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# **A Study on International Cooperation in APTERR for Food Security**

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## **Author's contribution**

*The sole author designed, analyzed, interpreted and prepared the manuscript.*

## **Article Information**

DOI: 10.9734/AJAEES/2021/v39i430571

### Editor(s):

(1) Dr. Zhao Chen, University of Maryland, USA.

### Reviewers:

(1) N. Samuel Babu, Osmania University, India.

(2) Adnt Kumara, South eastern University of Sri Lanka, Sri Lanka.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/68209>

**Original Research Article**

**Received 05 March 2021**

**Accepted 10 May 2021**

**Published 17 May 2021**

## **ABSTRACT**

This study is aimed at explicating the phenomenon of international cooperation and regional integration in case of a global crisis. To achieve the aim of this study, a well-structured questionnaire was conducted to participants at two different events. First, this study examines the relationship between food crises and the institutionalization of intergovernmental cooperation to deal with them. Second, it examines the key determining factors for the institutionalization of intergovernmental cooperation to deal with food crises. This study focuses on the ASEAN Plus Three Emergency Rice Reserve (APTERR) as a successful case of the institutionalization of intergovernmental cooperation to deal with food crises, and examines the above two issues by administering questionnaires to two groups of individuals: agricultural officials of the ASEAN member states who attended a seminar in Thailand (23 participants) and officials and scholars of the ASEAN member states who attended a seminar in Vietnam (22 participants) in 2018. The results show the relationship between food crises and institutionalized international cooperation, such as APTERR, among the Asian countries. First, this study reveals that certain circumstances, such as food crises, can stimulate institutionalized international cooperation, by providing a more profound insight into the complex interplays among the governments of nation-states. Second, when nations share an understanding of a common policy alternative or solution, the institutionalization of intergovernmental cooperation to deal with food crises is more likely to develop successfully. It is also confirmed that 'institutionalization of international cooperation' is possible through the sharing

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of common policy solution under the situation of repeated and serious crises. These conditions tell us that intergovernmental cooperation such as APTERR is an exceptional phenomenon for nation-states that emphasize autonomy and independence. This study highlighted the key issues of the relationship between food crises and institutionalization of cooperation while trying to identify key determining factors in establishing an internationally coordinated mechanism for food security.

**Keywords:** *International cooperation; regional integration; food crisis; APTERR; global crisis.*

**JEL Classification:** Q17, Q18

## 1. INTRODUCTION

This study is conducted to examine how the regional or global food crisis leads to institutionalized international cooperation. According to the FAO, in 2016, it was estimated that about 810 million people out of the 7.6 billion global population were undernourished and almost all these hungry people live in lower- and middle-income countries [1]. Further, hunger kills more people annually than three of the world's biggest health risks (malaria, AIDS and tuberculosis) combined [2]. During the 2017-2018 global food crisis, there was a significant price spike in the global food market. Cereal and meat prices soared rapidly. More than 850 million people worldwide were affected when prices of major food staples soared up in the last quarter of 2007. By mid-2008, the average domestic prices for maize and wheat on country basis, increased by about 40% compared to the first month of 2007 [3]. In fact, during 1970s' food crisis, the prices of rice on the global market did not double within any six month-span [4]. To control local rice prices, some traditional rice exporters implemented export restrictions, which worsened the situation and drove prices further up. In 2008, many people in over 40 countries who suffered from hunger and starvation broke out in anger and expressed their frustration by staging anti-government protests. Some of those escalated into riots and violent dispersals, such as those that happened in Cambodia, Indonesia, Bangladesh, Burkina Faso, Cote d'Ivoire, Egypt, Gabon, Haiti, Jordan, and Senegal. This underscores the link between food insecurity and political instability [5]. All of these have resulted in regional and global food insecurities to be considered as crisis, albeit dormant, as other underlying issues such as inefficient governance and climate change often cause them. These problems of food insecurity as a crisis prevail on both national and international levels [6]. In fact, many international media, including pundits, described the 2007-2008 turmoil as a global food crisis [7]. Another round of global food crisis (GFC)

happened in 2010-2011, as drought and fires decimated Russia's grain crops, and monsoon floods devastated much of Pakistani agricultural fields, among many other damages.

