizing operations and production of the agriculture sector (Yuan et al., 2019; Zivojinovic et al., 2020). On the other hand, some agricultural lands face obstacles to high-cost innovation, so the intervention process tends to decrease (Gebremariam and Tesfaye, 2018). Therefore, the role of various stakeholders is critical to overcoming the lack of intervention in the rural areas from the aspects of academician (Singh and Bhaskar, 2015; Kratzer and Ammering, 2019; Yin et al., 2019), industry (Elena et al., 2015; King et al., 2019), and government (Bonfiglio et al., 2017; Lyons et al., 2017; Martindale, 2021) or even from the media (Provenzano, 2016). In this era of globalization, several countries have developed new ideas for rural development from different perspectives, for example, from production to consumption (Garcia, 2020; Liu, 2021; Martindale, 2021) and destinations (Nair et al., 2015; Carson and Carson, 2018). It shifts indirectly adds to the commercial value of a product or service that is classified as an innovation on an idea into a product or process and successfully commercialized (Castree et al., 2013).

Besides, to achieve a new idea discovery into innovation, the innovators must have an ecosystem that supports the problemsolving process (Yuan, 2019), both from a physical aspect (Lyons et al., 2017; Gebremariam and Tesfaye, 2018; Liu et al., 2021), social aspect (Radulescua et al., 2014; Lopez-Iglesias et al., 2018), or a combination of both. Hence, by recognizing the ecosystem, it can find the common thread of the main problem and then formulate it into the right strategy as a solution in finding an innovation. However, finding or making innovations in rural areas is not as easy as in urban areas. It is due to several inhibiting factors that must be resolved with the right strategy to catch up with innovation in rural areas. Given the different characteristics of rural areas, the strategy applied must be adaptive to adjust the overall conditions and find the root of the problem, whether toward the search for stakeholders involved or by looking at the existing ecosystem in a rural area or both. Therefore, this conceptual study aims to identify the rural adaptive model by investigating the relation of stakeholder, ecosystem, and strategy in rural areas to pursuing innovation, under the research question "how is the rural adaptation model by stakeholder, ecosystem, and strategy can pursuing an innovation?"

### METHODOLOGY

The interest of this study is to find frameworks that draw upon new solutions to face the challenges for an impactful construct in the rural area to pursue innovation. The focus is to explore the rural adaptability model of the innovation process as it develops throughout the rural innovation. Therefore, the study is not looking at the result of the innovation processes but how stakeholder, ecosystem, dan strategy can support and optimize the rural innovation. For that purpose, a three-stage systematic literature review was conducted. The first stage is identifying papers addressing rural innovation context by state of the art. In the second stage, an analytic framework based on the articles' year, region, methodology, and keywords are summarized and visualized to understand the framework's setting in the rural innovation context. In the last stage, clustering keywords based on specific code in main indicators of stakeholder, ecosystem, and strategy in rural innovation context and building the new framework of Rural Adaptability Model by Stakeholders, Ecosystem, and Strategy (RAMSES) was conducted as a finding of this study by correlating the three main indicators.

#### Step 1: Systematic Literature Review

As a preliminary study step, this step aims to collect relevant scientific literature on rural innovation. The searching process in the research data uses high-quality journal search tools, such as Science Direct and ProQuest. After that, an iterative search for articles is carried out by limiting the criteria for the selected articles. The keywords used in the pursuit are ("rural" and "innovation") and ("rural innovation") by applying the scientific journal settings and scanning articles based on the title, abstract, and reputation of the journal. In addition, the limitation of the renewal of the journal is also based on the year of publication which is not more than the last ten years. As for briefly, the inclusion and exclusion criteria can be seen in Table 1 following the data collection summary by Iqbal and Suzianti (2021).

(Figure 1), with the majority of research conducted in European countries (Figure 2). It may indicate that research on rural innovation has always been a stable issue every year due to the different number of articles each year is not significant. Still, in a total of the research articles, the number of research findings shows that discussion of rural innovation is not as much as a discussion of urban innovation, which tends to be more mature in concept and carrying capacity. Moreover, European countries became the most discussed by rural innovation. In contrast, the number of developing countries in Europe is not as much as in Asia or Africa, which is also a practical parameter in determining the classification of rural or urban areas. It is because the maturity of the carrying capacity of the region (physical and social) is accompanied by more advanced technological knowledge that can be adopted by rural conditions. In addition, refers to the categorization according to Tamee et al. (2018) and Weißhuhn et al. (2018) after being modified by Lee et al. (2020), combined with Horte et al. (2008), the 22 selected articles consisted of four articles using conceptual methods, nine articles using qualitative methods, and the other nine articles using quantitative methods (Table 2). Meanwhile, in terms of descriptive, explanatory, and exploratory approaches, the articles dominated by the 'exploratory approach' tend to explicitly discuss a problem without profoundly examining the causality.

