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Food security and political ecology for sustainable agriculture: some crucial notes from the ICEFS 2020

M Arsyad¹, A Amiruddin¹ and Y Kawamura²

¹ICEFS Editorial Committee, Department of Agricultural Socio-economics, Faculty of Agriculture, Universitas Hasanuddin, Makassar, 90245.

²ICEFS Review Board, Kyoto Prefectural College of Agriculture and Ryukoku Extension Center, Ryukoku University, Kyoto, Japan, 623-0221

E-mail: arsyad@unhas.ac.id

Abstract. Food security and political ecology become a global issue to solve sustainably. Rising food prices affect economic growth and stability of global food security. This paper is a short report of the International Conference on Environmental Ecology of Food Security (ICEFS), held on March 30, 2020, in Makassar, Indonesia. ICEFS was directly directed to build a network between researchers and research institutions supported by the Department of Agricultural Socio-economics, Hasanuddin University. ICEFS used the multi-disciplinary approach is based on the knowledge and experience of scientists, researchers, practitioners, and policymakers in discussing issue related. Keynote speakers emphasized: environmental ecology is one of the sciences, focusing on agricultural resources conflict towards a wide range of issues on environmental problems towards sustainable agriculture, including the issue of global food security. Think political ecology, environment, institutional, technology, extension, off-farms income diversification, power and interest of stakeholders, rural-urban linkage for global food security: the shift from Fordism to Nichism. We need to concretize "what we can do" in tracing the global food supply chain in order to feed the world. In addition, we need strong supporting from the political will of the government to keep global food security.

1. Introduction

Prior to all sessions of keynote speakers, President of Hasanuddin University, Professor Dwia Aries Tina Pulubuhu gave a welcome speech for all participants and speakers. She ²⁵ emphasized that Hasanuddin University, as the largest university in the Eastern part of Indonesia, can **play an important role in** the concretizing idea **and** stepping up food security and ecology for sustainable agriculture and agribusiness development. Efforts to maintain food security have many challenges, including how to balance environmental ecology and socio-economic aspects of rural/agricultural **so** ⁷ **ty** [1,2]. One example of a research case from Pulubuhu [3] ⁷ **at** explained women's strategies in dealing with agrarian land conflicts. The results showed that **women farmers in the face of the conflict took the strategy of joining men in fighting for their land rights.** This strategy has advanced women and made women stronger and more confident. The value of intelligence and brave **affect women farmers in determining strategy [3] as a crucial part in agricultural development towards global food security.**

Climate change is also a challenge for food security. Human lifestyles that don't pay attention to environment will be a problem in the future. Cleanliness and concern for the environment can be started from the family environment. A study conducted on communication carried out at the family



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level of community awareness that shows the influence and significance of family communication strategies together at the level of community awareness. Significant and positive test results affect family communication strategies and the level of community awareness in coastal areas [4]. This is also in line with the opinion of Arsyad [5] that the better public health services will also affect household income. It can be concluded that public health services can help agricultural poverty alleviation though indirectly. These evidences above lead us to argue that socio-economic determinants and political ecology are important pillar in keeping global food security and sustainable agriculture.

1.1. *Alternative development from fordism to nichism for Asian agriculture*
 Professor Yoshio Kawamura (President, Kyoto College of Agriculture) started the speech by introducing alternative development from fordism to nichism for Asian agriculture in a globalizing era. In the 21st century, any country is expected to develop into a more globalized society which is directly associated with high-tech information development. With this background, this paper deals with a basic strategy for agricultural/rural development in the globalizing era, based on the socio-economic characteristics of rural agriculture. For this purpose, we shall consider: firstly, the changes in the international environment to which rural agricultural communities have to face; secondly, the peculiarity of agriculture which is a given condition directly affecting the agricultural development process in globalizing economy; thirdly, the strategic framework for rural agricultural development in the globalizing environment; and lastly, the roles of rural studies for agricultural development in the globalizing era [6].

Paradigm shift in development scheme, fordism type vs. nichism type of development. Unlike the manufacturing industry, agriculture, forestry, and fishery have a strong local character because they are directly influenced not only by the socio-economic environment but also by the natural environment. Systems of productions in these industries are difficult to change in a short period of time, and therefore they cannot swiftly cope with changes in the market. In fact, Japanese agriculture has faced fierce competition from imported farm products since imports were liberalized. Every region has its mainstay agriculture featuring its locality. The technology and know-how that farm households in the region have acquired in regard to the mainstay agriculture are essential resources for the region. Since the mainstay agriculture has been established by dint of years of accumulation, no region can be vitalized if it is weak. The mainstay agriculture is, though often inconspicuous, the most important and basic production system for the region. Therefore, the most important step for the development of regional agriculture is to foster the sustainable development of the mainstay agriculture [6].

		Market		
		Fordism Type (Indifferentiated Market for Mass Consumers)	Nichism Type (Differentiated Market for Specified Consumer)	
Production	Nichism Type (Diversified/Multiple-crops in Limited Production)	D	C	Dynamic Function
	Fordism Type (Specialized/mono-culture in Mass Production)	A2	B2	
	High Added Value Commodity	A1	B1	Potential Function
	Ordinary Commodity	Potential Function	Dynamic Function	

Figure 1. Hypothetical Framework of Production-Market Linkages [6].