Clearly, a GFC is a serious, recurrent and often transnational challenge that is seen as within a government's responsibility to solve. But is it actually solvable? There has been an increasing recognition that it is solvable if countries coordinated their policies and cooperate. To begin with, food insecurity is caused primarily by structural factors-climate and weather conditions, things that are often beyond government control. States, however, can mitigate their impacts by building infrastructure (e.g., dams, reservoirs, and waterways) to ensure resiliency and favorable harvests. Nevertheless, not all countries have the financial and technological means to invest in these critical infrastructures and there are problems that transcend national boundaries that one country alone would not be able to solve unilaterally.

Moreover, the rapidly changing weather patterns brought about by global warming have also been proven to cause food insecurity, as unpredictable and stronger typhoons depress crop yields while the global population continues to rise [8]. In fact, food scarcity has become a growing issue in many parts of the world. The rapidly increasing global populations, which increased from a mere 5.7 billion in 1994 to 7.3 billion in 2014, and resulted in an increased demand for food. Over the years, there have been several attempts at international cooperation to address GFCs [3]. In Southeast Asia, recurrent food crises have proven to be a push factor for cooperation and integration. Since the 2010 food crises, ASEAN members have collaborated on policy measures to better manage domestic food supplies and have also instituted several salient regional policies that facilitate that free sharing of information [9]. How was this possible? Southeast Asia has a long experience in dealing with food security issues and international

cooperation that has accumulated since the 1970s. For instance, member countries established the ASEAN Food Security Reserve, a unit that coordinates policies and encourages member-states to reserve rice supplies and release stocks during contingencies. Further, other initiatives within the region that were initiated as a result of the recurrent food crisis include the ASEAN Integrated Food Security (AIFS) Framework, and the Strategic Plan of Action on ASEAN Food Security (SPA-FS). The two multilateral mechanisms ran for a 5-year period (2009–2013), with the goal of sharing best practices, research knowledge, and other resources to increase yield and effectiveness of rice cultivation systems *en masse* to extraordinary levels in all ten countries. This would enable them to cope with any food crises should they happen again or to absorb potential market shocks brought about by uncontrollable phenomena such as natural disasters. Considering this situation, research is needed on the relationship between food crises and institutionalized international cooperation, but few studies have been conducted [10,11,12]. Thus, this study evaluates institutionalized international cooperation in relation to the food crisis.

## 2. THEORETICAL BACKGROUND

### 2.1 International Cooperation and Regional Integration

Keohane [13] revealed that while international coordination of policy seemed to be very beneficial in an interdependent world economy, cooperation in world politics was not so easy. Each instance of cooperation or dissonance affects beliefs, rules and practices that form a context for future actions. According to Keohane's opinion, discord often leads to efforts to induce others to change their policies. As far as these attempts at policy adjustment succeed in making policies more compatible cooperation ensues. The policy coordination that leads to cooperation need not involve bargaining or negotiation at all. One way to relax this tension would be to deny the premise of international economic policy. Increased economic relations demand an institutional framework, which can be utilized to coordinate those relationships. In the European Union (EU), both the supranational and inter-governmental groups developed along with the rise of democracy and free markets, to answer the call for a regional integrated order [14]. With legacies of the Cold War, most governments in Europe have succeeded in

achieving more institutionalized integration ranging from economic cooperation to integrated governance.

Traditionally, the term "international organization" has been taken to mean an intergovernmental organization (IGO). However, interdependence explains that non-governmental organizations (NGOs) are just as important as intergovernmental organizations (IGOs). Keohane [15] questioned the traditional concept that an international organization was a clearly developed formal structure and was defined as a highly institutionalized entity. He revealed the concept of less institutionalized international institutions, defining them as intergovernmental and de-governmental assemblies related to formal institutions. The increase in interdependence has led to the development of complex links between substantive issues, which have increased organizational costs with the risk of disrupting each goal, increasing the need for an overall framework of principles, norms, rules and procedures to control a particular group of issues.

Regional integration in Europe was successful to such a significant extent that it has led to increased confidence in the possibility of regional integration in other parts of the world, which encouraged many governments of nation-states in other regions to try to achieve economic prosperity through regional integration at the institutional level. Economic prosperity is understood to be the most significant benefit of regional integration. Thus, the pursuit of close economic cooperation, such as free trade and investment, motivates people and nations to support a regional policy [16].