Table 1.	Data	collection	boundary	/ bv	inclus	sion a	nd ex	clusion	criteria
1 11010 10	- Date	conceron	o o u ii u u i		III CI CA	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	na ch	ciusion	~

Attribute	Inclusion criteria	Exclusion criteria
Keywords	Search string: ("rural" and "innovation") and ("rural innovation")	-
Type of journal	Reputable journals from innovation, marketing, business, and	Non-scientific journals, book chapters, magazines, review articles,
	management study area	low-ranked journals in business and management, and conference
		paper
Perspective	Focus on the organizational perspective	Focus on individual perspective
Type of content	Empirical and conceptual articles (qualitative and quantitative)	-
Language	English	Other languages
Time	2011-2021 (ten years)	Before 2011
Relevance	Rural and innovation	Not directly related to the research questions OR not associated with
		the rural innovation



Figure 1. Article's distribution by year

After all the inclusions above were applied, 22 articles related to rural innovation study were obtained, which were then analyzed and edited in the data table using Ms. Excel, including data on the title, author, year, region, research methods, objectives, key findings, and keywords. From key findings and keywords, a grouping process is carried out through a predetermined "code" and results in a clustering approach from the stakeholder, ecosystem, and strategy aspects.

#### **Step 2: Analytical Framework**

Based on the distribution of the year of publication, the majority of the selected articles were published in 2019-2020



Figure 2. Article's distribution by region

It could be due to the limited previous research or the little innovation carried out by rural areas. Furthermore, in terms of citation, the total articles' citations are 239, which the highest citation is the article written by King *et al.* (2019) of 40 citations – published by Journal of Rural Studies under the title Navigating shades of social capital and trust to leverage opportunities for rural innovation (Table 3).

Га	ble	2.	Article	S	distribution	by	method	ological	l approach
----	-----	----	---------	---	--------------	----	--------	----------	------------

	Conceptual	Empirical Qualitative	Empirical Quantitative	Total
Descriptive	2	0	0	2
Explanatory	0	1	5	6
Exploratory	2	8	4	14
Total	4	9	9	22

#### Table 3. List of articles by journal and citation

No	Paper	Author(s)	Year	Journal	Citation
1	The heterogeneous effect of shocks on agricultural	GebrelibanosGebremariam and Wondimagegn	2018	Food Policy	22
	innovations adoption: Microeconometric evidence	Tesfaye			
2	from rural Ethiopia Rural innovations in biosphere reserves – A social	Armin Kratzer and Ute Ammering	2019	Journal of Rural	10
	network approach			Studies	
3	Rural innovation system: Revitalize the	Ximing Yin, Jin Chen, Jizhen Li	2019	Journal of Rural	20
4	A New Role for Land Grant Universities in the Bural Innovation Ecosystem?	Thomas S. Lyons, Steven R. Miller, and John T. Mann	2017	Journal of Regional Analysis and Policy	8
5	A predictive model of innovation in rural	Harpa Elena, Monica Sorina, and Dana Rus	2015	Procedia Technology	3
6	An Exploratory Study for Conceptualization of Rural Innovation in Indian Context	Sonal Singh and Bhaskar Bhowmick	2015	Procedia Social and Behavioral Science	2
7	Are rural regions prioritizing knowledge transfer and innovation? Evidence from Rural Development Policy expenditure across the EU	A. Bonfiglio, B. Camaioni, S. Coderoni, R. Esposti, F. Pagliacci, F. Sotte	2017	Journal of Rural Studies	31
8	space Benchmarking innovations and new practices in rural tourism development	Vikneswaran Nair, Kashif Hussain, May Chiun Lo, Neethiahnanthan Ari Ragavan	2015	Worldwide Hospitality and	7
9	Relevance of local knowledge in decision-making and rural innovation: methodological proposal for leveraging participation of Colombian cocoa	Gustavo Adolfo Gutiérrez García, Isabel Gutiérrez- Montes, Héctor Eduardo Hernández Núñez, Juan Carlos Suárez Salazar, Fernando Casanoves	2020	Journal of Rural Studies	7
10	From Land Consolidation and Food Safety to Taobao Villages and Alternative Food Networks: Four Components of China's Dynamic Agri-Rural Innovation System	Leigh Martindale	2021	Journal of Rural Studies	3
11	Enhancing Rural Innovation and Sustainability Through Impact Assessment: A Review of Methods and Tools	So Young Lee, José M. Díaz-Puente, and Pablo Vidueira	2020	Sustainability	2
12	Innovations and opportunities for entrepreneurial	Elena Radulescua, Liviu Marian, SorinaMoica	2014	Procedia Economics	0
13	Innovation in the rural areas and the linkage with	Vincenzo Provenzano, Massimo Arnone, Maria	2016	Procedia Social and	2
14	Experiencing forest products – An innovation	I. Živojinović, G. Weiss, M. Wilding, J.L.G. Wong,	2020	Land Use Policy	13
15	Navigating shades of social capital and trust to	A. Ludvig Barbara King, Simon Fielke, Karen Bayne, Laurens	2019	Journal of Rural	40
16	Extended opportunities for rural innovation Extended based Innovation of New Professional Farmer Cultivation under the Strategy of Rural Vitalization	Nerxx, Ruin Nette Ping Yuan, Xiao-rui Zhao, and Shouzhen Zeng	2019	Procedia Computer Science	0
17	International lifestyle immigrants and their contributions to rural tourism innovation: Experiences from Sweden's far north	Doris A. Carson, and Dean B. Carson	2018	Journal of Rural Studies	30
18	Macroeconomic Analysis of the Competitive Factors which Influence Innovation in Rural	Elena Harpa	2017	Procedia Engineering	8
19	Interpreterminp Inter-regional innovation cooperation and structural heterogeneity: Does being a rural, or border region or both make a difference?	Rannveig Edda Hjaltadóttir, TeemuMakkonen, Timo Mitze	2020	Journal of Rural Studies	9
20	Mobility innovations for sustainability and cohesion of rural areas: A transport model and public investment analysis for Valdeorras (Galicia, Spain)	Edelmiro Lopez-Iglesias, David Peon, Jorge Rodríguez-Alvarez	2018	Journal of Cleaner Production	11
21	Participatory video proposals: A tool for empowering farmer groups in rural innovation	Pamela Richardson-Ngwenya, María J. Restrepoa, Raúl Fernández, Brigitte A. Kaufmann	2019	Journal of Rural Studies	7
22	Promoting agricultural innovation as a means of improving China's rural environment	Pingyang Liu, Shengxin Qi, Dongxuan Li, Neil Ravenscroft	2021	Journal of Environmental Management	4