Kawamura explained we have to note that this kind of production system is predicated on the Fordism type indifferent market (Figure 1: A1-A2) that caters to mass-consumers. In this type of market, there is fierce competition between domestic and imported agricultural products. If we are to acquire added value and survive in this type of market, we must either reduce costs and prices by enlarging scale (Figure 1: A1) or develop new breeds and charge higher prices (Figure 1: A2). However, it is difficult and risky for a large-scale production system to transform itself to swiftly cope with changes in the market. In contrast, if goods are targeted at relatively small-scale differentiated markets of differentiated consumers, they will generate added value and have development functions (Figure 1: A1→B1, A2→B2). This type of market is called a nichism type market. As economic terms, the phrases “niche market” and “niche industry” are often used to indicate that the market or industry is intended for a small gap that has been neglected. We shall here define nichism as a system that intends to exert its capabilities in a small-scale market in ways best suited to the environment.

1.2. Political ecology and supply chain perspectives: Kra Canal evidence

Professor Mohd Nizam (National University of Malaysia) emphasizes that Kra Canal: What should we know from the political ecology and supply chain perspectives ?. The Kra Canal construction project is a canal-making project that stretches across mainland Thailand which divides the plains in Thailand. This project is a joint project between Thailand and China. The development of this project is to shorten the path crossed by ships with new transportation links connecting the South China Sea and the Andaman Sea and vice versa without having to cross the Thai peninsula.

Canal construction provides an opportunity and will become an alternative for international logistics vessels to transit through the Malacca Strait and shorten the transit for oil shipments to Japan and China. That way, logistics vessels will increase in terms of the number of trips of 1,200 km. In addition, another advantage that can be obtained is that travel time is relatively reduced or faster for three to four days. The Kra Canal issue has widely been discussed by maritime players, such as policymakers, regulators, and shipping and port operators. It seems that the idea of developing the Kra Canal is most welcome due to the significant savings in costs, higher levels of safety, and shortened distance compared to the journey via the Strait of Malacca. Nizam [7] explained (figure 2) the various economic potentials of Kra Canals : (a) 1200km vs 2800km (Malacca Straits) and 3500km (Lombok Strait); (b) 2015 – MoU between China-Thailand (Asian Union Group -Kra Infrastructure Investment and Development Company); (c) Thailand as a new hub - International Investment, Employment, Trade benefits (USD280 billion); (d) Potential benefits include port fees, tolls, foreign investment and infrastructure developments; (e) For China, the shorter route for time and cost savings when importing oil.



Figure 2. Economy Potential of Kra Canal [7]

The industry players in the maritime field appear to be highly receptive to the Kra Canal because the canal will enable ships to bypass the Malacca Strait, thus reducing voyage distance by 1,200 km. A shortened single journey means that ships could reduce up to 72 h of sailing time. Therefore, this will very likely attract the crossing of vessels. Definitely, shipping and logistics companies would welcome the reduced operating and voyaging costs between East Asia and Europe. Besides that, a shorter trip would also reduce the risk of running into pirates and avoid congestion. In addition, the length of the canal is proposed to be 102 km, 400 m in width, and 25 m in depth [8,9]. This will allow the passage of any type of cargo vessel, up to ultra-large crude carriers (300,000 deadweight tonnage (dwt), or supertankers, the largest presently operating cargo vessel in the world [10].

1.3. *The political ecology of food consumption and production: power and interest analysis*

Professor Saleh Ali from Hasanuddin was giving a speech on the political ecology of food consumption and production in the mountain and small island ecological zones: power and interest analysis of stakeholders. The problem providing food is a civilization problem, and it will exist along with human civilization history, by 2050 when the world's population will reach 9.1 billion (34% higher than today), food production will need to be increased up to 16% by using limited natural resources especially land. In this situation, we need "post-modern" agriculture that draws more effectively on production ecology principles to improve the productivity and efficiency of agriculture while reducing negative environmental impacts. Political ecology is a theoretical perspective that attempts to integrate human and physical approaches to environmental change through an analysis of politically, ecologically, and economically marginal people, the social and cultural pressures of production on local resources; and, the interaction of local-global politics [11]. Saleh Ali [12] gave important explanations about perspectives of political ecology, which was explained in the research of Thomas J [13]:

1. The environmental/social dialectic perspective [13]; this perspective argues that environmental degradation or change occurs as a result of political economic and ecological processes; combines a structuralist view of society with a positivist view of ecology; the social theoretical basis of this perspective draws on historical materialist perspectives, notably neo-Marxist (under) development studies [12].
2. The environmental constructivist perspective [13]; this perspective argues that accounts of environmental change legitimize knowledge claims about socio-ecological relations that simultaneously legitimize power relations [14]; the goals of this perspective are not simply to deconstruct narratives and to propose counter-narratives but also to advance scientific understanding of biophysical changes and to open up this analytical process to actors like smallholders whose experience and understanding have historically been undervalued [12].
3. The co-production of socio-nature perspective [13]; this perspective is the most recent political-ecological approach to examine the interplay of socio-ecological relations; the theoretical foundation of this approach builds upon two multi-disciplinary research traditions: Science and Technology Studies (STS) and Actor-Network Theory (ANT) [12].