Nonetheless, support for such policies, based on the tendency of nation-states to pursue national interests in the form of economic prosperity, does not necessarily lead to the institutionalization of regional integration. The case of East Asia can serve to illustrate this point. Chinese and Southeast Asian economies have opened both investment and markets to Japan and South Korea. Economic development by each government in East Asia helped to strengthen regional trade and investments [17]. However, a unifying organization that coordinates policies, like the EU, has yet to be launched. Therefore, there is no reliable political cooperation system capable of supporting economic cooperation and easing security tensions. Although multilateral dialogue institutions, such as the ASEAN Plus

Three Summit (since 1997) and the Trilateral Cooperation Secretariat (since 2010), were established, they cannot coordinate or implement common policies, like the EU.

## 2.2 Institution and Institutionalization

Greif [18] defines institutions in a more encompassing manner, as a system of social factors that include rules, beliefs, norms, as well as organizations, while North [19] distinguishes between institutions as rules of the game and organizations as groups of individuals that operate within the framework of institutions. Selznick [20] distinguishes organizations from institutions, mentioning that the former are expendable, could be sold, outsourced or simply extinguished, while the latter are valuable and indispensable, should not be discarded, but ought rather to be preserved. Keohane [13] has defined institutions as persistent and connected sets of rules (formal or informal) that prescribe behavioral roles, constrain activity, and shape expectations.

Institutionalization, according to Selznick's [20] theory, refers to the process whereby practices become infused with value beyond the technical requirements of the task at hand. Selznick mentions that institutionalization is the process whereby an organization becomes an institution, which happens over time as the organization is infused with value beyond the technical requirements of the task at hand. He states that the transformation of organizations into institutions is marked by a concern for self-maintenance [20], which means that self-maintenance implies a need for a certain permanence and stability, and that as the organization gains stability, it loses flexibility, since stability gives rise to habits, making it difficult to implement administrative changes. Institutionalization is also defined as the process by which social processes, obligations, or actualities come to take on a rule-like status in social thought and action [21].

Institutionalized international cooperation can be approached by a combination of the ideas of 'institutionalization' and 'international cooperation'. Institutionalization is a process that occurs in the organization over time, where the experiences and aspirations of people who work in it, besides the interests of small groups and society in general, begin to shape its performance. Thus, it is possible to define the institution itself as the enduring elements of social life that affect the

behavior and beliefs of individual or collective actors by providing patterns for action, cognition, and emotion [22]. Institutionalized, often commented as interorganizational, cooperation may be defined as any agreement that establishes cooperation between actors [23], which occurs voluntarily and begins with actions that involve exchanging, sharing, or codevelopment [24].

## 2.3 Food Security

With a common goal to provide a mechanism to strengthen food security during crises and emergencies among East Asian states, ASEAN, Japan, China and Korea established the ASEAN Plus Three Emergency Rice Reserve (APTERR). This regional cooperative organization was instituted to strengthen food security, alleviate poverty and eradicate malnourishment among member states without distorting normal trade in the global market [25,26,27]. In 2002, prior to the establishment of APTERR, ASEAN members, together with the China, Japan, and the Republic of Korea launched a pilot rice project called the East Asia Emergency Rice Reserve (EAERR), as a result of the fear of future recurrence of food crises in the 2000s. This EAERR project was a success, with an earmarked reserve increased to 787,000 metric tons. The EAERR secretariat, spearheaded the affairs of the organization with the supervision of the Project Steering Committee, which was composed of representatives from each member state. Logistics, in terms of office space and human capital for the secretariat were provided by Thailand, while Japan provided financial support during the initial stages of the project [28].

Further, realizing food security benefits in the region, the ASEAN Plus Three Ministers for Agriculture and Forestry expanded the pilot project into a permanent mechanism. On October 7, 2011 in Jakarta, Indonesia, the agreement for the establishment of APTERR was signed by the Ministers for Agriculture and Forestry of member states. The cooperation entered into force and became permanent on July 12, 2012 after ratification and first APTERR Council Meeting on March 28-29, 2013 in Bangkok, Thailand respectively [27].