#### Step 3: Clustering Keywords by "Code"

In this step, cluster analysis used by adopting text analysis, also known as open coding, is a qualitative method for visualizing data from a language-based of descriptive, process, or emotional coding (Saldana, 2009). Text analysis is generally divided into axial and selective coding (Creswell, 2009; Saldana, 2009). In this study, axial coding was adopted by the article's finding to sort and relabel code into conceptual groups, which grouping similarly coded data decreases the number of initial codes established step by step (Creswell, 2009). Then, each indicator of stakeholders, ecosystem, and strategy has keywords or codes as the main factors of rural innovation. As a result, the model proposed was built as conceptual framework for pursuing an innovation in rural area by correlating three main indicators of this study, which is discussed more in the results and discussion sections.

# RESULTS

Carayannis and Campbell (2009) explain that the evolution of the innovation model is based on the triple helix developed by Etzkowitz and Leydesdofff (1997), which includes academia, business, and government. Then they added media-based and culture-based public as the fourth helix, which became known as the quadruple helix. The triple helix was initially identified as an agent/stakeholder who has a vital role in the evolution of the innovation model. Then after the entry of the fourth helix, which consists of media and culture, it brings a process of change to the concept of innovation which was previously a closed innovation to be an open innovation. As part of the fourth helix, the media plays an essential role in involving civil society participation in planning an innovation. So that in the end, this quadruple helix involves user orientation in achieving innovation by accelerating and improving a new product, service, or even the innovation process (Provenzano et al., 2016). In rural innovation, the quadruple helix plays an important role that drives the innovation. With limited knowledge and facilities, villages tend to have obstacles to move forward, especially in creating new ideas or ideas based on the current state of technology. In the end, academicians act as knowledge transfer agents (Lyons et al., 2017; Yin et al., 2019; Garcia et al., 2020). The business operates as an investment and commercialization agent (Nair et al., 2015; Liu et al., 2021). The government facilitates innovation with supportive policies (Bonfiglo et al. 2017; Martindale, 2021). The media becomes an inspiration in finding ideas, communicating, and providing feedback, which indirectly acts as agents of open innovation in rural areas (Provenzano, 2016; Richardson-Ngwenya et al., 2019). On the other hand, human resources that operate innovation are also needed, such as young people who are more adept at using technology than older people so that the quadruple helix and good-quality human resources become agents that are very crucial in the rural innovation process (Radulescu et al., 2014; Carson and Carson, 2018), which in the concept of the rural innovation in this study are referred to as "stakeholder" (Table 4).

