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Climate Change, Agricultural Resilience, and Rural Society Adaptation in the Era of Rapid Change

Indonesian Perspectives

Edited by
Fitrio ASHARDIONO

Asia-Japan Research Institute
Ritsumeikan University

AJI BOOKS

Climate Change, Agricultural Resilience, and Rural Society Adaptation in the Era of Rapid Change: Indonesian Perspectives

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Fitrio ASHARDIONO

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Note:
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Editor's Preface

As this growing number of human beings face a multitude of threats from climate change, pollution, viruses and other forms of serious problems, including each other as we compete for an ever shrinking piece of the pie, this small book intends to provide hope by giving an insight into the planning of future developments in agriculture and rural society in an environmentally friendly and economically sustainable way in the authors' homeland, Indonesia. It attempts to review the present conditions from a realistic perspective that does not conveniently forget to account for the future losses to agriculture incurred by pollution, overuse, and soil degradation while providing the means to address the social and economic losses to rural society as their talented sons and daughters are lured by lucrative employment prospects to the already overloaded urban areas.

Can such an ambitious plan succeed? It is up to us to draft an eloquent argument that can persuade those who refuse to see what is perfectly clear to the world's scientists, that the only way to ensure a stable, secure, and prosperous future for future generations is to make sure the human race progress together, and leaves no one behind.

Indonesia's advancement towards a sustainable future is still a work in progress, very much in the planning stages. As a humble first step I have called upon my colleagues in related fields to report on the present situation on the ground, and explain the latest developments in their respective fields.

In the first chapter Dr. Iqra Anugrah, a specialist agrarian politics, gives his report on solidarity practices in rural and fishing communities across Indonesia. In the Chapter 2, I lay out my proposals for strengthening the resilience of rural agricultural societies. In Chapter 3, Dr. Corinthias P. M. Sianipar introduces the issues, challenges and

opportunities provided by advances in Smart Farming, and in Chapter 4, AR. Rohman Taufiq Hidayat shows how spatial planning for rural development can provide holistic and sustainable solutions for rural societies. In the concluding chapter, I give a summary of a discussion among my coauthors after sharing their research, and I will draw from each contributor and try to see how we can collaborate to better achieve our goal.

It is my sincere hope that through the insights of these young specialists, we can work together to guide an increasingly prosperous Indonesian nation towards a bright future. Due to its diversity of pioneering endeavors, it is our hope that this will provide a model for ensuring sustainable growth in the Asian region.

Fitrio Ashardiono

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Chapter 1
Solidarity Economy Practices in Rural and Fishing Communities Across Indonesia

Iqra ANUGRAH

1. Introduction

Agrarian politics, agrarian studies, issues concerning politics and development in rural societies in Southeast Asia, particularly Indonesia, have been the focus of my research for the last two years, and this chapter presents my preliminary thoughts on a project to extend this research focusing on solidarity economy practices.

Why is it important to look at the politics and economy of agriculture? Because of its resurging or continuing importance in our world today. This topic was very popular in the 1960s and 1970s in the post-colonial context, when so many countries in the global south-eastern region gained their independence and had to deal with issues of rural development, but it is still important today, even in developed countries, where much of the support for conservative parties such as the LDP in Japan, and the Republican party in the USA comes from rural areas or de-industrialized areas. It is obviously important in countries such as India, which recently saw a series of mass protests, as well as Indonesia, where agrarian issues have been prominent in political and cultural discourses in the last couple of decades. The ongoing issues arising from the reshaping of rural areas are the main reasons why this topic remains important for us today.

In this project, we will look at how ‘smallholders’, which is just a generic term for peasants and fisherfolk, respond to agrarian change; or how they react to the expansion and deepening of market relations and

forces in rural areas in contemporary Indonesia. In particular, in this project, we will look at the connection between society and the market, focusing mostly on local responses to agrarian change, primarily during the post-authoritarian period, from 1998 onwards.

Scholarship on agrarian studies as well as Indonesian society and development has primarily focused upon agrarian conflicts such as land conflicts, or political actions by farmers and rural activists against land grabbing and resource dispossession. However, one type of response that is often overlooked is economic resistance, and alternatives to market rule. This economic response is also known as Solidarity Economy, which means correctives and alternatives to market capitalism.

This ideologically is mostly inspired by populist and sometimes left-leaning ideas, and there are some examples of these practices such as the self-sufficient, communally oriented Marinaleda village in Spain, the community housing projects of urban squatters and landless peasants in Brazil, and the welfare state or social democracy experiments in the state of Kerala in India. These are some examples of solidarity economies that already exist in different parts of the world.

This project is an attempt to shift our attention away from the obsession with open agrarian conflicts and political actions by farmers, fisherfolk, and proactivists, and look at other types of activities and activism, especially in econometric areas. This area has been under studied, and in particular few studies have looked at Solidarity Economy experiments among fishing communities. In this author's opinion, a more comprehensive view of proceeding economic experiments in Indonesia is long overdue.

To put changes in rural politics and economy in Indonesia into context, the current features of Indonesian rural society and development are more or less the byproducts of the mode of governance and development under the previous authoritarian regime, which lasted

for three decades from the 1960s until the late 1990s. Then in the late 1970s to 1980s we saw the expansion of state backed large scale plantations and land grabs that engendered opposition to this expansion of investment and capital into rural areas, leading to a new wave of protests by activists as well as peasant communities campaigning for land rights and against eviction. This was exacerbated in the 1980s by the liberalization of the economy, including the land market in rural areas. This period of economic liberalization also coincided with political liberalization. So, even though the region was under authoritarian control, they were relaxing some rules and political spaces and this paved the way for a new wave of peasant activism. Then through the 1990s, and with the democratization of the country in 1998, we have seen a more vibrant wave of activism by peasants and fisherfolk as well as by rural activists.

At the same time, there was an intensification of market expansion in rural areas, which led in the early 2000s to the rise of peasant unions protesting land-titling legalization without land reform. This prompted several activists and communities to shift their attention to expanding the focus of their operations by not only looking at politics and cultural resistance, but also looking at the economy. They started to ask what sort of alternative economic arrangements and experiments they could undertake to challenge market expansion? According to several activists whom this author talked to this is a quite recent strategy which started in 2010, although some of the practices behind this can be traced back all the way to the 1970s or 1980s. However, in the context of recent developments, this is a pretty recent experiment.

2. Field Findings

In this section I would like to share some illuminating case

studies from my fieldwork that showcase these Solidarity Economy experiments. According to my observation so far, these experiments of can be broadly defined into more or less five types. The first is organic or natural farming. The second is producer cooperatives. The third is community enterprises or community businesses. The fourth is credit unions, and the fifth is social institutions such as community run schools and adult education programs. This is based on my past three years of in-country fieldwork, from 2015 to 2017 and 2018 to 2019 as well as ongoing conversations with my interlocutors in the field. I cannot go back to Indonesia yet, but I still maintain communications with my friends and dialogue partners in the field. These experiments are both productive and socially reproductive. Socially reproductive refers to activities that are not directly related to agricultural or economic production activities, but are nonetheless still important to support the economy, such as education.

Currently, there are a number of similar experiments in various parts of Indonesia but to illustrate the ongoing progress being made in empowering local communities in Indonesia, we will take a few examples to help deepen our understanding and generate future discussion.

1. Organic Farming

Figure 1. Natural/Organic Farming in Salassae Village
Source: Author

Several peasant unions and community organizers see organic or natural farming as an alternative to corporate-dependent mainstream agriculture. For instance, the Indonesian Peasant Union (SPI) promotes organic farming as a way to improve the autonomy of smallholders while still participating in the market economy (Edwards, 2013). In Bulukumba District, South Sulawesi Province, an organization called the Salassae Rural Self-Governing Community (KSPS) encourages local peasants to adopt organic farming to lessen their dependence on big fertilizer companies and increase their political awareness. The idea is to produce high quality agricultural products and challenge the market by reducing the dependence of farmers on middlemen and finding a niche market that they can sell their products to.

Advocates of this practice prefer to call this natural farming or *pertanian alami*, in Indonesian language, because according to them, organic farming is being corporatized and already big companies have appropriated the term. So they prefer to use the term 'natural farming'. The logic behind this is basically to lessen dependence on big fertilizer and agricultural companies through organic farming.

2. Producer Cooperatives

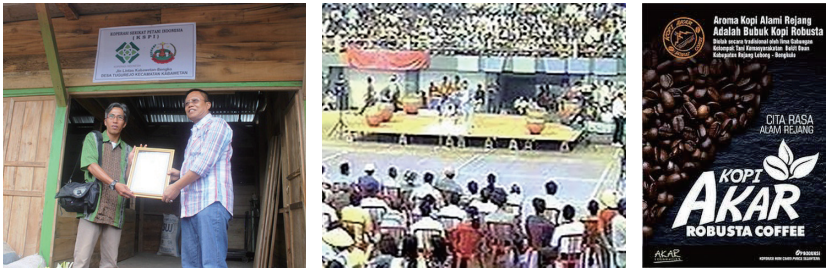

Figure 2. Producer Cooperatives in Bengkulu
Source: Author

Producer cooperatives are another example of a solidarity economy that is growing in popularity across Indonesia, and this is a research focus that the editor of this volume, Fitrio Ashardiono has also been working on. These cooperatives are common in both fishing and farming communities, and some of them have emerged out of years of struggle for land rights in different parts of Indonesia in areas where land conflicts happened. In some places where corporations and state authorities illegally or forcefully took away land from the local communities, they fought back and managed to win back some of their land in the post-authoritarian period.

Producer cooperatives are typically formed as an economic organization of smallholders. These cooperatives aim to maintain production rates, democratically control production activities, and keep socio-economic inequality among smallholders in check. The results of this endeavor vary across contexts. In Bengkulu Province, some peasant unions, such as SPI and the Bengkulu Peasant Union (STaB) have been struggling to maintain both the production and organizational activities of their cooperatives. Others, such as Muara Baimbai Cooperative fishing community in Serdang Bedagai District, North Sumatra Province, have been more successful in maintaining their production activities and selling their products to the market (Anugrah, 2019).

The underlying concept can be expressed as: "We need to maintain this land. We need to control our production activities so that our land will not be taken away again, so that we don't have to depend on big companies, so that we will not have to sell our land because we have no money. The best thing we can do is to combine our resources and develop a community-based business." As a result, these communities have established cooperatives in a number of different agricultural sectors such as coffee and rubber.

Some are more successful and others are struggling. In a number of unions, for example, the Indonesian Peasant Union, and Bengkulu Peasant Union, it's been pretty hard for them to sustainably establish these cooperatives due to a variety of reasons. However, in some other communities such as the coffee growers in Rejang Lebong district in Bengkulu, they have been successful in establishing and running their own cooperatives as well as branding and selling their products, at least for the local market.

3. Community Enterprises

Another example of solidarity economy in Indonesia is the community enterprise or community business. A few of the most successful producer cooperatives have managed to expand their cooperative production activities and build successful businesses. Over the years, members of Muara Baimbai Cooperative and the local fishing community have expanded their livelihood beyond fishing activities to successfully running a community-based ecotourism business. After obtaining their initial capital from a business contest organized by the British Council in Jakarta, they managed to turn their local initiative into a profitable enterprise.

Figure 3. Ecotourism Business run by Fishermen in Serdang
Source: Author

In my research, I am focusing on a cooperative of fishermen in Serdang Bedagai district in North Sumatra province. These fishermen operate their own beach business, so they manage their own beach, and mangrove forests and run their tourism business. Obviously, this is a product of years of struggle for fishermen's rights and years of improving their capacity, so that they are able to manage a fairly large business. It has been running for four years, and it's been quite profitable.

4. Credit Unions

Figure 4. Pawartaku Smallholders Credit Union
Source: Author

Other than community cooperatives and enterprises, a number of local communities and peasant organizations have formed credit unions or people's banks, as alternatives to big banks.