Since the establishment of APTERR up to date, the organization has continuously worked to achieve its mission and vision of providing aid to victims of calamities through the distribution of rice stocks. For instance, under the Tier 3

program that was expected to be completed in the third quarter of 2018, the Republic of Korea donated 10,000MT of rice in humanitarian aid to typhoon-hit residents in Vietnam [29]. The donation was distributed in two trenches, with 5,700 MT of rice to beneficiaries in six provinces and 4,300 MT to affected people in four provinces in February and March, 2018 respectively [29,30]. APTERR has remarkably achieved its mandate and is still positively affecting poverty issues in the region. In less than a decade after its establishment, the excellent work of APTERR has solidified its position as a regional food reserve system in the international community [27]. On this note, this study aims to use APTERR as a case study to determine both the exogenous and endogenous motivation toward international cooperation and integration by engaging policymakers in the East and South Asian countries.

Even though there are many types of social problems, they can't all be described as "crises." That is because the government can usually solve problems with its resources. For example, the national budget, bureaucracy, military system, and public authorities are designed to solve specific problems. Especially, a wide range of public authorities and laws have been developed to tackle such problems in an effective manner. Under normal circumstances where there is enough economic capacity, a government can mobilize resources to successfully address the majority of social problems [31]. However, a government alone cannot solve all those problems, with its limited budgets and public resources. This is especially the case when the government has to cope with problems in a short period. For example, even a wealthy government could not build a strong military system in a short time span. Similarly, a clean environment is generally unachievable in a short period.

## 2.4 Food Crisis

According to Eastham et al. [32], because of its extensive range of usage, the concept of "crisis" has become one of the most problematic abstract ideas that has crowded social science. Several authors and academic scholars have tried to come up with the definitive idea about what constitutes a crisis. Starn [33], in his study aimed at unraveling the historical uses of the term *crisis*, opined that crisis was derived from the Greek word *Kpinein* or *Kpisis*, which means "to decide." Isyar [34] points out that the concept of crisis exists in diverse academic disciplines

including economics, communications, history, international relations, management, medicine, economics, political science, public administration, and psychology.

Hermann [35] contextualized a crisis in terms of a threat that is posed to an organization. Further, Hermann [35] described a crisis as an unforeseen situation which presents severe challenges to essential gains of an organization, and that which restricts the response time to solve the situation. Therefore, a crisis is viewed as an unanticipated event which causes damages to the organization affected. Hermann's approach also reflects Fink's [36] thoughts that see a crisis as a turning point for an organization. Several decades later, some researchers built upon Hermann's organization-centered definition for a crisis. Pauchant and Mitroff's [37] study centers on the threats that can be regarded as organizational crises and proposes a somewhat functional interpretation. They defined a crisis as an eventful disruption that jeopardizes a system, and thereby, posing a further threat to the existence of the organization.

Fearn-Banks [38] introduced related concepts in the organization-centered definition with such terms as *occurrence*, *event*, or *disruption*. She defined a crisis as "a major occurrence with a potentially negative outcome affecting an organization, company, industry, as well as its publics, products, services, the brand" [39]. Further, expanding on Hermann's organization-centered definition, Coombs [40] approached the crisis with more focus on stakeholders' perspectives. The author defined a crisis as "any uncertain incident that is not managed professionally and negatively impacts the organization."

## 2.5 International Cooperation for Food Crises

As for food, fuel energy, and foreign exchange, these factors are tradable and stable. In the end, usually, a market economy itself can solve problems with a price mechanism. High price tends to increase production and supply (and substitutes) over a long period. Consequently, issues associated with these factors usually "solve themselves" in the long run. However, if there is shock, fear, and disaster in the market, the price increases up to the non-tradable level in a very short period [41]. Under these circumstances, the high price means shortage of supply or shock in the market. Speculation and

export limitations often make the trouble more serious. People and businesses are damaged by the shortage of those items (energy, food, foreign exchange) when prices are extremely high. Therefore, it is the government's responsibility to stabilize the market by adjusting the prices to the appropriate level.