In addition to the quadruple helix, according to Provenzano et al. (2016), several other factors also play a role in rural innovation, *i.e.*, core economies, biodiversity, and a healthy environment. They adopted this from the document "The World in 2025. Rising Asia and partner-ecological transition" (2009) prepared by the European Commission on social and ecological. It is also in line with the fifth helix described by Carayannis and Campbell (2010) and developed into a quintuple helix in the evolution of the innovation model. In brief, these social and ecological aspects include geographic characteristics (Provenzano et al., 2016; Hjaltadottir et al., 2020; Martindale, 2021), physical constraints (Lyons et al, 2017; Gebremariam and Tesfaye, 2018), socio-economic (Nair et al., 2015; King et al., 2019), socio-cultural (Carson and Carson, 2018), and entrepreneurial cultures (Elena et al., 2015; Elena, 2017), which form an "ecosystem" in the rural innovation (Table 5).

After we know the related conditions through stakeholders and the ecosystem in the rural area system, then we can develop a strategy to solve a problem in the rural area through an innovation. Some literature narrows rural innovation strategies based on their relationship with stakeholders and the ecosystem. The results of the literature review are shown in Table 6, which consists of *upscaling knowledge* (Singh and Bhaskar, 2015; Bonfiglo *et al.*, 2017; Yin *et al.*, 2019; Garcia *et al.*, 2020), *upscaling creation* (Kratzer and Ammering, 2019; Lee *et al.*, 2020; Martindale, 2021), *inter-relation* (Nair *et al.*, 2015; King *et al.*, 2019; Richardson-Ngwenya *et al.*, 2019), and *TACIT-trust, adapting, changing, integrating, and technology-based* (King *et al.*, 2019; Lee *et al.*, 2020).

Table 4. Stakeholder in rural innovation

Stakeholder	Source	Article's statement
Academic Institution	[a] Lyons et al. (2017) [b] Yin et al. (2019) [c] Garcia et al. (2020)	<ul> <li>[a] "There may also be university technology transfer opportunities for rural and agricultural regions that can capitalize on recent agricultural innovations."</li> <li>[b] "The technology innovation system is not only the core part of urban innovation system, but also the fundamental driving force of agricultural science and technology innovation. However, unlike the urban innovation system, rural innovation system lacks the technology hubs such as universities and research institutions."</li> <li>[c] " knowledge producers have been indispensable for the inventions and successful interventions on the territory. That is why, the orientation of new training processes must be redefined and thought, taking into consideration the educational priorities of farmers."</li> </ul>
Business Representative	[d] Nair et al. (2015) [e] Liu et al. (2021)	<ul> <li>[d] "Building smart-partnerships amongst all tourism-related stakeholders in rural tourism management is an ideal tool for promoting rural tourism"</li> <li>[e] " In particular, when E-commerce help enlarge the market, farmers are motivated to maximize their outputs as the problem of selling out is gone."</li> </ul>
Government	[f] Bonfiglo et al. (2017) [g] Martindale (2021)	<ul> <li>[f] "RD Programmes represent the main EU policy supporting KT&amp;I (Knowledge transfer and innovation) in the agricultural sector and in rural economies."</li> <li>[g] " this success of Xiedao (agriculture innovation) has had a powerful cumulative effect, shaping government policy to encourage similar forms of large-scale peri-urban agricultural projects to take-off and providing a stimulus for this particular trajectory of agricultural development."</li> </ul>
Media	<ul><li>[h] Provenzano et al.</li><li>(2016)</li><li>[i] Richardson- Ngwenya et al.</li><li>(2019)</li></ul>	<ul> <li>[h] "According to the guide for the elaboration of Research and Innovation Strategies for Smart Specializations (RIS3), the European Commission makes explicit references to the model of innovation of the "fourth helix" (Carayannis&amp; Campbell, 2009), which is based on openness of innovation process to civil society."</li> <li>[i] " the accessibility of video as a medium to transmit the voices of the group members assured the funders that the innovation plans were agreed upon and understood by the group as a whole."</li> </ul>
Good-Quality Human Resources	<ul><li>[j] Radulescu et al.</li><li>(2014)</li><li>[k] Carson and Carson (2018)</li></ul>	<ul> <li>[j] "Single persons who, despite the young age, have above-average income manifest a stronger inclination towards entrepreneurship."</li> <li>[k] " human capital contributions did not so much manifest through formal education and professional knowledge transfer, but through the application of informal skills, experiences and cultural understandings."</li> </ul>