One of the successful examples is Pawartaku Credit Union (CUG Pawartaku), established by the Aryo Blitar Peasant Association (PPAB) in Blitar District, East Java Province. PPAB founded the credit union to lessen the dependence of their members on conventional big banks and to prevent

the selling of land to those banks by providing cheaper, more accessible loans managed by their own members. The result has been remarkable. Now, CUG Pawartaku has a total asset of 3.8 billion IDR, with 70 percent of it (2.4 billion IDR) circulating among its members as loans (Hasani, 2019).

Another example is the credit union in Blitar district in East Jaffa, a farmers-run or peasant-run credit union which is basically a people's bank. This is a community bank and this is not the same as the big banks that we currently use in the world today. This credit union was formed by a peasant union in Blitar, and this particular peasant union managed to win back their land, which had been illegally grabbed. They won back their land and as a way to maintain their presence, they have built corporate cooperatives and a credit union. This has been growing pretty well, and they have amassed total assets of 3.8 billion Indonesian Rupiah of which roughly around 70% is still circulating as loans among its members, which means these loans are used for productive household activities, from education, as well as growing their businesses.

5. Social Institutions

Figure 5. Community-run Vocational Highschool
Source: Author

Last but not least, several communities have successfully created and managed their own social institutions, such as schools and adult education programs. I witnessed this on my visit to Garut District in West Java Province, one of the strongholds of the Sundanese Peasant Union (SPP). In this district, SPP has been able to run their own school system with elementary, middle, and vocational high schools. SPP has also managed to send the children of their members to local universities, who will then take up community organizing and leadership activities in the union.

So basically this peasant Union and its members have been able to build these schools and run them for a number of years. They have an elementary school, and a middle school, as well as a vocational high school. And they also manage to send the kids of these union members of these peasant families into local universities. And once they graduate, they go back to their communities and work as community organizers or as teachers at the schools.

3. Conclusion

To conclude, I would like to share some concluding remarks and further notes for future research and discussion. The first challenge is: How do we scale up these experiments? How do we turn them into another Marinaleda or Kerala, for example? And how do we make them sustainable? There are two variables that I think are important. First, a major challenge for advocates and practitioners of these alternatives is to scale-up their operations beyond their respective localities. Secondly and relatedly, the expansion of these activities necessitates state support and technical expertise.

The second challenge is just as important. How do the practitioners

of a solidarity economy experiment address the complexities of today's rural political economy in Indonesia? They're facing the challenge of an aging rural population, a more urban-oriented rural youth, and the increasing importance of non-farming and non-fishing income and activities for rural households. These are issues that the practitioners as well as scholars should take into consideration in the future.

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Chapter 2
Strengthening the Resilience of Rural Agricultural Societies in Indonesia: Agroecology with a Terroir Approach

Fitrio ASHARDIONO

1. Current Agriculture Outlook

We live in a world where success is measured by profitability in the short term, and long-term losses are rarely factored into the decision-making equation. Over the years this has inevitably led to the widespread adoption of monoculture in agricultural cultivation, where vast tracks of land are devoted to the production of a single crop. Agricultural scientists have been warning us that this will be more than likely to cause soil degradation and fertility loss. Years later we are reaping the harvest of spreading monoculture, which has created an imbalance between fertilizer supply and crop offtake, thus leading to soil erosion and further loss of nutrients. In addition to overproduction, industrial monoculture predisposes farms to pest problems. To keep up with intensified production, farmers have increased pesticide and fertilizer usage, but these may run off into the waterways causing further damage to neighboring ecosystems. Additionally, with heavily mechanized cultivation, almost all the energy consumption throughout every stage of the agricultural production releases greenhouse gases which further contribute to global warming. Today, the environmental issues that commonly arise due to intensified agricultural production can be observed in water and air pollution, biodiversity loss, and land

degradation. Until recently, farmers have ignored the downsides and agricultural production has continued to be optimized for generating profit, but in the light of the scientists' warnings, and growing public awareness, the farming industry is now coming under pressure to meet the environmental targets set to protect future generations from extinction.

In modern monoculture cultivation, high-input/high-output is always geared for profitability, and more often than not a holistic understanding of plants or animals achieving an optimum response to inputs is not adequately explored. When the environment is always treated as secondary, the loss of environmental resources is unlikely to be included in the costs when calculating the profitability of the agricultural industry.

It is time to change this paradigm into a more sustainable agricultural production process, to put a price on these environmental burdens and properly evaluate the resources taken from the ecosystem services and how these directly affect the whole cultivation process. In other words, to make agricultural production sustainable it is a necessary factor in the economic value of the environmental burdens and the resources from ecosystem services.

2. Agroecology and Terroir

In pursuit of sustainable agriculture production, a new approach in agricultural practice known as agroecology has been introduced, and furthermore in my research I have found another methodology which is the Terroir Approach.

As generally observed, when economists who are not agriculturalists perform cost-benefit analysis, they generally refer to the costs that do not appear in the calculations as indirect or external. These costs

can include environmental burdens, consumption of local ecological resources, as well as the valuation of existing ecosystem services. They are not factored into their calculations.

So, one of the approaches to address environmental and sustainability issues in agricultural production is to address the social and economic aspects in a holistic and systemic manner.

This includes understanding the organization, communication, and coordination among stakeholders in agriculture production as well as analyzing the farmer consumer relationship and how they affect each other.

Agroecology researchers in this field are trying to solve these questions by employing scientific methods and implementing ecological principles when designing agriculture management systems. It is no longer just about cost-benefit analysis, but more about how agriculture can benefit from the local ecological system and at the same time, how the agriculture production can give back and help balance the ecological system, thus ensuring the sustainability of the ecosystem procedures.

And building on agroecology, it is also very important to highlight the importance of the interconnected nature of local stakeholder relationships in landscape identity and territorial resources which are embedded in the local or regional food systems, and in this case, there's another landscape identity which is a territorial resource. These things are very much located locally, like the real food system, and so on.

The agroecology territories discuss three major domains (Wezel et al., 2016):

1. Adaptation of agricultural practices.
2. Conservation of biodiversity and natural resources all
3. Development of food systems embedded in the territories.

All of these three items refer to a much smaller area of local life. Building on this, it is clear that agroecology is always aiming at a smaller local space. So, in this case, it's heavily related to the concept of Terroir.

Derived from the wine industry the concept of Terroir describes the relationship between the character of an agricultural product and its geographical origin (van Leeuwen & Seguin, 2006). Human factors such as history, socioeconomics, as well as viticultural and or oenological techniques are also part of Terroir (Seguin, 1986).

The Terroir concept is linked to the unique biophysical properties of a particular area which contributes to the agricultural products (Berard and Marchenay, 2006); thus it can be argued that the special quality of an agricultural product is determined by the character of the place the product comes from (Gade, 2004).

Put simply, Terroir explains about the relationship between the local natural environment and ecosystem characteristics and the local agriculture knowledge and practices where these two are directly influencing the characteristics of an agricultural product (Ashardiono, 2019).

The diagram depicting the framework of the terroir concept shows how all aspects are interconnected, and how they affect each other. Any particular agricultural product is affected by two main elements, which are the environmental ecosystem, and then the inherent agriculture knowledge and practices in that local area.

Figure 1. The Framework of Terroir Concept
Source: (Ashardiono, 2019)

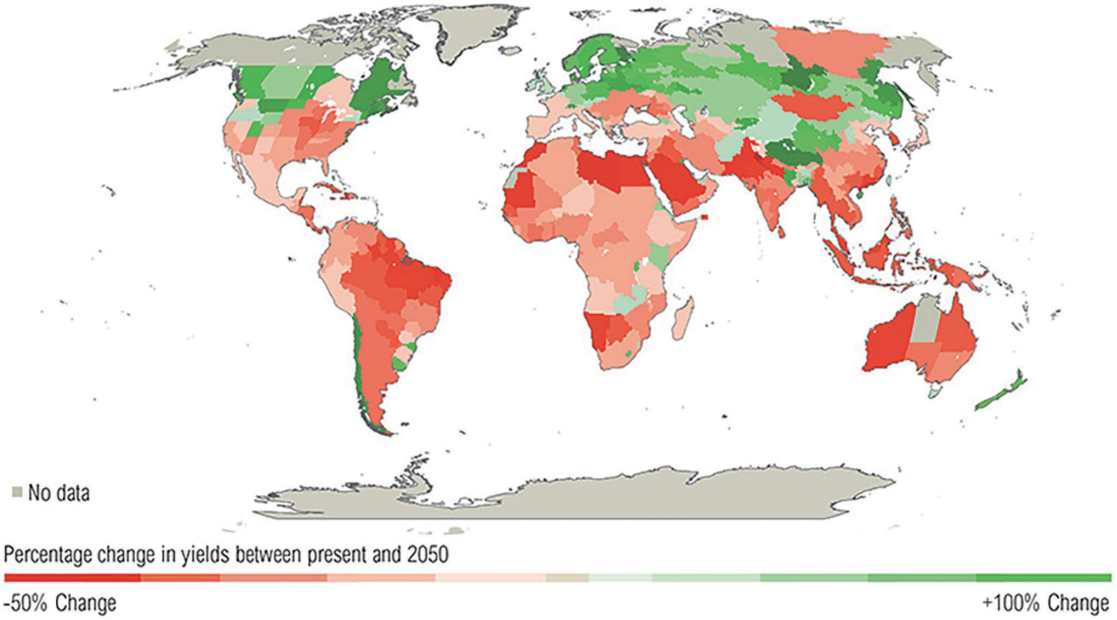

Figure 2. Projected Impact on Crop Yields due to Climate Change between Present and 2050 (3oC Warmer World)
Source: World Bank (2010) in World Resource Institute (2013)

3. Changing Southeast Asia: Indonesian Coffee Cultivation

In this era of climate change the tropical regions are among the most vulnerable. The temperature variability is predicted to increase, and so is the tendency of increasing local temperatures. (Bathiany et al., 2018). Other research has also found that there a is significant increase in the variability of precipitation patterns and increasing occurrences of severe weather events as well as temperature increases (ADB, 2010). The map highlighting temperatures in temperate and tropical regions shows that Indonesia is going to be heavily impacted in the near future.

Coffee cultivation in Indonesia began during the Dutch colonial period in the 17th century. From 2018 up until now, Indonesia is still the fourth largest coffee producer in the world with the combined production of both Arabica and Robusta beans totaling 612,000 tonnes. In the past years, this volume of production has largely been stagnant. But inside this total, the production of Arabica beans has been slowly increasing, as there has been a gradual switch among the growers from Robusta to the higher quality Arabica variety.

Historically, extreme weather events have been occurring in this region, and while they had significant impacts the farmers were able to recover. The current argument is that due to the steady increase in global environmental changes, this might not be so anymore, because the changes will become much more irreversible (Tucker et al., 2010). This changing climatic behavior means that coffee cultivation might no longer be beneficial (Gay et al., 2006).

Moreover, increasing climatic variability such as sudden changes in precipitation patterns and their volumes will directly affect the coffee production quantity (Schroth et al., 2009; Jaramillo et al., 2013), thus bringing negative impacts on crop production yields, forest harvest,

and biodiversity. Furthermore, under the current COVID-19 pandemic agricultural communities are facing more economic pressures, and with the economic downturn, there is less demand for coffee products internationally (ICO, 2020). Even Starbucks is losing customers, and fewer people buying coffee means that fewer beans are being sold. At the same time, Indonesia and Vietnam, two of the biggest producers, are still actively producing coffee, which is contributing to further imbalance in the supply and demand (ICO, 2020), so there's going to be more impact on the economic side.

4. Coffee Cultivation in Solok Region


Figure 3. Arabica Coffee
Source: Author

How about the conditions in the coffee growing regions themselves? I'm going to explain one of my case studies, which is in the Solok region located in West Sumatra, Indonesia, which is famous for good coffees.

Some of the most well-known coffee products in Indonesia are produced on the island of Sumatra. I'd say that Aceh Gayo, Mandheling, Lintong and Solok are the four best coffees from the region, and the Arabica beans produced in these regions are regarded as high-quality coffees which have a distinct aroma and taste characteristic. In the past years, the popularity of Solok coffee in the domestic market as well as the demand from the international market has risen significantly. Solok is a kind of rising star, not yet widely known, but among coffee connoisseurs, it is known already.