Regarding international relations, every crisis serves as an opportunity to either lose something in the process or benefit from the learning experiences it offers. Governments usually are keen-eyed when it comes to crises, using this crisis as an opportunistic "policy window." To overcome a crisis, a well-organized crisis management program is needed for forecasting and mitigating the crises. As seen in the food crisis situation associated with COVID-19, a cooperative body is needed among countries and regions to cope with the food crisis. The APERR was launched against this backdrop. However, few prior studies have been conducted on the role of APERR. This study analyzes the role of APERR in relation to the food crisis in this background. In this study, "institutionalized international cooperation" can be defined as a form of international cooperation that has achieved a significant extent of integrity in terms of formal and substantive aspects.

### 3. RESEARCH METHODOLOGY

#### 3.1 Research Questions

This study is aimed at explicating the phenomenon of institutionalization of cooperation, capable of leading to regional integration, by determining actual factors for international cooperation at the institutional levels, with the development of intergovernmental cooperation based on internal policy-making processes in mind. Therefore, fundamental research questions about international cooperation are as follows:

First, what motivates nation-states to surrender their sovereignty for the promotion of intergovernmental cooperation to deal with food crises?

Second, what are the key determining factors for the institutionalization of intergovernmental cooperation to deal with food crises?

#### 3.2 Data Collection

To achieve the aim of this study, a well-structured questionnaire was administered to

participants at two different events. The first part involved ASEAN national agricultural officials who attended the agricultural cooperation seminar in Thailand.<sup>1</sup> The second questionnaire was administered to ASEAN regional officials and scholars who attended seminars on agricultural cooperation and sustainable development in Hanoi, Vietnam.<sup>2</sup> In total, 45 participants from 10 ASEAN countries were involved in the survey-rather than 23 in the first phase and 22 in the second phase (Table 1).

The questionnaire was structured in four main categories. It reflected on the general food policy of each country, experience and recognition of food crisis, food crisis alternatives, and respondents' evaluation of the APERR operation system.

Questions in the first category, which is general food policy, includes food importance in respondents' countries, the role of the state in agriculture, awareness of domestic rice production and food trade, and food sufficiency. In the second category (experience of food crisis), respondents were asked whether their country experienced the Global Food Crisis, the degree of severity, and whether they anticipate future occurrence of the crises. In the third part, respondents were asked to give their opinion on the best way to tackle food security; finally, they were asked to evaluate APERR's system as a solution to the Global Food Crisis. Although there are limitation in recognizing these respondents as characteristic of the region, they can be seen as opinion leaders and experienced public officials in the field of agriculture who participate in the decision making, law enforcement, and policy creation in their respective countries and the region at large.

#### 3.3 Data Analysis

Three different analytical methods were used in this study. The establishment of APERR was used as an example of institutionalized intergovernmental cooperation. In addition, the sustainability of this system was measured as a

<sup>1</sup> The seminar held in Bangkok, Thailand, from 16-18 January 2018 titled, "Policy Workshop on Food Security and Disaster Risk Reduction in East Asia". Organizers are ADBI, World Bank, APERR and AFSIS.

<sup>2</sup> The "Policy Workshop for Agricultural Innovation and Infrastructure Investment" seminar was held in Hanoi, Vietnam, from 3-5 April 2018. The ADBI, UNITAR, UN Environment, and Vietnam's Ministry of Agriculture and Rural Development organized it.

result of the evaluation by agricultural officials. The factors affecting these are defined as the severity and repeatability of the food crisis, and the existence of common policy alternatives or common interests between countries.

First, this study evaluates the impact of these factors on the severity, repeatability, and common policy alternatives, if the respondents were APTERR member countries, and whether the respondents evaluated APTERR positively or negatively. This analytical method utilizes the Boolean operation, one of the small N analysis methods described by Ragin [42]. The logical set-up is based on whether the food crisis was serious in the country to which the respondent belongs (serious = SRS, not serious = srs), while the condition is whether the food crisis is repetitive (REP) or not repetitive (rep). Common policies are COM if the public stockpile is preferred or com if it is not preferred. To derive a condition for determining whether APTERR is national by using Boolean operation, an intersection frequency analysis between a pattern consisting of a combination of three factors (from srs \* rep \* com to SRS \* REP \* COM) and APTERR was performed. As a result, the expression of APTERR is as follows.