## Table 5. Ecosystem in rural innovation

Ecosystem	Source	Article's statement
Geographic Characteristic	[a] Provenzano et al. (2016) [b] Hjaltadottir et al. (2020) [c] Martindale (2021)	<ul> <li>[a] "The additional step to the model stresses the importance of the natural environment as an asset for the production of knowledge and innovation."</li> <li>[b] " the latter result points to a negative border effect, our gravity model estimates also show that pairs of border regions are more active in terms of close geographical innovation cooperation."</li> <li>[c] "Xiedao evolved from pragmatic responses to the challenges and 'trust pressure' involved in Chinese agriculture and food industry and its situational location in Beijing."</li> </ul>
Physical Constraint	[d] Lyons et al. (2017) [e] Gebremariam and Tesfaye (2018)	<ul> <li>[d] " young educated workers are finding new opportunities in the rural landscape compared to past generations and exhibiting a greater willingness to locate based on amenities rather than employment opportunities, especially for those in service sectors where location is less constrained by the need for a physical presence."</li> <li>[e] " farmers often face many alternative agricultural innovations that need to be adopted as complements or substitutes to address overlapping constraints and objectives such as weeds, pests, disease infestations and low soil fertility."</li> </ul>
Socio-economic	[f] Nair et al. (2015) [g] King et al. (2019)	[f] "The socio-economic impact that rural tourism adds for a developing and even developing nations is enormous." [g] " the influence of dark and bright social capital, both beneficial and detrimental, to the advancement of rural innovation and complement the contention by Turner et al. (2017) that rural innovation networks require a balance between open and closed innovation networks."
Socio-culture	[h] Carson and Carson (2018)	[h] " great efforts were made to establish links with a few Sami-operated businesses in the region (e.g., reindeer herders, meat producers, cultural guides), because Sami culture was seen as an attractive aspect that could enhance tourism packages for international markets."
Entrepreneurial cultures	[i] Elena et al. (2015) [j] Elena (2017)	<ul> <li>[i] " the identification of the level of innovation within entrepreneurs in the region which constituted the location of the research as well as the identification of the relevant factors which can lead to the significant improvement of innovation."</li> <li>[j] "Following the development of descriptive model analyzing the factors which influence innovation in the development of rural entrepreneurship, it can be conclude that stimulating entrepreneurial activity may provide an alternative to economic development in rural areas."</li> </ul>

# Table 6. Rural innovation strategy

Strategy	Source	Article's statement
Upscaling	[a] Singh and	[a] " sharing of information and knowledge help in decision making to improve performance; integration of new
Knowledge	Bhaskar (2015)	ideas and knowledge help to give a better way to solve the problems; new skill help in better utilization of resources
	[b] Bonfiglo et	and new learning practice creates a comfort level with change."
	al. (2017)	[b] "In particular, knowledge transfer is a precondition of innovation as it creates partnerships and builds capacity. It
	[c] Yin et al.	is therefore a fundamental part of innovation processes and policies."
	(2019)	[c] " the collaboration between different agents becomes as important as knowledge itself."
	[d] Garcia et al.	[d] " an improvement of knowledge of cultural management practices and epidemiology of pests and diseases in
	(2020)	cocoa, results in a decrease of these problems and an average increase of 30% in cocoa yields."
Upscaling	[e] Kratzer &	[e] "The strengthening of local networks and the support for local actors remain a crucial task for an intermediary
Creation	Ammering	organization like Biosphere Reserves to create new development paths and economic opportunities."
	(2019)	[f] "The innovation process adapts and responds to the complex environment where it unfolds, fostering co-creation;
	[f] Lee at al.	engaging diverse perspectives; learning from and adapting to local and global contexts; defining processes; and
	(2020)	learning from implementation on an ongoing basis".
<b>Policy Support</b>	[g] Lyons et al.	[g] "In general, the obstacles faced by rural firms can be categorized in one of three ways: firm/owner characteristics,
	(2017)	historic policy/perception, and agglomeration effects."
	[h] Živojinović	[h] " networks are an important feature of each business but these are self-generated and maintained and there are
	et al. (2020)	few examples of support from policy programmes, formal innovation systems or the sponsored networks associated
	[i] Martindale	with them."
	(2021)	[i] "The cumulative effect of these large enterprise-based recreational agriculture parks on policy would suggest that
		this transformation of norms i.e., a system level change, is not only possible, but likely."
Inter-relation	[j] Nair et al. (2015)	[j] " the inter-relationships among the stakeholders highlighted in this theme issue are critical to the success of rural tourism development."
	[k] King et al.	[k] "Historical relationships had developed significant companion trust and created an overly embedded network in
	(2019)	which many participants deferred to established leaders, avoided conflict and/or openly challenging ideas."
	<ol> <li>Richardson-</li> </ol>	[1] " a key motive for using PV (participatory video) to develop the farmers' proposals was to create an inclusive
	Ngwenya et al.	space in which hierarchical relations between scientists and farmers and also between farmers in the group could be
	(2019)	disrupted and renegotiated."
TACIT	[m] King et al.	[m] " trust is a cohesive force, an enabler of knowledge exchange and also that an understanding of relational trust
(Trust, adapting,	(2019)	has much to offer researchers, advisors, policymakers and facilitators of innovation with respect to enabling both
changing,	[n] Lee at al.	social and technical processes."
integrating, and	(2020)	[n-1] "Innovation could be hindered by its high dependency on aspects such as infrequent technology and
technology-		infrastructure availability, as well as the joint commitment of stakeholders to work on innovation in rural areas as a
based)		way to ensure adaptive action through learning."
		[n-2] "Together with feedback integration, being aware of and acknowledging the changing environment, and
		adapting plans, events and activities, accordingly, are remaining challenges that still need to be unrevealed."