The Solok region consists of three separate administrative areas which are Solok Municipality, Solok Regency and South Solok Regency.

The Arabica coffee varieties are mostly grown in Solok Regency and South Solok Regency.

In general this region is well known for its production of rice which has always been the main agricultural commodity, whereas coffee production is relatively quite low compared to other commodities.

Historical evidence shows that in this region coffee cultivation started in the early 18th century and most of the coffee, especially the Arabica variety is grown in areas with an elevation above 1,500 meters

While the Arabica variety was originally cultivated, it was wiped out by coffee rust disease in the late 18th century. At that time they switched to Robusta, which as its name implies, is less vulnerable to pest and climate issues. So production of the Arabica variety is comparatively low compared with other well-known coffee producing regions in Sumatra, but lately, they are trying to switch back to Arabica. Based on 2019 statistical data, the 2018 total coffee production in the Solok Region was 4,656.11 tons, and from this total the production of Arabica variety was 1,010.47 tons (21.7%) and the production of Robusta variety was 3,645.64 tons (78.3%).

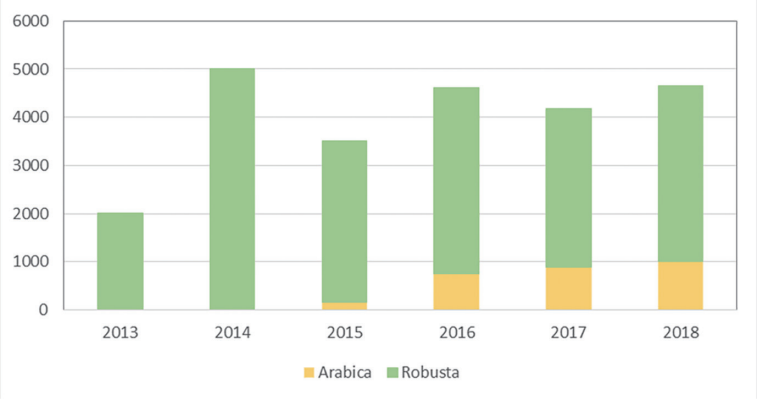

Figure 4. Total Coffee Production in Solok Region (tonnes)
Source: Statistics of West Sumatra, 2019

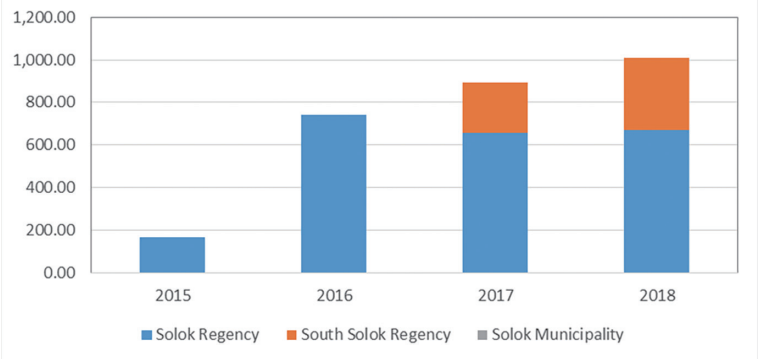

Figure 5. Production of Arabica Variety in Solok Region (tonnes)
Source: Statistics of West Sumatra, 2019

As seen in the previous graph, the production of the Arabica varieties is increasing, albeit slowly, and most of the production is in the Solok Region.

5. Farmers' Community in Solok Region

Now I would like to discuss the farmers' community. In the previous chapter, Dr. Iqra Anugrah has already mentioned about cooperatives, and one of my research subjects is a cooperative.

With the increasing domestic demand for Arabica coffee in the past few years the Solok Radjo Farmers' Cooperative was established in 2012 to address issues surrounding the coffee production system. The cooperative consists of coffee farmers, agricultural field advisors, coffee traders, and coffee enthusiasts. It operates as a post-harvesting processing center, purchasing coffee cherries from the farmers and marketing the processed green beans. Normally, they purchase and process the coffee cherries, and sell the processed beans to a myriad of buyers.

Currently, the total number of farmers who are members of the cooperative is around 800 whereas the members who have actively contributed to the coffee production system are only 23 farmers. Presently, there is relatively low interest from the farmers and the board members of the cooperative to change from cultivating Robusta to the Arabica variety.

Figure 6. Solok Radjo Farming Cooperative
Source: Author

One of the reasons is because they are dependent on the economic benefits, and switching to Arabica means they will have to use much more of their precious time in cultivation. I saw from direct observation that the farmers have mostly been caring for plantations on the same land for generations. They inherited knowledge about the local climate and the local soil from their predecessors. The farmers mostly focused their daily work on cash crops such as shallot, tomato, and potato, while work on the coffee plantation was only conducted a few times a week. In several coffee plantations, the farmers intercropped the coffee plants with other crops such as sweet potato and chili pepper, as well as passion fruit.

Based on direct interviews with the farmers (n=5), there are several reasons why the farmers have a low interest in increasing coffee production:

1. Reluctance to make coffee as their primary crop (n=5).
2. Preference to cultivate multiple different crops (traditional agriculture knowledge and subsistence agriculture) (n=3).
3. More work and resources are needed to cultivate Arabica variety (n=5).

4. Despite the increased popularity of Solok Coffee, most farmers have not enjoyed any direct benefits from coffee production (n=4).
5. Low sales value of coffee cherry (n=4).
6. Lack of agricultural assistance from the local government (n=5).

Figure 7. Solok Radjo Coffee Laboratory
Source: Author

So, they tend to just plant it and they leave it as it is which actually led to one of the interesting findings that I made. Most of the farmers think that climate change is not very important; it is there but they don't think that it is crucial to take any action immediately. The farmers are aware, but they are confident that things will be okay. However, the non-farming producers from the cooperative that processes the coffee beans think that it might be worrying in the future. So there are some disparities in information here.

The members of the cooperative perceived three climate change impacts as threats.

1. Extreme wind gusts
2. Longer drought season.
3. Changes in intensity and period of rainfall.

While the farmers (n=5) are aware of the climate change impacts on the coffee cultivation, they are confident that the coffee plants can survive drought and less worried about gust damages and precipitation changes.

On the other hand, the non-farming members (n=3) expressed their

worries as the incidences of coffee cherry damage from the coffee borer beetle have been increasing, due to the increasing climatic variability. Also, from the latest information obtained, due to the impact of COVID-19, there is a significant drop in the sales price.

6. Towards a Sustainable Coffee Production System

The discussion up to now can be summarized as follows:

1. Coffee products from the Solok Region are perceived to have special quality characteristics by coffee experts and coffee connoisseurs.
2. The farmers have been cultivating coffee for several generations.
3. Coffee cultivation is intercropped with other crops (sweet potato, passion fruit, chili pepper, etc.).
4. Post-harvest processing is mainly conducted by a farmers' cooperative.
5. Changing climatic conditions are already observable, although the impact is still thought to be negligible by the farmers.
6. The farmers have not received significant economic benefits.
7. COVID-19 brought significant changes in the domestic market demand.

There are many issues as we can see. The economics and social issues are somehow interconnected, and climatic issues are quite complicated. How can we approach all of these issues? I argue that it is really important to understand the relationship between the existing agricultural knowledge and the local environmental ecosystem. This will be the key to developing a new, more robust, localized approach, and understanding the special characteristics of the coffee products.

Instead of going for a more mass production process, it is more

important to focus on producing quality products, and together with that, by projecting the future climatic conditions we can also understand how this will impact the quality of the coffee itself.

There are many studies that need to be conducted such as the identification of important factors in the local environmental ecosystem through monitoring and measurement of the Terroir factors, leading to the development of local bioclimatic indicators, and this might be related to Dr. Sianipar's research in the following chapter. Then we need to make an analysis of the local cultivation methods through observation of the cultivation processes as well as conducting focus group discussions among the farmers, to learn how the local knowledge is being inherited, how it's transferred, and how it affects the production process.

Factors with a direct influence such as local identity and place attachment, which is also related to the research of Taufiq Hidayat described in Chapter 4, also need to be clarified, especially in relation to how it changes the timing and types of cultivation process selected by the farmers. From the social survey and observation, it was also observed how the coffee farmers are highly dependent on coffee processors, and thus vulnerable to price variability.

By complementing their local agricultural knowledge with the bioclimatic indicators, farmers will be able to predict the level of productivity as well as further enhance the quality and characteristics of their agricultural products. The values of bioclimatic indicators will be a critical source of information regarding the local ecosystem services and real by biophysical condition of the plants. Bioclimatic indicators will help farmers to conduct effective and optimal cultivation processes as well as swiftly adapt to the climate changes while ensuring the sustainability of coffee cultivation in their region.

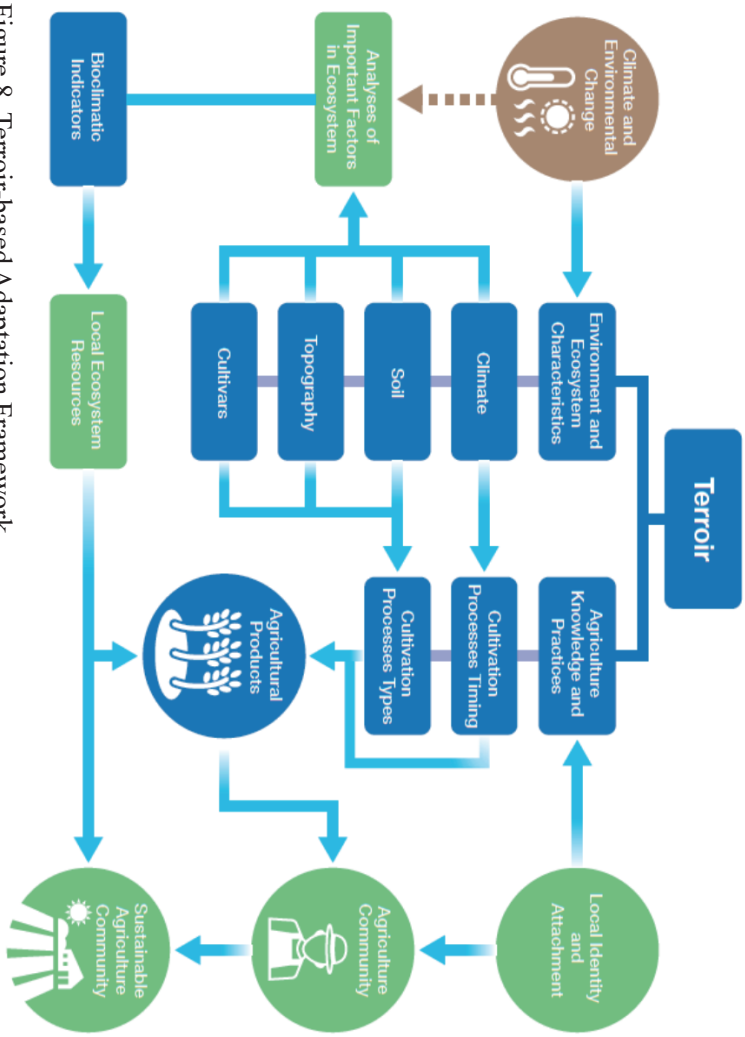

Figure 8. Terroir-based Adaptation Framework
Source: (Ashardiono, 2019)

It is hoped that this will help the farmers to understand more about the reality of the local climate and soil, as with ongoing climate change actually happening, things are becoming more and more unpredictable. Under these circumstances, the farmers' own intuition might no longer be enough to avoid the destruction of their crops. Hopefully with this information, then also the farmers should be able to safely adapt to the ongoing change and make their cultivation processes more sustainable.

So, to sum up, the Terroir-based adaptation framework can be utilized to characterize the environmental potentials of a region, which are strongly linked with the qualitative potential and characteristics of the agricultural products.