1.4. *Effect of organic and inorganic amendments on the productivity of cocoa on a marginal soil*

Professor Peter McMahon, University of Sydney, explained the effect of organic and inorganic amendments on the productivity of cocoa on a marginal soil in Sulawesi. The results of his presentation are to confirm the crucial role that SOM can play in the nutrition of cocoa in marginal tropical soils. The higher Ca and Mg content, CEC and BS in the compost-treated soils and the higher tissue concentrations of Ca and Mg, taken together with substantially increased growth and yield, suggest that availability of these nutrients was limiting to growth and productivity of the cocoa trees. Intervene necrosis observed in leaves of control and mineral fertilizer-treated trees was indicative of Ca deficiency, while low Mg/K ratios suggest added K may have exacerbated limited Mg availability. Despite increasing the supply of Ca and Mg with dolomite, dolomite-treated trees were also smaller and had lower yields than compost-treated trees. Clearly, organic matter played a role in promoting the

uptake of these nutrients, resulting in up to five times higher yields and highly improved survival of trees in treatments with compost. Further studies are required to determine appropriate formulations of inorganic fertilizers for use in conjunction with organic amendments on cocoa [15]. In addition to fertilizer management, water management models are also very important for commodity cocoa. Water management as an alternative method to increase its productivity by harvesting rainwater on the hilly cocoa farm area and distributing the water based on the gravity law. The results showed with the right management of Artificial-Mini-Hill-Basin (AMHB), rainwater can be optimally utilized as a source of cocoa farm water to overcome the lack of water during the dry season [16]. Sustainable agriculture becomes a crucial issue in economic development (the importance of sustainable agriculture for global development) [17]. In order to improve agricultural efficiency and productivity growth, agricultural activities should follow technological developments in industrial times 4.0. The movement of information becomes an important aspect for farmers. For example, research on developing an app in the efficiency of rural farming communities. Proven this app helps farmers in determining fixed costs and variable agriculture, getting market price information [18]. Benefits from the right technology to improve efficiency and grow agricultural productivity.

2. ICEFS Scoping

ICEFS 2020 collected 167 papers distributed into four topics: (1) Environmental policy of food security, (2) Availability of resources and technology for food security, (3) Agricultural institutional in an ecological environment perspective, and (4) Socio-economics and agricultural extension for food security.

Some importer notes can be extracted from table 1. First, the topic "availability of resources and technology for food security" has the highest percentage of paper presented (35%) at ICEFS. This shows that the availability of resources and technology tends to be important (interest in speaking) related to global food security, followed by the topic "agriculture institutional in an ecological environment perspective" (27%). This implies that the availability of resources, technology, agricultural institutions, and the ecological environment will be the driving force for global food security. Second, the topic "environmental policy on food security" places by 25% of the paper presented in ICEFS. This reminds us that the importance of various policies is needed by the government in balancing global food security aspects for sustainable agriculture. The last crucial topic in ICEFS is "socio-economic and agricultural extension for food security" (13%). This indicates that socio-economic conditions and agricultural extension also have unique functions in each region, will provide interesting information for readers to understand how the socio-economic determinants and agricultural extension affect farm income diversification for global food security.

Table 1. ICEFS 2020 Scoping.

Topic	Number of papers presented	Long-standing issue-Determinants	Discussant proposal toward a solution for government
Environmental policy of food security	59 (25%)	<ul style="list-style-type: none"> • Conflict areas • Government • E-government • Innovation 	Agricultural resources conflict with environment solution
Availability of resources and technology for food security	72 (35%)	<ul style="list-style-type: none"> • Ecotourism • Willingness to Pay • Willingness to Receive • Entrepreneur 	The paradigm shift from Fordism to Nichism
Agricultural institutional in an	64 (27%)	<ul style="list-style-type: none"> • Stakeholders • Conflict 	Power and interest of stakeholders

ecological environment perspective			management	
			• Forest area	
Socio-economics and agricultural extension for food security	51 (13%)		• Socio-economic factors	Off-farms income diversification
			• Dryland rice	
			• Profit	

Hints: Needs actively supporting from the political will of the government to keep global food security and sustainable agriculture

23 Conclusion

International Conference on Environmental Ecology of Food Security (ICEFS) was directly directed to build a network between researchers and research institutions supported by the Department of Agricultural Socio-economics, Hasanuddin University. Some important points to be concluded: environmental ecology is one of the sciences, focusing on agricultural resources conflict, towards a wide range of issues on environmental problems towards sustainable agriculture, including the issue of global food security. In maintaining global food security, do not forget to think about political ecology, environment, institutional, technology, extension, off-farms income diversification, power and interest of stakeholders, and rural-urban linkage: the shift from Fordism to Nichism. We need to concretize "what we can do" in tracing the global food supply chain in order to feed the world. In addition, we need to continue the ICEFS and actively supporting the political will of the government to keep global food security in the world.

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