## DISCUSSION

Rural and urban innovation are very different in terms of stakeholders, ecosystem, and strategy. Rural innovation is still lagging behind urban innovation caused by various factors that exist in the system, as well as from the aspect of stakeholder limitations (Lyons et al., 2017) and ecosystem patterns (Gebremariam and Tesfaye, 2018). Besides, the formulation of strategies to create innovations still uses a conventional and limited approach, so it requires synergy in the rural area system itself. For example, the need for an integrated program in developing the strategic sector based on spatial conditions initiated by the collaboration of stakeholders such as the government and academia is helping rural entrepreneurial support in increasing local economic (Bonfiglo et al., 2017; Elena, 2017). Thus, the balance between needs in the ecosystem and stakeholder support can form an adaptive collaboration as illustrated in Figure 3.

Moreover, the ecosystems without the full support of key stakeholders that must be involved can also produce strategies towards innovation, but it is more because of the need to overcome physical constraints independently, later we called it as adaptive independent. However, the independent party initiating a strategy must have strong motivation and experience in dealing with the same problems that arise (Elena et al., 2015). In real case, with the complexity of the problems, adaptive independent often occurs due to various limitations of human resources, knowledge, and experience along with a centralized development system from the government which has an effect on a rural innovation strategy (Radulescu et al., 2014; Lyons et al., 2017; Matindale, 2021). On the other hand, because rural innovation tends to be conservative, both in terms of knowledge transfer (Yin et al., 2019) and process (Hjaltadottir et al., 2020), it is possible for disruption to occur before the strategy is fully planned and executed. As a result, the strategies that have been prepared may become obsolete and must be improved through collaboration between stakeholders. It is not always a negative outcome, because with the emergence of a problem, the environment will react and require the preparation of strategies in adaptive collaboration. For strategies that were previously prepared with an adaptive collaboration mechanism, they will evaluate and make more mature projections from the iteration process. Meanwhile, for the strategy composed by an independent adaptive mechanism, stakeholder involvement will be very helpful with a stronger carrying capacity in determine the mature strategy, especially if it involves the media as an additional agent of open innovation.

Therefore, adaptability is an important key in developing rural innovation toward identifying key stakeholder, ecosystem pattern, and determine its strategy. Regarding stakeholder indicator, Provenzano et al. (2016) explained that the parties involved in the evolution of the innovation process exist in a of academics. quadruple helix consisting business representatives, government, and the media. Academics have an important role in the discovery of innovation with the development of science and technology. By collaborating with academics, related parties can find solutions to problems that often arise in rural areas (Kratzer and Ammering, 2019). In addition, business representatives and government have an important role in the legality and commercialization process (King et al, 2019). Coupled with the media that can be agents of communication and open innovation (Provenzano et al., 2016; Richardson-Ngwenya, 2019). Moreover, to the quadruple helix, good resources in a rural area can also be part of stakeholders who play a role in rural innovation (Radulescu et al., 2014). It can be seen from the demographic composition which can also be influenced by the urbanization factor for the productive age population migration.

In most cases, innovation in rural areas is related to three sectors, including agriculture, tourism, and entrepreneurship. In agriculture, academics play a role in finding appropriate technologies that can improve agricultural productivity processes and supply-chain efficiency of these products (Garcia et al., 2020). Meanwhile, business representatives play more roles in the tourism and entrepreneurship sectors related to commercialization which are usually also related to the media (Nair et al., 2015; Elena, 2017). As a stimulus, the innovation process must receive the approval of the government with regulations made (Živojinović et al., 2020). However, everything will not be done well if the human resources in the rural area do not have sufficient quality. A clear example is the abundance of productive age will accelerate the process of rural innovation from the aspect of product digitalization and the use of media as an agent of open innovation (Radulescu et al., 2014; Provenzano et al., 2016). Thus, the gap in pursuing innovation between rural areas and urban areas can be narrowed by stakeholder involved. The second indicator that has an important role as well as the carrying capacity of rural innovation is the ecosystem. Ecosystems are generally related to geographic characteristics based on location (Matindale, 2021), abundance of natural resources (Provenzano et al., 2016), and regional conditions (Hjaltadottir et al., 2020). The location of an area will affect the supply-chain (Garcia et al., 2020) and mobility from/to rural areas (Lopez-Iglesias et al., 2018).