This framework will be the basis for evaluating the quality of agriculture products leading to the classification and categorization of products and delineation of terroir boundaries in this case, such as the application for GI, (geographical indications). In this diagram, you can see how the terroir, if it is being used properly, can help with the farmer and consumers' direct relationship.

It's very important to use this framework as there are lots of interrelated aspects that can be improved throughout the whole production system. Research to date has noted the following benefits of adopting this framework:

1. Optimal and effective use of ecosystem resources
2. product traceability,
3. Direct consumer relationship with farmers
4. increase in product values recognition,
5. economic benefit to the rural community
6. increased community awareness of climate change.

In conclusion, I would like to highlight the following point which is almost the same as was made by Dr. Iqra Anugrah. In order to sustain the local economies, and especially for the survival of the smallholders themselves, it is very important for the local government and agriculture

institutions to be involved on the ground and for them to provide comprehensive support to the coffee farmers in the post-harvesting period, as well as recognizing the importance of ecosystem services and the terroir characteristics of the local agriculture production.

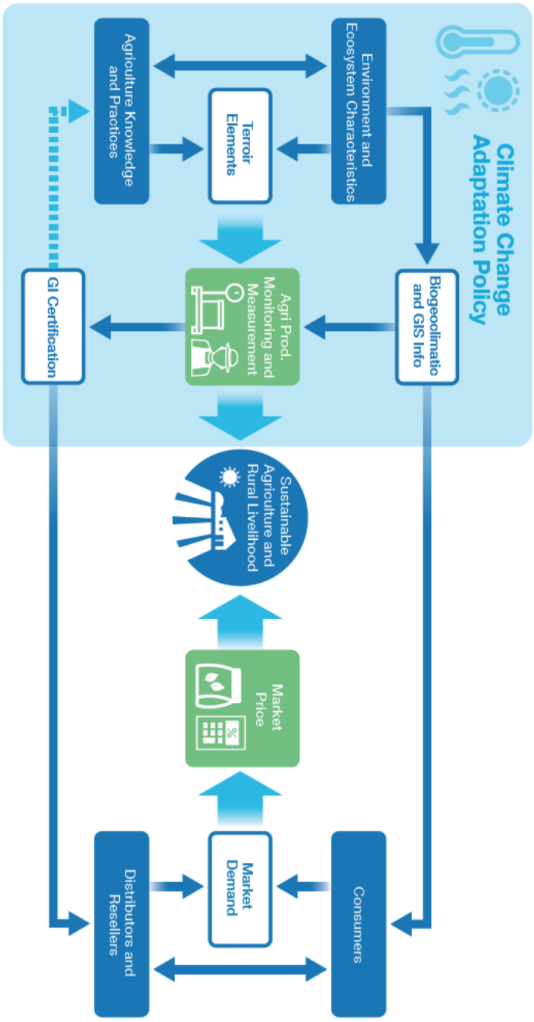

Figure 9. Terroir-based Adaptation Framework as a Comprehensive Agricultural Policy
Source: (Ashardiono, 2019)

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Chapter 3
Towards Smart Farming in Indonesia: Issues, Challenges, and Opportunities

Corinthias P. M. SIANIPAR

1. Introduction

In this chapter, I would like to share with you some ideas about Smart Farming issues. Like all researchers at present, our work at the Faculty of Agricultural Research in Kyoto has been hindered by the COVID 19 pandemic, especially in relation to our fieldwork, and we are presently seeking ways to conduct smart farming research in Indonesia remotely.

I would like to discuss the issues, challenges and opportunities to work on smarter farming in developing countries, not only Indonesia, but in rural areas in developing countries to be exact. This report is founded on quite a wide interdisciplinary background from engineering, industrial management, and also factory-based manufacturing, holistically from the perspective of a system modeler.

In my research work I take care of all the factors that are related to the focus objective and try to solve related problems dynamically as a whole.

2. General Background

First, I would like to highlight the fragile nature of humankind. We know climate change, rising global population or widening inequality especially economic equality, and recently the global pandemic has

brought concern about the fragile future of humankind.

Thus, our fragile future is dependent on all those compounded issues that worsen each other, and are expected to worsen our supporting system also. It's not only about the task of dealing with what is in front of our eyes, but also about what effort we need to make to sustain our future.

Among critical concerns about our future at the local, regional and global level, one of them is food security. Food security, including agriculture as its foundation has become a major issue all over the world. When we talk about climate change, rising global population, widening inequality and global pandemics, the root problem of everything is food security. If we cannot eat, how do we work? How do we move? How do we think? And if we talk about food security, then we talk about agriculture as its foundation. And when we talk about agriculture, we mostly talk about rural areas, because rural areas are the place or the location in which most agricultural activities are conducted.

However, rural areas are experiencing numerous critical sustainability issues. The primary issue is rapid urbanization and the next is the recent trends concerning the shifting interests of the younger generation. In the past, the younger generation in rural areas was expected to carry on doing farming activities. Dr. Iqra Anugrah in his chapter mentioned how they should make a kind of solidarity economy, but then the younger generation's interest is shifting from agriculture to non-primary industries, and this will also lead to further urbanization. This could be physical urbanization, or just conceptual urbanization. That is, they still stay in rural areas, but their minds, their work, and activities are all focused in urban areas. So, they only stay physically in the countryside, but everything they do is for the sake of urban areas.

Another important issue is the aging and declining of rural populations, not only due to urbanization, but also because the average

age, which is higher in rural areas, is compounded by rapid urbanization, and the movement of younger people to the cities. The resulting average age in rural areas will be much higher, and so the population will eventually decrease. It has happened in developed countries already, but we also expect it to happen in developing countries in the near future.

We know that currently almost half of the global population already lives in the worlds large cities and in the next few decades, we expect that to increase to 70% or 80%. However, when we talk about food security, we are largely talking about rural areas. So, how do we feed all those billions of people? If we leave the rural areas and rural agriculture to somehow run themselves that will not be sustainable.

We know that this is inevitable, but we still keep pursuing urbanization and city development. There is nothing wrong with it, but when we do this development we leave rural areas behind, which means that we are cutting the very foundation of city sustainability in the future, which is food security.

So, especially in less developed economies like Indonesia, we expect stronger challenges compared to rural areas in developed economies. This is due to the fact that compared to developing countries, we have a lack of resources and limited knowledge that will compound each other and produce less sustainability, or we could say a weaker foundation for a sustainable future, because of the lack of resources and limited tolerance.

These are the basic facts that we have to deal with and in fact, in developed countries the younger generation accounts for the largest proportion of the population, because life expectancy is much higher than in developing countries. However, the birthrate in developing countries is much higher than in developed countries and because the large corporations employ the younger generations, and they have been shifting their interest to non-primary industries, so we have a much

bigger problem than ever.

So we have a workforce, but that workforce does not want to sustain our rural agriculture. And that's a much bigger problem, we have to feed them, but they do not want to produce things that will feed themselves.

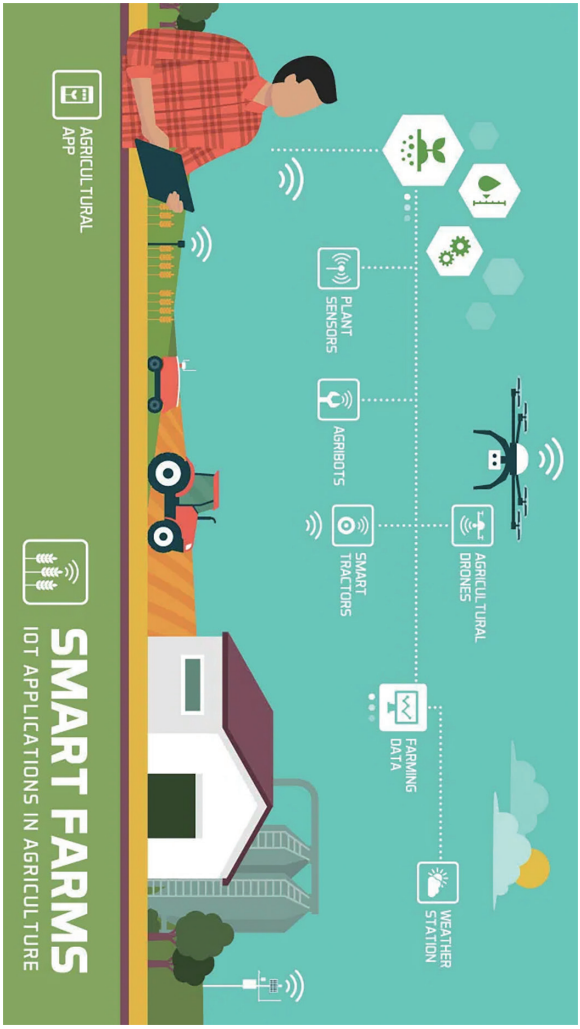

Figure 1. Smart Farms: IOT Applications in Agriculture

Source:

https://www.insidetelecom.com/the-new-frontier-of-smart-farming-powered-by-5g

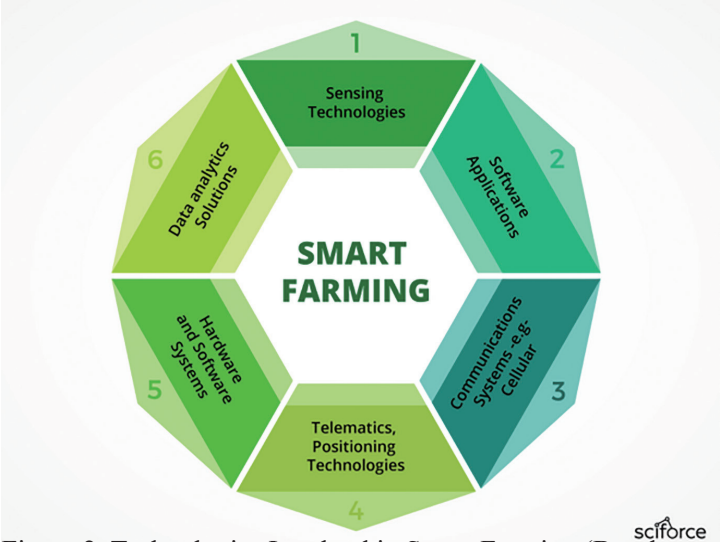

Figure 2. Technologies Involved in Smart Farming (Beecham Research)
Source: https://medium.com/sciforce/smart-farming-or-the-future-of-agriculture-359f0089df69

2. What is Smart Farming?

Recently, Smart Farming, or Digital Agriculture as it is called in the West, has begun to attract attention from the stakeholders of rural agriculture, especially because it requires less labor, is able to do automated scheduling, and can provide us with data-driven decision making, and so on. We expect smart farming to address the low availability of human resources in rural agriculture. We have fewer human resources for rural agriculture but that is when smart farming can address the issue.

Technically speaking, smart farming combines two things. The first is the devices, and the second the brain behind the devices. We call the devices the Internet of Things, or IoT devices, and the brain behind the devices we call data-driven artificial intelligence.

The combination of these two things can take the form of for

example, automatic farm machinery for fertilizer, like a fertilizing mechanism that is attached to drones.

In the diagram we can see drones and plant sensors, and there are agricultural robots related to smart tractors that will take care of the lands of the farm and all the data from them is collected and connected to a weather station so that it will provide us with information for when we should plan our rice project.

Consequently, if we want to apply smart farming, there are factors in the agricultural sector that will affect or be affected by smart farming or smart farming systems in general. So, if we want to understand how smart farming will affect or be affected by agricultural sectors, we have to understand the transformation that it will bring. This transformation may go beyond technological development. People tend to think that smart farming is always about technologies, about the technical nature of the IoT devices, etc., but then we have not been able to evaluate the bigger impact of smart farming on the whole society. My point is that it is not about farm or farming activities, but that it can bring transformation to the whole agricultural system and to the whole rural society.

So by understanding this transformation, we can make sure that smart farming will bring a sustainable agriculture and also for example sustainable rural areas.