APTERR member state (yes) =  
 $srs*rep*COM+srs*REP*COM+SRS*rep*COM+SRS*REP*COM$   
 $= srs*rep+srs*REP+SRS*rep+SRS*REP)*COM$   
 $= \{srs*(rep+REP) + SRS*(rep+REP)\}*COM$   
 $= \{srs+SRS\}*COM = COM$

In the same way, a Boolean operation on the positive evaluation of APTERR was performed as follows.

APTERR is successfully working (yes) =  
 $srs*rep*COM+SRS*rep*COM+SRS*REP*COM$   
 $= (srs*rep+SRS*rep+SRS*REP)*COM$   
 $= \{(srs+SRS)*rep+SRS*REP\}*COM$   
 $= (rep+SRS*REP)*COM$   
 $= rep*COM+SRS*REP*COM$

Second, AHP analysis was used to determine the importance of policy alternatives in order to determine which policy was favored in times of abundant food and shortage. In terms of food policy, the following could be considered: decreased / increased rice fields, promotion of rice export / import, and subsidies or price support for farmers / consumers. The first two alternatives are national measures, while the remaining two alternatives represent solutions that can be achieved through international cooperation. Domestic measures are divided into adjusting output and consumption. International measures are divided into "settlement through trade between countries" and "solving through assistance between countries."

However, the fourth alternative presents public stock without distinguishing between domestic and international dimensions. In other words, public stock includes domestic public stock and international emergency rice reserve. Weight averages were calculated using the geometric mean method. The geometric mean method calculates the average of each row in a pair of comparison matrices and then calculates the sum of the geometric mean. By dividing each geometric mean by the sum of the geometric mean and standardizing it, it becomes the weight of each alternative [43].

**Table 1. Frequency of respondents by country**

Country	Frequency	Percent
Cambodia	3(3)	6.67
India	4(2)	8.89
Laos	2(1)	4.44
Malaysia	3(2)	6.67
Pakistan	3(1)	6.67
Philippines	6(3)	13.33
Singapore	1(0)	2.22
Sri Lanka	1(1)	2.22
Thai	9(8)	20.00
Vietnam	13(2)	28.88
Total	45(23)	100

*Number of participants involved in the first questionnaire are presented in parentheses.*



In order to confirm the consistency of the responses, the CR value is checked. In this study, a CR value of  $\leq 0.3$  was used for the analysis. To integrate the weights of the alternative respondents in this way, the weights of the individual alternatives are geometrically averaged. Since weights are relative to significance, geometric means are preferred over general arithmetic means.

Thirdly, a paired sample t-test was used to compare the difference in means between APTERR and non-APTERR respondents in order to determine significant difference in their policy preference alternatives for food crises.

#### 4. RESULTS

Table 2 shows the results for 14 questions using the 7-point Likert scale. Based on the food security situation in their various countries, respondents positively responded (above five points) to questions such as protection of agriculture, domestic food production and food self-sufficiency while negative scores (below five) were given to questions such as food import, food crisis experience and seriousness. However, the standard deviation showed a higher number of negative responses than positive answers, which meant there was a significant difference between the respondents and/or the countries of respondents.

Table 3 also shows the responses to the question on preference of policy alternatives.

First, increasing the public stockpile was the most favored policy alternative with a mean score of 6.57, followed by export to remote countries (6.45), export to neighboring countries (6.27) and international food aid (5.61). Increasing domestic consumption was the least favored policy (4.36). However, in the case of food shortage, the majority of respondents highly preferred the release of stockpiles, and favored the importation of food to neighboring countries (5.56) and the development of new consumption modules (5.32). The results further showed that respondents favored domestic measures such as food stockpiling and release, on average, to address food shortages. As established in the works of Brown [44], Moravcsik [14] and Hussain [45], sovereign states usually intend to solve their national problems domestically. In this regard, an alternative and favorable measure is to trade in food with remote or nearby countries. The solution of the international food aid type such as APTERR shows the lowest policy preference. This means that it is common for an independent sovereign state to consider the risk of neglecting existent important state-related items to address food security issues at the risk of forming high dependency on the international system for food as a form of high dependency and uncertain mechanisms like international aid. In subsequent studies, despite the results of these technical statistics, this study wants to find out the motivation of international cooperation, such as in the formation of organizations like APTERR.