Figure 3. Rural Adaptability Model toward Stakeholder, Ecosystem, and Strategy (RAMSES)

In addition, unique natural resources are also very influential on rural innovation, for example the management of forest products (Živojinović, et al., 2020). In terms of geographical characteristics, physical constraints are also one of the unique ecosystems in rural innovation. The regional position of the continent and the economic conditions of a country will also have an impact on the ecosystem, one of which occurs in Ethiopia which is facing problems from agriculture innovation (Gebramariam and Tesfaye, 2018). From a more specific ecosystem point of view, socio-economic and socio-culture play a role in rural innovation based on the demographic, economic composition of the rural area, as well as the role of culture, cultural heritage, or heritage in a rural area. In people who have a high socio-economic and socio-cultural level, creativity and ideas tend to develop more quickly and give birth to an innovation, among most innovations in the form of the tourism sector (Carson and Carson, 2018). Furthermore, both can give birth to an entrepreneurial-culture that overlaps with demographics, motivations, and experiences to produce creativity and ideas that have commercial value in society (Elena et al., 2015). By identifying the stakeholders involved and the ecosystem pattern in the rural area, there are several alternative strategies that can be used and combined. The first alternative is related to human development in the form of upscaling knowledge and upscaling creation. Upscaling knowledge can be done in various ways including new learning, new skill development, knowledge education, and knowledge sharing/network (Yin et al., 2019; Bonfiglio et al., 2017). Meanwhile, upscaling creation can be done through value creation, co-creation, initiative, and benchmarking either by rural to rural or urban to rural (Kratzer and Ammering, 2019; Lee et al., 2020). By implementing both upscaling processes, it is expected to improve the quality of human resources as agents of stakeholders who can accelerate the rural innovation process. Stakeholder inter-relationships (Nair et al., 2015; King et al., 2019; Richardson-Ngwenya et al., 2019) also affect the smooth running of the rural innovation process along with policy support by the government (Živojinović et al., 2020) which is also part of the strategy. Even more complex, a TACIT strategy is needed related to trust (between stakeholders), adapting (always adapting to field conditions), changing (able to change positively in different environments), integrating (integrating agents, agents, and indicators). indicators), and technology-based (following the latest innovations with technology) (King et al., 2019; Hjaltadóttir et al., 2020; Lee et al., 2020; Liu et al., 2021). With a strategy that varies from the results of stakeholder and ecosystem reviews, it is hoped that it can be used as a medium of adaptability in pursuing an innovation in rural areas so that an idea that can be commercialized (rural innovation) is born as the conceptual framework proposed in this study.

## CONCLUSION

There are three important indicators in producing rural innovation, i.e., stakeholders, ecosystem, and strategy. Stakeholders and ecosystems play an important role in the rural innovation process so that it can produce an adaptive strategy. With collaboration, the three of them can form an adaptive collaboration mechanism as a holistic approach in rural innovation. On the other hand, not all cases in rural areas can achieve a holistic approach, there are some that use adaptive independent mechanisms by not involving main stakeholders and tend to experience problems in execution to produce rural innovation. To overcome obstacles in execution, the balancing process of identifying agents from the stakeholders involved and inviting collaboration can accelerate the rural innovation process. At least the collaboration mechanism is adaptable and does not take time to wait until there is a disruption from the latest innovations. Although this research uses a holistic approach, there are some limitations related to the mechanism and objectives of rural innovation to be achieved. Therefore, research related to rural innovation with more and richer literature sources will help find limitations that are not discussed in detail in this study.

### REFERENCES

- Bonfiglo, A. et al. (2017). Are rural regions prioritizing knowledge transfer and innovation? Evidence from Rural Development Policy expenditure across the EU space. Journal of Rural Studies 53 (2017), 78-87
- Carayannis, E.G., and Campbell, D.F.J. (2009). Mode 3 and Quadruple Helix: Toward a 21<sup>st</sup> century fractal innovation ecosystem. *International Journal of Technology Management, 46*(3/4), 201-234
- Carayannis, E.G., and Campbell, D.F.J. (2010). Triple Helix, Quadruple Helix and Quintuple Helix and how do knowledge, innovation and the environtment relate to each other? A proposed framework for a trans-diciplinary analysis of sustainable development and social ecology. *International Journal of Social Ecology and Sustainable Development*, 1(1), 41-69
- Carson D.A., and Carson D.B. (2018). International lifestyle immigrants and their contributions to rural tourism innovation: Experiences from Sweden's far north. *Journal of Rural Studies*, 64 (2018), 230-240
- Castree, N., Kitchin, R., Rogers, A., 2013. A Dictionary of Human Geography. In: Oxford Paperback Reference, first ed. Oxford Univ. Press, Oxford.
- Creswell, J. W. (2009). Research Design: Qualitative, Quantitative, and Mixed-Method Approaches – 3<sup>rd</sup> Ed. London: Sage Publication Inc. ISBN: 978-1-4129-6556-9
- Elena, H., Moica, S., and Dana, R. (2015). A predictive model of innovation in rural entrepreneurship. *Procedia Technology*, 19 (2015), 471 – 478
- Elena, H. (2017). Macroeconomic Analysis of the Competitive Factors which Influence Innovation in Rural Entrepreneurship. *Procedia Engineering 181*, 965-968
- Garcia, G.A.G., Isabel, G., Hector, E.H.N, Juan, C.S.S., and Fernando, C. (2020). Relevance of local knowledge in decision-making and rural innovation: A methodological proposal for leveraging participation of Colombian cocoa producers. *Journal of Rural Studies*, 75 (2020), 119–124
- Gebremariam, G., and Tesfaye, W. (2018). The heterogeneous effect of shocks on agricultural innovations adoption: Microeconometric evidence from rural Ethiopia. *Food Policy*, 74 (2018), 154–161
- Hjaltadottir, R.E., Teemu M., and Timo M. (2020). Interregional innovation cooperation and structural heterogeneity: Does being a rural, or border region, or both, make a difference? *Journal of Rural Studies*, *74*, 257–270
- Horte, S.A. *et al.* (2008). Product development in SMEs: A literature review. *International Journal Technology Intell. Plan. 2008, 4*, 299–325.
- Iqbal, M., and Suzianti, A. (2021). New Product Development Process Design for Small and Medium Enterprises: A Systematic Literature Review from the Perspective of Open Innovation. *Journal Open Innovation Technology Mark. Complex. 2021*, 7, 153.