3. The Perspectives of Understandings

In order to understand the issues, challenges, or opportunities, which affect or are affected by smarter farming in rural agriculture, we need an understanding of systems thinking. Theoretically, systems thinking offers an integrated perspective to understand the complexities of both transformational requirements and the things that will affect smart farming and the impact on things that will be affected by smart

farming in every part of rural agriculture and its related systems such as a societal system or an ecological system or an industrial system around the smart farming, all through a holistic lens.

In that sense, the transformation can be observed through two different lenses, the first is systemic and the second is systematic. Systemic transformation refers to changes that happen to almost all components of the observed system and in systemic transformation, we try to understand changes that have happened to all the components. So, we have a rural agricultural system, we have a societal system, we have an ecological system surrounding the smart farming. If we try to understand it systemically it means we have to understand the facts about the whole farming system and other related systems.

Systemic transformations refer to changes that happen to almost all components of the observed systems. Meanwhile, systematic transformations attempt to discover how smart farming brings changes that occur in a staged manner from one factor/actor to other related parts of the system. So if we talk about systemic transformation, we are talking about how those changes happen gradually, step by step, (a) affecting (b) and so on.

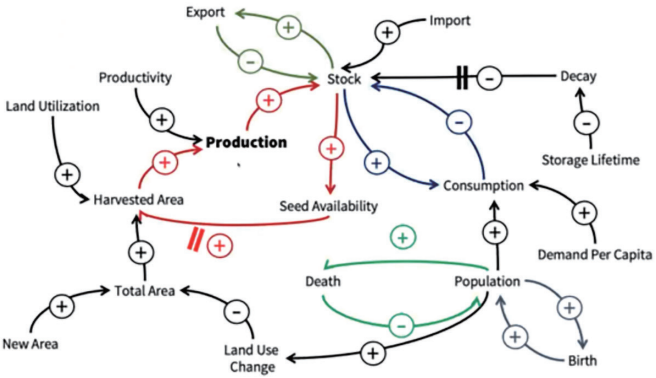

Figure 3. Understanding How an Agricultural System Works
Source: Author

This diagram shows how a production system works. This example is of onion production. If we talk about the production and consumption of onions, we have to include all these things. So the stock will affect exports, the stock will be affected by imports, consumption will affect the stock and so on. In the same way, if we want to talk about smart farming, we have to talk about them all.

So, then, in general, the systemic and systematic transformation to smart farming can occur at three different levels.

1) Routine level. Here we have to focus on scheduled activities like routine farming activities

2) Macro-level. Here, we focus on aggregated structures, what you can call a helicopter view.

3) Micro-level. Here we focus on heterogenous and autonomous actors, on some micro-interaction between actors involved in some smart farming whether they are farmers or non-farmers or the families of the farmers or intermediaries and so on. Then, if we want to observe the impact of smart farming, we have to observe all the those impacts at three different system levels.

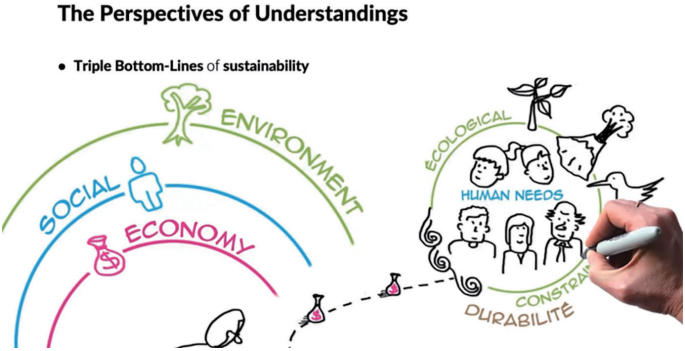

Figure 4. Triple Bottom-Lines of Sustainability
Source: https://www.lshtm.ac.uk/aboutus/introducing/environmental-sustainability/sustainability-resource-centre

In addition, the systemic and systematic transformations due to smart farming should be approached from the triple bottom-lines of sustainable development (economic, environmental, social). It is purposed to ensure the correct perspectives of those transformations in the fields.

4. Issues, Challenges, and Opportunities

Looking at the perspectives above, probable transformations triggered by or affecting smart farming implementation in rural areas in less developed countries are provided in Table 1.

System transformations affecting and affected by smart farming implementation can be divided into three categories.

Table 1.

Systems Level	**Transformations**		
	Economic [E]	Environmental [V]	Social [S]
Routine [A]	[1] Investments for smart farming devices [2] Internet connection costs [3] Fuel costs of devices [4] Labor costs [5] Utility costs [6] Irrigation maintenance costs [7] Transportation costs for harvested products [8] Building maintenance costs [9] Transportation maintenance costs [10] Maintenance costs of devices	[1] Emissions emitted by smart farming devices [2] Emissions emitted by internet infrastructures [3] Emissions emitted by transportations [4] Weather forecasts [5] Animal disruptions [6] Fertilization	[1] Labor forces [2] Community meetings

Macro [B]	[1] Investments for recharging facilities [2] Investments for adequate internet infrastructure [3] Investment for faster postharvest processing [4] Investment for adequate storage volume [5] Aggregated loans required [6] Liquid savings [7] Running costs of smart farming devices [8] Return-of-Investment of smart farming devices [9] Value depreciations of smart farming devices	[1] Emission per mass of products [2] Projected land abandonments [3] Climate models [4] Risks of natural hazards [5] Water control [6] Plot productivity (yield)	[1] Projected immigration [2] Projected emigration [3] Effects of urbanization [4] Projected birth [5] Projected deaths [6] Regional demands of products [7] Demands for exogenous experts [8] Media exposure [9] Disaster recovery plan [10] Community education
Micro [C]	[1] Negotiation for financing schemes [2] Pricing mechanism [3] Cooperative investment of smart farming devices [4] Price sharing between farmers [5] Financial incentives from authorities [6] Loan payment	[1] Farm extensification [2] Weather models [3] Emissions emitted by transportations for community meetings [4] Harvest failures [5] Plot irrigation [6] Soil nutrition	[1] Projected numbers of active farmers [2] Cooperative usages of smart farming devices [3] Labor demands [4] Local demands of products [5] Cooperative water arrangements [6] Indigenous agents-of-change [7] Exogenous experts [8] Disaster response training

Source: Sianipar, 2021

1. Economic Transformations

Looking at the probable economic transformations at three system levels, the biggest expected challenges for rural farmers in less

developed countries are the large investments required for providing smart-farming devices. As a large-scale technological investment, smart farming requires a cautious calculation of financial risks for smaller-scale farmers. In that sense, there are opportunities to negotiate more flexible financing schemes, or collaborative investment in smart farming devices to reduce risks for individual farmers. Besides, meeting the running costs of sophisticated smart farming systems would expectedly bring additional challenges to farmers' financial situation such as avoiding any default in loan payments. Therefore, shared uses of the devices can be an alternative way to reduce the running costs, and eventually the maintenance costs.

For example, today smart devices will be used by farmer A and the next day by farmer B and so on. Then the investment or the running costs can be spread. It can be shaped by them and we can relate to what Dr. Iqra Anugrah mentioned in the first chapter about sustaining all the activity going on in rural areas by doing it collectively. Shared use will also lead to reducing maintenance costs for individual farmers, so then we go to environmental transformation.

2. Environmental Transformations

Furthermore, environmental transformations at routine, macro, and micro levels are expected to bring different dimensions to smart farming implementation. Basically, the primary concern is the added emissions produced by smart farming devices, including those emitted by faster postharvest processing and larger volumes of products being processed. So it is not only about how we can buy the devices or how we can repay the loan but we have to deal also with emissions. In fact, the shared uses suggested above may also be useful in reducing prorated emissions per mass of agricultural products being traded.

Nevertheless, besides the immediate emissions from the devices,

we must consider the things that are taken care of by the device, for example, fertilization. We know that smart farming can work much faster, and much more precisely, that is why we sometimes call it precision agriculture, but then it will require more inputs such as fertilizers.

However, more intensive fertilization will add another form of environmental impact, which requires an expanded life-cycle assessment of the smart farming systems. In fact, farm extensification may help in offsetting the emissions by producing better yields per farm plot.

Moreover, land abandonments due to existing labor problems before smart farming implementation will be another issue to address. Land abandonment may occur because of the aging and declining population before smart farming was introduced. So, when we apply smart farming we have to deal with those abandoned lands and make them active farm plots. Smart farming may also reduce the abandonments due to its capability to work on a larger size of lands compared to conventional (non-smart) machineries and manual labor.

Then, hazard risks due to animal disruptions, weather conditions, and/or reduced water levels can possibly be overcome by applying more sensors that can be integrated into the farm-wide smart farming systems.

3. Social Transformations

Social transformations at the three system levels will deliver additional understanding of the larger impacts of smart farming implementation to the whole rural society and beyond. At the routine level, the full/semi-automated principles of smart farming are expected to reduce the daily labor forces required to run rural agriculture.

In addition, there should be more active community meetings to ensure the smooth running of the smart farming systems between farmers and plots. Those meetings should, for example, establish an agreement on the arrangement of the routing of the devices to avoid

any accidents. Farmers need to hold meetings to establish agreement on the arrangement of device routes, where to store the devices in a centralized position, a schedule for use by the farmers and also the routes taken by those devices. They need to be moved from the storage to the farm, but this will use for example, public roads. So, by using a range of scheduled routing, it means we can avoid accidents for example, because sometimes things that we call 'smart' are not so smart, some accidents may still happen, and by thinking ahead we can help to prevent them.

As another example, the community meetings can decide the arrangements for the shared uses of smart farming devices and irrigation systems. Besides, the rural population is expected to affect and be affected by smart farming systems due to the significantly reduced labor demands but also lesser increases in demand for highly-skilled operators.

In such a situation, younger generations can be attracted to be the high-skilled operators since they have been growing in today's information era. If urbanization virtually diminishes the chances of recruiting local young people, exogenous experts can be introduced.

It follows that all the above-mentioned opportunities to install more sensors for hazards, animals, weather, water, etc., will require proper planning, training, and education for local people to build their capacities in responding to the outputs of the sensors and develop data-driven decisions based on the information gathered.

5. Implications and Insights

This brief description of my division's research has attempted to raise issues, challenges, and opportunities that are expected to affect or be affected by the application of smart farming systems. By considering

these transformations, we can make a summary of the implications. If we try to implement smart farming in rural areas in less developed countries, we can divide the implications into two types; two managerial implications and four policy implications.

1. Managerial Implications

In terms of managerial implications, smart farming requires transformed farm management that can apply more data-driven decision-making processes. In other words data-driven management that will make use of big data obtained through smart farming sensors or devices. So, by doing data preparation and management, we can precisely analyze what we should do. That's the first managerial implication.

The second managerial implication is more active community meetings to establish the proper arrangements for smart farming systems that involve multiple farmers working together and also dealing with the impacts on public facilities such as increased road use and noise levels.

2. Policy Implications

On the other hand, smart farming brings more cautious policy implications to ensure smooth investment, running, and maintenance of smart farming systems. In terms of policy implications, we can consider the basic financial incentive, but it's not only about financial incentives. Other policies may go beyond financial incentives for those issues.

We know that smart farming will help us to produce better yields, but then, where should we sell the excess production? So, we have to search for new markets. Here, for example, the government may take care of the searches for additional markets to cope with increased yields due to faster and larger processing scales of smart farming. In this way the government may act as an intermediary to access those human assets.

The third policy implication is about knowledge transfer. We have to make sure that smart farming will not leave local people behind. So we have to make sure that local people can take care of at least the basics of the new smart farming system. Policies may also cover training and education for local people to catch up with technological advances brought by smart farming, with the possible introduction of exogenous experts to pass on the necessary knowledge.

Then the last policy implication is offering an incentive for younger people. We know that younger people have more capabilities in related works or IP-related control or operation. If we can promote incentives for the younger generation to get involved as highly skilled operators and decision-makers, then we can create an incentive for them to stay in the villages in rural areas to take care of smart farming. In this way they can fulfill their capabilities or capacities in highly-skilled operations or jobs, but they are still supporting rural agriculture.