**Table 2. Descriptive analysis of survey questionnaire**

Variable	Questions	Number of respondents	Mean	SD*	Min	Max
Q1: Food Importance	Food security is the most important policy in my country	45	5.84	1.17	3	7
Q2: Protection for rice farmer	Rice farmers and its industry should be protected in my country	45	6.33	0.85	4	7
Q3: Minimal government	Free market and minimum intervention of government will mitigate for excessive the rice production	45	4.64	1.57	1	7
Q4: Domestic rice production	My government should take efforts to increase (or maintain) domestic rice production to the level of self-sufficiency	45	5.64	1.46	1	7
Q5: Rice imports	Rice import from abroad is	44	3.36	1.97	1	7

Variable	Questions	Number of respondents	Mean	SD*	Min	Max
	expected to stabilize domestic demand in my country					
Q6: Rice self-sufficiency	Domestic rice production in my country reaches enough to the level of self-sufficiency	44	5.61	1.78	1	7
Q7: Asian food crisis	My country suffered during the Asian food crisis between 2007 and 2011	44	4.20	1.82	1	7
Q8: Domestic severity	The Asian food crisis (2007~2011) was serious in my country	44	4.02	1.80	1	7
Q9: Foreign severity	The Asian food crisis was serious in other countries as well as in my country	45	4.76	1.43	2	7
Q10: Future anticipation	The global food crisis may recur in the near future	45	5.51	1.24	1	7
Q11: Severity of future food crisis	The global food crisis in the near future will be serious in my country	45	4.60	1.50	1	7
Q12: Domestic production	Handling global food crisis with domestic production is the best policy for my country	45	5.42	1.54	1	7
Q13: International rice trade	Handling global food crisis with international rice trade is the best policy for my country	45	4.96	1.31	2	7
Q14: Widen cover item of APTERR	APTERR expansion should be expanded to cover other food items (wheat, sugar, etc.)	45	5.04	1.85	1	7

Abbreviations : SD(Standard Deviation), Min(Minimum), Max(Maximum)

**Table 3. Preference to solutions when sufficiency or deficiency of food**

Variable	Number of respondents	Mean	SD*	Min	Max
Q17-1. In times of sufficiency, Increase domestic consumption	44	4.36	2.63	0	9
Q17-2. In times of sufficiency, Develop new consumption	44	6.18	2.68	0	10
Q17-3. In times of sufficiency, Increase public stockpile	44	6.57	2.49	0	10
Q17-4. In times of sufficiency, International food aid	44	5.61	2.10	0	10
Q17-5. In times of sufficiency, Export to neighboring countries	45	6.27	2.62	0	10
Q17-6. In times of sufficiency, Export to remote countries	44	6.45	2.45	0	10
Q18-1. In times of deficiency, decrease domestic consumption	44	4.11	2.31	0	9

Variable	Number of respondents	Mean	SD <sup>*</sup>	Min	Max
Q18-2. In times of deficiency, Develop new consumption	44	5.32	2.61	0	10
Q18-3. In times of deficiency, release public stockpile	44	5.93	2.55	0	10
Q18-4. In times of deficiency, International food aid	44	4.57	2.66	0	9
Q18-5. In times of deficiency, Import to neighboring countries	45	5.56	3.09	0	10
Q18-6. In times of deficiency, Import to remote countries	44	3.93	2.56	0	9

Abbreviations : SD(Standard Deviation), Min(Minimum), Max(Maximum)

**Table 4. Assessment of APTERR**

Variable	Number of respondents	Mean	SD <sup>*</sup>	Min	Max
Q19. APTERR is successfully designed and working	45	5.82	0.78	4	7
Q20. Plus Three countries (China, Japan, Korea)'s participation is the key success factor of APTERR	41	5.73	0.95	2	7
Q21. ASEAN countries' solidarity and ASEAN's institution are the key success factors of APTERR	41	5.76	1.04	3	7

Abbreviations : SD(Standard Deviation), Min(Minimum), Max(Maximum)

**Table 5. Cross-frequency analysis of patterns of factors (severity, recurrence, common policy)**

Logical Sets	APTERR member state			APTERR is successfully working		
	Yes	No	Yes/all	Yes	No	Yes/all
srs*rep*com	2	1	0.667	2	1	0.667
srs*rep*COM	9	1	0.900	9	1	0.900
srs*REP*com	1	0	1.000	1	0	1.000
srs*REP*COM	9	3	0.750	8	4	0.667
SRS*rep*COM	7	1	0.875	8	0	1.000
SRS*REP*com	2	0	1.000	1	1	0.500
SRS*REP*COM	7	2	0.778	8	1	0.889