- King, B., Simon, F., Karen B., Laurens K., and Ruth N. (2019). Navigating shades of social capital and trust to leverage opportunities for rural innovation. *Journal of Rural Studies*, 68 (2019), 123–134
- Kratzer, A., and Ammering, U. (2019). Rural innovations in biosphere reserves – A social network approach. *Journal of Rural Studies*, 71 (2019), 144–155
- Lee, S.Y., José M.D., and Pablo V. (2020). Enhancing Rural Innovation and Sustainability Through Impact Assessment: A Review of Methods and Tools. *Sustainability 2020, 12*, 6559
- Liu, P., Qi, S., Dongxuan, L., and Neil, R. (2021). Promoting agricultural innovation as a means of improving China's rural environment. *Journal of Environment Management* 280 11675.
- Lopez-Iglesias, E., David, P., and Jorge R. (2018). Mobility innovations for sustainability and cohesion of rural areas: A transport model and public investment analysis for Valdeorras (Galicia, Spain). *Journal of Cleaner Production*, 172 (2018), 3520-3534
- Lyons, T.S., Steven, R.M., and John, T.M. (2017). A New Role for Land Grant Universities in the Rural Innovation Ecosystem? *Journal of Regional Analysis and Policy*, 48(2), 32-47
- Martindale, L. (2021). From Land Consolidation and Food Safety to Taobao Villages and Alternative Food Networks: Four Components of China's Dynamic Agri-Rural Innovation System. *Journal of Rural Studies*, 82 (2021), 404–416
- Nair, V., Kashif, H., May, C.L., and Neethiahnanthan, A.R. (2015). Benchmarking innovations and new practices in rural tourism development - How do we develop a more

sustainable and responsible rural tourism in Asia? *Worldwide Hospitality and Tourism Themes Vol.* 7 No. 5, 2015, 530-534

- Provenzano, V., Massimo, A., and Maria, R.S. (2016). Innovation in the rural areas and the linkage with Quituple Helix Model. *Procedia - Social and Behavioral Sciences*, 223 (2016), 442 – 447
- Radulescu, E., Liviu, M., and Sorina, M. (2014). Innovations and opportunities for entrepreneurial rural developments. *Procedia Economics and Finance*, 15 (2014), 1495 – 1500
- Richardson-Ngwenya, P., Maria J.R., Raul F., and Brigitte, A.K. (2019). Participatory video proposals: A tool for empowering farmer groups in rural innovation processes? *Journal or Rural Studies, 69* (2019), 173-185.
- Saldana, J. (2009). *The Coding Manual for Qualitative Researchers*. London: Sage Publication Ltd.
- Singh, S. and Bhaskar, B. (2015). An Exploratory Study for Conceptualization of Rural Innovation in Indian Context. *Procedia - Social and Behavioral Sciences*, 207 (2015), 807 – 815
- Yin, X., Jin, C., and Jizhen, L. (2019). Rural innovation system: Revitalize the countryside for a sustainable development. *Journal of Rural Studies*
- Yuan, P., Zhao, X., and Zeng S. (2019). Extenics based Innovation of New Professional Farmer Cultivation under the Strategy of Rural Vitalization. *Procedia Computer Science*, 162 (2019), 131–138
- Živojinović, I, G. Weiss, M. Wilding, J.L.G. Wong, and A. Ludvig. (2020) Experiencing forest products – An innovation trend by rural entrepreneurs. *Land Use Policy* 94 104506.

\*\*\*\*\*\*