In this chapter I have attempted to instill the understanding that if we talk about technology, we do not only talk about the technology by itself, but also about things that will affect the implementation of that technology and be affected by the implementation of the technology. For smart technology to be used not just for profit, but as Dr. Fitrio Ashardiono insisted in his editorial, for the sustainability of agriculture and rural life, it must be introduced in close collaboration and cooperation with the rural society, with a focus on the younger generation.

Chapter 4
Place, Space, and Community: Spatial Planning for Rural Development

Rohman Taufiq HIDAYAT

1. Introduction

Spatial planning is usually adopted in urban planning or higher levels of spatial entities and up to now, the adoption of spatial planning in rural development is still low. However, its implementation will spur rural development as it has the ability to elaborate spatial and non-spatial aspects (social, economic, and environmental), and it supports the current rural development approaches.

To outline this brief report, I will begin with a brief history of rural development in Indonesia, explaining the flow of money and goods, and then answer the question: Is spatial planning really necessary? Before I attempt to answer this question I'll give a fairly brief explanation of the significance of space and community in rural areas and what spatial planning is about as these concepts are relatively new, it may be the first time for some of you to read this terminology. I will conclude with two case studies that applied these planning techniques in the rural areas of Java and Borneo.

1. History of Rural Development in Indonesia

The history of Indonesian rural development can be traced back to the Kingdom's Era. The village was led by a lower royal family member and positioned as a producer for the kingdom, with a responsibility to develop their own villages, and villages with prominent achievements

received a prize from the king.

During the Colonialization Era, the status of rural areas in the state was relatively similar. "Negarakertagama" — a book of the Majapahit kingdom, and "Max Havelaar" — a true story-based novel written by a Dutch officer, illustrated rural development in the old era. Similar to the Kingdoms' Era the Dutch colonial rulers had the authority to redirect rural development, especially that related to agricultural activities (*landelijk stelsel* and *cultuurstelsel*). The villagers had to give some of their agricultural produce to the Dutch company and also to the king.

Then with the coming of the Independent Era conditions for Indonesian rural development began to improve. The government then gave greater attention to developing infrastructure and regulations related to rural development (Zainal, 2016). After village law became effective, rural development became part of the national strategy to achieve national development goals, rural areas received equality status and were granted a limited budget for rural development and village councils were given limited authority to develop their villages.

Then, during the New Order Era, transmigration programs were introduced and basic infrastructures were developed. There was a Dutch immigration program and during that period the central government tried to distribute the birthrate more evenly by trying to reduce the population density in Java Island while increasing populations in other islands. Also during this era, the central government tried to develop basic infrastructure to enable the flow of goods.

These infrastructures were basic, but started getting better during the Reformation Era with improved village recognition and community participation in development.

Then with the Post-Reformation Era villagers had a greater opportunity to develop their own independence as a part of national development strategies and were given a special budget allocation.

The rural development objective was mainly based upon agricultural production and capital and economic development, and then the government tried to improve the social conditions, not only by considering how the economic benefit could be achieved, but also by trying to understand what the community's needs were.

Presently, the economic, social and environmental conditions are improving and the government is trying to achieve sustainability.

2. Place and Space

Place and Space are related to each other (Tuan, 1980). A simple illustration can explain place and space. A person stays in a $20m^2$ room inside a house. The room is defined as a Place. The room size represents the Space. This example follows geographical measurement. It has a different meaning from the personal feeling perspective. The room, whomever the owner is, will give that person a different feeling; for example, this room is or is not mine. Further discussion will lead to a sense of place theory. As to Space: I may say that this room is too wide or too narrow for me. As we know, humans are equipped with the special ability to understand the place and space around them. Place is a location. Rural is a place without a firm definition and many researchers have used economic and social approaches to define it.

Figure 1. President's Room
Source: Author

Can you guess whose room this is? This is the first president's room, and by using this picture, the objective is to describe three things, place space, and the community. The place is this room itself in the house. This is related to the location and space we live in

and usually it has a measurement. For example, Y is the volume and so on, and the community represents the people who live in this room.

Basically, place, space and community refer to physical things. However, if we learn more about the space and community we begin to understand the social aspect. When we consider space we mainly consider the physical things. However, there can be non-physical things, for example, a cyber place, we can think of ourselves as being in a cyber community, and then space is not always about the physical but also about the social aspect.

A rural area is place, space and community. It is a place for villagers to live and a space for agriculture. To get benefit from the place and the community they need a space where they interact with each other.

3. Community

A community is a group of individuals who live in the same place and/or are bound by similar interests. Community participation is required to increase the development success rate and reduce the adverse impacts. Also, the village community has the special ability and knowledge that is beneficial to their living. For example, a villager can go inside the forest within village boundaries without getting lost. They can describe their village's special conditions using unique signage, such as trees, and the natural landscape.

2. Spatial Planning 1

Previously, discussion of rural development in Indonesia mainly focused on economic activities and providing basic infrastructures such as education facilities, village markets, and transportation. Nowadays, rural development addresses quality of life, environmental quality, advanced technology, climate change, and sustainability. However, less

attention been paid to spatial aspects than in urban development, which has addressed spatial aspects extensively. The spatial development theory was introduced mainly based on economic activities (Robinson, 1969). Before revealing the necessity of a spatial approach in rural development, an understanding of the spatial components is necessary.

Spatial planning is a process for arranging the space, land utilization, and control (UU 26/2007).

The land use diagram illustrates how humans and living creatures utilize the land. It can be a built-up area or a cultivated area like farmland or a forest, and the land use has a function. It can be a social function, an economic function, or an ecological function. In a built up area for example, a building does not always have a single function. It may have multiple functions and they can be social functions or economic functions. Another example is the farmland. We can cultivate anything on the farmland and it may produce an economic function. However, farmers can interact with each other too. They can talk together and have a social interaction on the farmland, so it also has a social function.

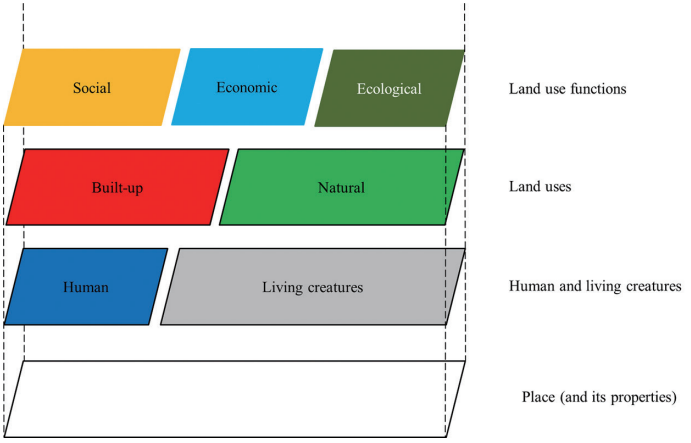

Figure 2. Process for Arranging the Space, Land Utilization, and Control (UU 26/2007)
Source: Author

Spatial planning is an approach that combines all development strategies into a single output document. Regional and urban planning has adopted spatial planning to direct development and has been developed over the centuries. In the past, spatial planning addressed technical and geographical aspects. Then, it incorporated intangible aspects since it is embedded in human nature. As humans have special abilities and knowledge, place and space are also determined by social aspects. Therefore, involving social aspects in spatial planning is possible.

Spatial planning covers physical and non-physical aspects. Briefly, it is constructed of land use planning and non-spatial planning, including land use and land use functions. Land use planning consists of a land-use structure plan, or a land use pattern plan. Non-spatial planning consists of a social and economic activities plan in the case study area. Spatial planning can be applied at any level (national, provincial, region, town, and rural).

3. Spatial Planning 2

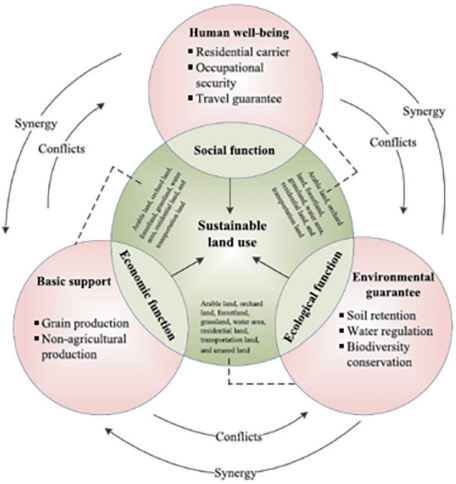

Figure 3. The Conceptual Framework of Land Use Planning
Source: (Zhang et al., 2019)

The conceptual classification framework of land use functions (Zhang et al., 2019) in the above consists of:

1) Selected interaction among functions based on common patterns.

   This is the concept or classification framework of land use function and every function is interconnected in this figure from Zang et al.'s research and illustrates a selected interaction among function pairs based on a common pattern.

2) Tradeoff/synergy among functions

   This figure tries to address the threat of instability among the functions. If they increase one function how will this affect two other functions for example?

   If we use farmland more rapidly or more intensively how will this affect another function. Maybe we will get more income and more social benefits. However, if it decreases the ecological function the farmland will be degraded in the future.

3) Interaction between function and land use

   This is another explanation of land use. Figure A shows the land use of each piece of land and the land use pattern is shown in Figure B.

Figure 4. The Master Plan of Pujon Kidul Tourism Village
Source: RTRW Kabupaten Malang Tahun, 2011–2031; Bakorsutanal Tahun, 2011; Survey Primer, 2015

- ► Land use: land use of each piece of land (fig. A), land use pattern (fig. B), Land use structure (center of growth, sub-growth center, and links among them)
- ► Land function (≠ land use) → agricultural land: farmland (land use) has economic functions
- ► Elaborate on physical and non-physical attributes → forest's role in religious practices
- ► Maximizing the potential and overcoming the problems
- ► Drawing the interaction between activities and spatial onto a map

In the Indonesian context, spatial planning has a hierarchy, starting from national spatial planning and going down to specific spatial levels such as a neighborhood. Spatial planning must pass a synchronization procedure. For example, a lower level of spatial planning must address a higher level of spatial planning (national > Provincial > municipality > smaller spatial level/neighborhood/village). Spatial planning aims to provide a foundation and guidance for following development plans and involving actors and stakeholders. The main output of spatial planning is a policy and the concept of development plans. It requires further detail and an action plan. Otherwise, actors and stakeholders will find it difficult to employ it.

Under spatial planning law and village law (Government of The Republic of Indonesia, 2007, 2014), villages are encouraged to establish spatial planning to spur rural development. However, only a few villages have done so. They prioritize formulating a village government work plan since it is mandatory. Further, the village government work plan focuses on the villages' physical development, such as the basic infrastructure development plan. Promoting spatial planning in rural development is necessary and useful.

During formulating the spatial planning, multiple actors are

involved, including public participation. They discuss various issues, such as public services, social and economic dynamics, and environmental issues. Therefore, solutions and planning that are derived from the social and cultural approach are relevant. Spatial planning for rural development is simpler than others. It employs well-known rural development tools (PRA, RRA, social mapping) and combines them with maps. Spatial discussion is infused in it. The Standard of Basic Infrastructure is based on community needs because there is no exact standard for rural development. As facilitators, spatial planners usually adopt the rural region (consisting of several villages) and urban infrastructure standards (see Indonesia national standard for infrastructure/ SNI).

Since it involves many actors and stakeholders, spatial planning allows them to communicate and accommodate each other's needs. They will decide the common goals, implementation procedure, development priorities, and each actors' role. In the Indonesian context, spatial planning also consists of monitoring and evaluation procedure and incentive and punishment regulation.

Developing spatial planning is time-consuming because it involves many actors with their own needs. Constructing and achieving common understanding and goals requires time and resources.

Involving the community in the spatial planning process and implementation is not an easy task. Rural communities may have better social capital and strong social ties than urban communities. However, it is not guaranteed to be a smooth process. Current rural development depends on community participation. To some extent, the rural community is likely to be less enthusiastic. They often blame local officials and rely on government action.

To overcome this issue, the role of the facilitator is necessary. The facilitators educate the community to get involved in the process

actively thus bridging the gap among actors and stakeholders. The facilitator can be an individual from outside the village or a member of the community. They cannot be involved in decision-making because it violates the community participation concept.

During my fieldwork in one of the villages in Indonesia, when I asked the communities what they knew about their villages and asked them the location of the problems that existed in the villages and they tried to make a map and locate the problem on the map. It could be seen that villagers had a sense of spatial ability but they didn't realize it. In this sense, spatial planning is very feasible for rural community development.

4. Spatial Planning Components

I will briefly explain the Indonesian spatial planning system. Spatial planning, consists of five components, spatial structure, spatial pattern, development concept and program, monitoring and evaluation program, and incentives and disincentives,

1. Spatial Structure

Spatial planning requires an understanding of the spatial structure. If we want to develop the community in the village, we just need to focus on one place as our priority. If the place that we prioritize is growing well, so the surrounding area will also be growing well. It's like a simple random sampling. If we need to understand all the population we just pick some people at random, and by asking them we will be able to understand all things. For example, if we drink a coffee, we don't need to drink it all to judge the quality of the coffee. We need just a sip of coffee to judge the coffee itself. So using that idea spatial planning structure is implemented.

2. Spatial Pattern.

The spatial pattern consists of the pattern of the land use. We don't focus on a single-use but the pattern in general.

3. Development Concept and Program.

Spatial planning also consists of a development concept and program according to the idea for the community development, and what has already been explained by Dr. Fitrio Ashardiono, Dr. Iqra Anugrah and Dr. Sianipar in the preceding chapters can be included in this part.

4. Monitoring and Evaluation Program

The most interesting part of spatial planning is the Monitoring and Evaluation Program. Spatial planning is not always about the plan itself, but about monitoring to see that the plan is running well and ensuring quality control of the planning. For these reasons, monitoring and evaluating the program is important.

5. Incentive And Disincentive.

This is related to reward and punishment and to ensure the improvement of the development itself. For example, if the farmers are following the rules of the spatial planning, we will give some incentive or reward, and if they break the rules, they will be censured. The aim is to teach them how to increase their capacity.

5. Spatial Planning Process

The participants in the discussion of this spatial planning usually consist of the key persons in the village, the religious leader, group leaders and the village officials.

The stakeholders are usually the national governments and provincial governments, and next to the private sector, and then the groups in the village community. The process is as follows:

1. Data Collection

The spatial planning process involves all the activities done by the communities themselves. During the data collection, we're trying to identify the community's needs, then identify the problems and then define the community's resources.

2. Analysis

The analysis is based on the data that is gathered from the community try to identify potential problems and find possible solutions.

3. Plan Formulation

Once they have identified and solved the important issues they will make possible development plans and select the best plan.

4. Plan Dissemination

Finally, they hold an open public discussion to disseminate the plan, so that all community members will know what they will be doing in the future. During this process only the community members can give feedback or a suggestion. For example, if there's a plan to make a new building for education, but the community members think that it's not urgently needed, they can reject that plan and the community members will discuss whether they need to delete that plan or continue. Usually, if they face some objection, they will think again and try to find a solution.

6. A Story of Two Villages

This section will describe the story of two villages, Pujon Kidul village, in Malang regency, and Batoq Kelo Village, in Mahakam Ulu Regency. I was involved in developing spatial planning in these villages, and the experiences illustrate spatial planning implementation in rural development. The case studies produced unique and distinguished experiences. The stories focus on the community initiatives, development process, and spatial planning results.

In 2015, Pujon Kidul village had the initiative to establish a village master plan. It was quite rare. Spatial planning and the village master plan are two different things. Spatial planning can be an approach to establishing a master plan. After conducting an initial discussion, they unconsciously employed the spatial method in their village public discussion. The village communities established a social map and identified community problems using a spatial approach, even though they had limited knowledge about spatial planning.

In 2019, we were involved in formulating the Batoq Kelo Village master plan. We employed a bottom-up approach, which is more relevant than a top-down approach for rural developments. After conducting an initial discussion with the village officers and key persons, we found that the Batoq Kelo community had no idea how to develop their village. Nevertheless, they wanted a better life and public services. On this point, the Pujon Kidul community was clearly more capable than the Batoq Kelo community.

We employed a participatory rural appraisal and spatial approach for Pujon Kidul village community needs assessment (CNA), and a spatial planning approach for Batoq Kelo Village (Hidayat & Vidianti, 2019). Focus group discussion and spatial mapping were the main tools to collect the data. Key persons such as the religious leader, public

figures, and village officers were actively involved during the process. As facilitators, we explained how to build the master plan using a spatial planning approach and gave them examples. Then, we started the planning procedure. The first step was to identify the village's condition and then analyze the strengths and issues of the village and find the solution. We provided capacity-building sessions that helped them through the process. Once the masterplan draft was completed, we held an open community forum to explain the draft and get their feedback. It took approximately a year to finish. We spent more time at Batoq Kelo village and gave extra discussion sessions, because their understanding of spatial aspects and development was lower than that of Pujon Kidul Community.

After a long process, each community agreed to the master plan. The development concept for Pujon Kidul Village is a tourism village. Batoq Kelo community agreed to focus on basic infrastructure development. Both communities planned to establish a village-owned enterprise to improve their economic capacity.

7. Pujon Kidul Village

Pujon Kidul Village is in Malang Regency, Jawa Timur Province. It is located approximately three kilometers from Batu city which is one of the emerging tourism destinations in East Java. The total area is around 324 hectares and the total population is 4,790.

1. Initiative

Initially, Pujon Kidul was an agricultural village but after they established spatial planning they changed its identity to a tourist village. I would like to explain each story in three phases. The first part is the initiative, the second is the process, and the third is the result.

The first initiative came from the village community. At that time, the village leader came to my university and told us that they wanted to have a kind of development plan. As I am in the spatial planning department, I proposed this spatial planning, and they agreed to adopt this proposal.

They wanted to develop tourism activities because their village is very close to Batu city which is a tourism destination. They thought that if the tourists in Batu village felt bored and wanted to see something different, their village could provide something to attract them, so they should become a tourism village.

2. Process

We went to the village and told them about the process. We explained that the work would be done by the community, and we would just act as facilitators and we would supply them with all the information they needed.

The neighborhood had a forum discussion with a focus group to identify the issues and the potential in their village and how they could overcome these issues using the village's potential. Then they formulated a village development concept and a development program.

They held a village forum discussion and received a lot of feedback from the community members, after which the focus group revised and finalized the plan and disseminated it again for the last time

3. Transformation

Pujon Kidul was divided into three hamlets called Krajan, Maron, and Tulungrejo. In the plan, each hamlet would have its own particular activity, and they supported each other. For example, Tulungrejo hamlet would focus on establishing tourism attractions. Maron Hamlet is predominantly housing, and several households have small-size enterprises. It has no tourism potential so producing souvenirs for the tourists and selling them

at the sightseeing spots is most profitable activity. We try to synchronize the activities so Krajan Hamlet was the center of tourism and the other areas would provide the support. So for example, Maran Hamlet would produce the souvenirs that are needed by Krajan Hamlet.

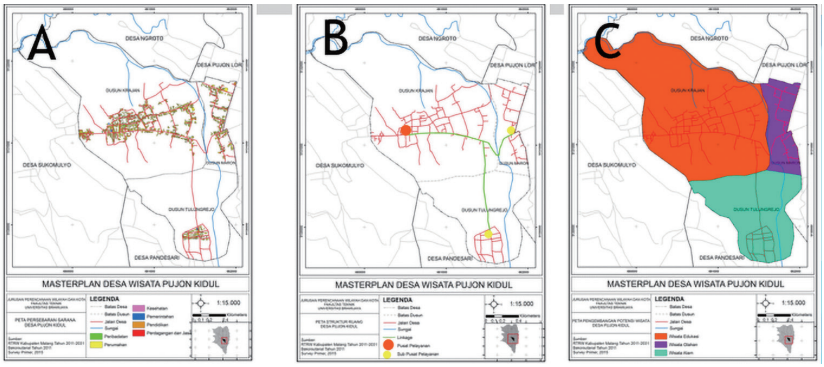

Figure 5. Pujon Kudol Village Spatial Planning
Source: RTRW Kabupaten Malang Tahun, 2011–2031; Bakorsutanal, 2011; Hidayat, 2015

These maps show the transformation of the village in the case of spatial planning. They represent the condition of Pujon Kidul village and we can see here that the land use is very low. The small shapes are the village houses. The villagers identified which part of the village is the central business district and identified the yellow part as the center of growth and light yellow as the sub-center. All the development will focus on the central area and the other area will support the development.

8. Batoq Kelo Village

The second story is of Batoq Kelo Village located in Mahakam ulu Regency, Kalimatan Timur Province, Kalimantan, East Borneo. This

is an agricultural village located three kilometers from the Regency capital. The total area not including the forest is around 7,846 hectares and the population is only 843.

The process in Batoq Kelo village was different from the previous one. I would like to explain the initiative, the process, and the result.

1. Initiatives

Batoq Kelo village community is unique because it is split into two groups. Some of the villagers moved from the old place to the new place because of a lack of facilities. So they moved closer to the regency capital. Then, after a certain number of years, some villagers returned to the original location because it was closer to the farmland. Some people stayed in the original place and some people moved to the new place and never wanted to return again. As a result the Batoq Kelo community lives in two separate villages. Usually, a tribe lives in one village, and territorial expansion is possible but not a common practice.

Due to the separation, maintaining rural development was becoming difficult. The municipal government initiated a process to develop spatial planning. The process is similar to the first story but the result is quite different. Every place is entitled to government funding for rural development and the village had already received funds from the government which they split equally between the households who used that money to build the necessary facilities or improve their homes according to their separate ideas. Actually, this practice is against the wishes of the central government which rules that these funds should be used to implement holistic spatial planning and establish facilities that are not yet available.

2. Process

During the planning process, the villagers agreed that the development

should focus on the original location because the new place already had access to the basic infrastructure of services of the regency capital from the neighboring village.

3. Result

As a result of spatial planning, they decided to try to revitalize and repair the existing infrastructure because they thought it could still be used if it was repaired. They decided that multiple uses of community buildings were the most preferable because this area has surplus buildings that can be used for various activities. Another reason was that purchasing materials to make another building would be quite expensive, and they were trying to reduce their expenses.

9. Conclusion

During the process of adopting spatial planning, these rural communities learned their potential, how to interact with each other and nature, what they needed, and how to resolve their problems. The stories of these two villages have demonstrated that if a community is open to spatial planning and understands their village's spatial attributes and how to elaborate them with its economic and social aspects, they can work together to improve their economic conditions.

As researchers who specialize in rural development we learned many things from these two stories that will be of use in future applications of spatial planning. The solutions always depend on the village and community conditions. Educating the community and ensuring community participation are the most challenging parts and furthermore technical terminology and procedures need to be explained in a way that can be easily understood. Moreover, as the villagers spend most of their time working, we have set the schedule based on participants' convenience.

However, there are undoubtedly benefits to adopting spatial planning methods to help rural communities to develop the potential of their villages in a holistic, sustainable way in relation to the natural features and nearby towns. If the potential of each area can be optimized in relation to the whole, it can have a positive effect on rural economies and especially on attracting the younger generations to remain or return to rural life.

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Chapter 5
Concluding Remarks and Discussion

Fitrio ASHARDIONO

At the outset, I stated that we wanted to address two vulnerabilities that are hastening the demise of rural communities. The bottom line is the ability to make a viable living from the land, and this is being threatened from two directions. The first is the inability of peasant farmers working individually with hand tools to earn a living from their harvest. The second is the increasingly apparent effects of climate change which are threatening ecological sustainability and thus further endangering their livelihoods.

This has caused the younger generations of rural families, especially those with a higher education, to seek their fortunes in the urban areas. However, as the cities expand, and the agricultural land becomes urbanized, the demand for food increases while productive agricultural land shrinks.

The popular solution is to develop larger, more efficient, mechanized, or as Corinthias P. M. Sianipar reports, robotized farming. However, this has the effect of pushing more farmers off their smallholdings into cities, while biological diversity is lost to cash crops, and excessive harvesting is depleting the land's natural ability to recover. A dependence on chemical fertilizers and insecticides is further destroying the natural ecology, agrobusinesses are consuming the natural forests, shrinking the habit of the indigenous flora and fauna, and by extension, threatening insect pollination. In our haste to fulfill the population's immediate demands, our nation's long-term sustainability is being threatened.

It is becoming increasingly clear that the present attempts to maintain a flourishing domestic economy and meet a growing demand for a more diverse, luxurious cuisine are not sustainable. However, when we read the fascinating reports of the contributors to these chapters, there is hope. The takeaway is that we do have amongst our academicians, scholars with the political, agricultural and technical and visionary qualities necessary to save the day.

Looking at the reports of my three colleagues, I could claim that we have done the research. So why then have we not come up with the solution yet? Regrettably, we also already know the answer to this question. Presently, we are all engaged in our specific fields, advancing our individual academic careers along parallel but separate lines. To fulfill the purposes of this book, collaboration is necessary. To fulfill the stated aim of this book, we must put our heads together. To achieve the Agricultural resilience and Rural social adaptation necessary for a sustainable humanosphere, scientific collaboration beyond borders is essential. So how can we work together?

Rohman Taufiq Hidayat shows us that this is possible in his chapter on spatial planning, enlightening us with an approach to local planning that combines the input from experts in a variety of fields, and consultation with all the actors involved in the designing of the plan and for its implementation.

In his work bringing the local fishermen and farmers together, Dr. Iqra Anugrah describes the political skills and strategies necessary to persuade locals of the importance of learning together the ways to adopt the efficient methods developed through Rohman Taufiq Hidayat's spatial planning.

In addressing the resilience of rural communities, what can be done to encourage the younger generation not to quit their rural towns? Employing the more efficient but expensive Smart Farming techniques

Corinthias P. M. Sianipar described can only be realized by forming the cooperatives being developed by Dr. Iqra Anugrah. Organizing cooperatives requires leadership and technical skills, and AI is the domain of bright young scientists, so there is both a need for and the promise of worthwhile careers for talented young people who would like to make a meaningful contribution to society.

Meanwhile all of these changes to the customary social and agricultural patterns should be done gradually with a wholistic vision from the seed to the table, as visualized in this editor's chapter on agricultural resilience.

As a sequel to the reports contained in the previous chapters, it is only fitting to outline some highlights from the preliminary discussion between this editor and my three colleagues.

We began by addressing urban population growth, the proverbial elephant in the room, and Doctor Sianipar pointed out that the recent data indicates that recent population flow is not that significant, but that the number of regions that do not constitute rural anymore is increasing. Physically the population may not be moving from rural to urban areas, but their homes are gradually becoming more urbanized. They may physically stay in rural areas, but their minds, their words, and their activities are all being urbanized. So the use of urbanization terminology may or may not be actual physical urbanization anymore.

Moreover, while we would like to see more income flowing into the rural areas, the growing popularity of e-commerce is causing that wealth to be diverted back to the centers of mass production. As a result people may live in rural areas, but they get an income from an urban area, and then they buy things from another urban area, and we cannot expect this causal effect anymore. Dr. Sianipar argues that if we want to make residents contribute to rural areas, it is necessary to tie them into activities that are really going on in those rural areas. So it is not

only about their needs, but how the needs of rural areas can be fulfilled by their expertise or their capabilities. But on the other side, can the needs of younger people be fulfilled by things or activities in rural areas? There are many benefits to making rural areas more appealing to the younger generation, and here the utilization of the technical skills required to employ smart farming techniques is a possible source of appeal to young college graduates.

Dr. Iqra Anugrah further pointed out that we have to understand the urban/rural distinction in terms such as smallholders, or peasants or rural communities in a more nuanced and comprehensive manner. When we think about urban-rural interaction, it is not a separate dichotomy but a continuum, a process, a flow. He stated that it is true that in rural areas across Indonesia, things have become more urbanized, perhaps not necessarily physically, but in terms of interactions in terms of the cultural imagination of the young people, in terms of the pattern of urban development in rural areas. Thus, in recent scholarship on urban studies, for example, or Indonesian politics, much has been said about the growth of provincial towns, or a professional middle class, and this is indicative of a growing trend in a positive direction.

Dr. Iqra Anugrah further explained that when we talk about peasants or farmers, these people are not the same as their ancestors of 60 years ago, or even 40 years ago. When we are talking about the peasants of the 1960s, they were basically the subsistence-oriented peasants described in a classical, agrarian literature. Today's peasants are very different. They are peasants insofar as they engage in small-scale agricultural activities, they are small holders to put it in more technical and simple terms, but these rural households engage in a variety of activities. Even the peasants themselves in off-farming seasons might work as motorcycle drivers in nearby towns, and their wives might engage in small businesses with customers in urban areas, while their

children, the second generation, certainly have a more urban-oriented outlook than their parents. This trend is not only limited to Indonesia; a similar pattern is also going on in Thailand, and by extension, must be occurring elsewhere in Southeast Asia, and perhaps globally.

A lot of literature has been talking about the growth of middle-class farmers in Thailand, and the concern is no longer about land, but concerns about STEM facilities or subsidies for fertilizers. So it leads to a different political outlook and view as well.

Dr. Iqra added that he was happy that Dr. Sianipar's report on Smart Farming answered his concerns, because having worked with community members as well as community organizers he had found that as expected, one of the major aspects that they are lacking is technical expertise. They might be really good at managing businesses, and they are pretty creative in obtaining additional capital for businesses or for their cooperatives, but technology is a major issue, and this is something that could be addressed by redirecting the educated rural youth to such activities.

Dr. Iqra also raised the issue of the changing status of young women in rural areas asking, "What is the most appropriate technology or approach to smart farming for female farmers, for women working in rural areas?" This is an important question because typically, the introduction of new agricultural technologies in rural areas tends to marginalize women workers. He asked what would be the best types of technology or the best way to approach integrating smart farming or integrating technology that at the same time would ensure the interests of women workers, or women farmers in rural areas?

Dr. Sianipar commented that it is not only about rural women who are female entrepreneurs or agricultural workers in rural areas, but also that every technological change will bring impacts to the societal structures, because technology has a characteristic to push change, to

redefine the work we have been doing, or the requirements of the work we have been doing, who is doing that work, and who needs to do the work.

So, in terms of the most appropriate technology, it will depend on the type of work. In other words, what is the appropriate technology and where or when should it be applied? So when we talk about a certain location, then we can talk about the most appropriate technology in that place and how women can be motivated and employed in these new sectors.

Dr. Sianipar mentioned that in 2013 he published a methodology to apply or recycle appropriate technology. He summarized this methodology by saying that appropriate technology is a democracy based technology, because appropriate technology should start from the people, should be worked on by the people, and should be delivered to the people. So when we talk about technologies, that is appropriate technology, we are also talking about the democratization of technology. If we need to find the most appropriate approach to deliver an appropriate technology, he said that there should be a gradual change, not an absolute change, but more about incremental changes between the type of technology that we will be applying in a certain location.

He told us that in his laboratory there is one new Ph.D. student who would like to see how smart farming can be applied in a certain location in Indonesia, and how existing technology in that area or introduced by the government can be gradually upgraded. Basically it will not be an absolute change, but an incremental change. So the capability or the knowledge or everything that they are required to have to support the technology should be developed in parallel with the stages of its introduction.

At this point this editor, as a social scientist and agricultural specialist, criticized that after listening to all the arguments, I felt no one

had touched on the issues of the environment.

While they probably did consider the environment, and they had just mentioned democratization, the truth is that in certain rural areas the populace wants new economic benefits, they want to do things, they want to produce more, but at the cost of the environment.

I asked my colleagues if, as academicians, we should just give them the technology and tell them to go ahead and cut down all the trees and make a new land, or tell them that it is destructive, and they had better not do it. There is a kind of push and pull between economics and environmental issues. This really does happen, especially in developing countries like Indonesia. It is critical because if you tell them not to do it they will complain that we are not allowing them to develop in terms of economics.

However, at the same time, I do believe from my research that the local knowledge of the environment is an essential resource that they need to keep, because sooner or later, once they start changing everything, they will realize that they have lost everything. In fact there are some cases where this is already happening, but at the same time, I think it is really hard to know how to share the right information and how to deliver the right data.

Then again this is a democratic process. So if the community wants it, then it must be right. These were just some of the impressions that this editor has encountered in agricultural and rural studies. When I asked my colleagues for their comments, Doctor Sianipar admitted that we had largely missed what we call the nature carrying capacity, that is the ability of nature to cope with everything we have been doing to exploit it.

He thought that our approaches were divided into two larger paradigms, environmental power economics and ecological economics. He asked us a question. “Should we exploit and then do reappropriation?

Or do we need to slow down to make sure that the nature can keep up with the changes we are making?"

He agreed that the environment is the missing link in every discussion, because we usually talk about money and people while we forget the environment that has been bringing us to life.

Dr. Sianipar then turned to Dr. Iqra Anugrah, whom he conceded had much more experience in dealing with people directly, and asked him whether in his experience he had encountered some rural people who thought that whatever they had been doing was good for the environment, while we know that some of the activities they have been doing for so long are detrimental to the environment. They have been using these practices for hundreds of years, but they are harmful to the environment. He wanted to hear Dr. Iqra Anugrah's opinion on how we can introduce a new perspective without blatantly confronting what they have been taught to believe in, how to make sure that when we introduce a new perspective to conserve the environment, we can persuade them to accept new ideas and change their destructive behavior, but without triggering their stronger resistance.

Dr. Iqra Anugrah agreed that the environment is the missing link. In the literature on political ecology, for example, and agrarian studies, and also in recent anthropology, people have been talking about the rift between society and nature. He called it an ongoing, fascinating conversation and agreed with the points that we had both raised. He thought it was important to mention that the biggest polluters are the biggest actors, but having said that, as someone who has worked pretty closely with rural actors, with farmers and with activists in rural areas, he didn't want to romanticize their world, as much as he respected them.

He went on to say that there are so many blind spots that they do not recognize, in terms of the region, in terms of environmental protection, and so on. He said that some of these issues cannot be resolved

through academic conversations alone. They require us to act within the community, but at least from anecdotal evidence from observation, the interaction between rural actors and non-rural actors, should be democratic and based on dialogues.

For example, there are lots of people with goodwill, middle-class activists, or researchers, but we all have our own blind spots. So we just need to listen to our counterparts in rural areas, but our rural friends also have their own blind spots. So, in research and in community activities, it is a matter of dialogue and democratic collaboration between these people.

Dr. Iqra Anugrah went on to say that he has had positive experiences and feels hopeful about the younger generation from rural areas. While none of them seem to be particularly interested in farming they do take leadership roles in peasant unions. They do take managerial roles in businesses like coffee cooperatives, for example. So they pick up the administrative roles in these community organizations. He told us that he had met a man who was around his age or slightly older, who was the current headmaster of a vocational high school that he visited, in Garud, West Java. He is comparatively young, but he knows how to handle staff, and importantly he knows how to politely challenge the older generation.

It is clear that there are some very interesting developments in the field. Some pieces are missing unfortunately, because at present, due to the pandemic we cannot see them. It does appear that a gradual change is taking place in the older generation's potential to accept change and in the younger generation's willingness to play a part in implementing change.

As the editor, I would like to conclude this short book by underlining the need to push for more collaborative exchange between, rural actors and non-actors, scholars and entrepreneurs, and especially

to exchange views and establish some grounds for cooperation with the rural youth. I would like to thank each contributor for their inspiring reports, and for their valuable insights in the ensuing discussion.

There are many things that we still need to discuss, and lots of important questions have been left unanswered, and we have only touched on rural issues, while there is a great need for integration in the planning of cities, future industrial development, and important social issues such as wellbeing and education.

This, in fact, is the focus and concern of our sponsor, Asia-Japan Research Organization, which has facilitated and supported the publication of this work. There is much to be done, and plenty of room for all of us to collaborate in the future. It is my hope that our readers will be inspired, wherever they are, to join this important work.

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