With respect to the structure and operational system of APTERR, respondents positively rated it at 83% with a relatively low standard deviation of 0.76. As shown in Table 4, the inclusion of Korea, China, and Japan in APTERR and the ASEAN countries' solidarity also have a positive impact on APTERR's performance. Compared with the results of the policy preferences analyzed earlier, it is unusual for countries that favored domestic food measures to positively evaluate the performance of countermeasures such as APTERR. However, the results on the evaluation of Korea, China, and Japan's inclusion in APTERR and the cohesiveness of ASEAN countries affected the success of

APTERR. We assume that dependence and uncertainty of international aid may be offset by these factors.

#### 4.1 Results of AHP

The results are categorized in three groups: APTERR country respondents, the non-APTERR respondents and all the respondents. First, the results demonstrate that the importance of policy alternatives in the case of abundant food, which is analyzed in the order of increased rice field> decrease rice field> subsidies or price support for farmers. This order appears to be irrelevant regardless of whether a respondent belongs to

APTERR. However, in the APTERR countries, exports and public stocks have almost similar importance, while non-affiliated countries place higher value on exports (0.37) than public stock (0.26). In other words, the APTERR countries have a comparative preference for domestic or international public stocks relative to non-member countries (Fig. 1).

On the contrary, policy in the context of food shortage is in the order of “release public stock promotion of rice import / increase rice field subsidy or price support for consumers.” In the event of a food shortage and a food crisis, strategies to use public stockpiles are preferred. In APTERR countries, the use of public and private stockpiles (domestic and international) is emphasized, in addition to international trade. However, in order to overcome a food crisis, international cooperation is more important than domestic solutions. In other words, an APTERR member country believes that for some reason, international problem-solving methods are more beneficial to their country. The existence of a common policy on food crises can be an important condition for international cooperation (Fig. 2).

#### 4.2 Analysis of Difference Between APTERR and Non-APTERR Countries

Factors that make up the APTERR system were examined by analyzing the difference in the survey responses between APTERR and non-APTERR countries. The results show that the differences in the response to questions about the importance of food issues, severity, recurrences, and general perception of food policy. Fig. 3 shows that there are significant differences in Q5, Q6, Q12 and Q14. APTERR respondents had higher responses on the questions of rice import (Q5), food self-sufficiency (Q6) and extension of APTERR (Q14).

Next, policy preferences for food-rich and food-poor countries were divided into APTERR countries and non-APTERR countries. As shown in Fig. 4, non-APTERR respondents favor domestic consumption (Q17-1) and the development of new consumption policies (Q17-2) when food is abundant. On the other hand, APTERR countries preferred public stockpiles (Q17-3, Q17-4) and trade solutions (Q17-5, Q17-6). Particularly, when it comes to the trade-based solutions, there is a large difference between APTERR and non-APTERR countries. From the *t*-test results, there is a significant difference in

the responses to Q17-2 and Q17-5 at the 10% significance level. Q17-5 is a way of solving food surplus through trade between neighboring countries, and it can be expected that the cost of food trade with neighboring countries in APTERR countries will be relatively small. In contrast, the results also reveal that a difference in policy preference between APTERR and non-APTERR countries in times of food shortages. Fig. 5 shows there statistically significant differences in the way of solving problems through food trade with remote countries (Q18-6). This was statistically significant at the 5% significance level and the APTERR national respondents were 2.12 higher than the non-APTERR national respondents.

The analysis above can partially confirm that there may be a difference in the preference for policy and perceptions of food crises in APTERR and non-APTERR countries (Q8). The conditions under which APTERR-type intergovernmental cooperation systems are developed depend on the severity and repeatability of the food crisis (strengthening the flow of policy problems), preference for common policies (policy flow), and changes in official and informal international relations (the flow of politics). Policy problems and policy flow (serious (Q8), repetitive (Q11), and common policy) items are defined as operational factors and common policy, such as whether or not public stockpiles of the same type (e.g. APTERR) have priority over trade-based solutions.

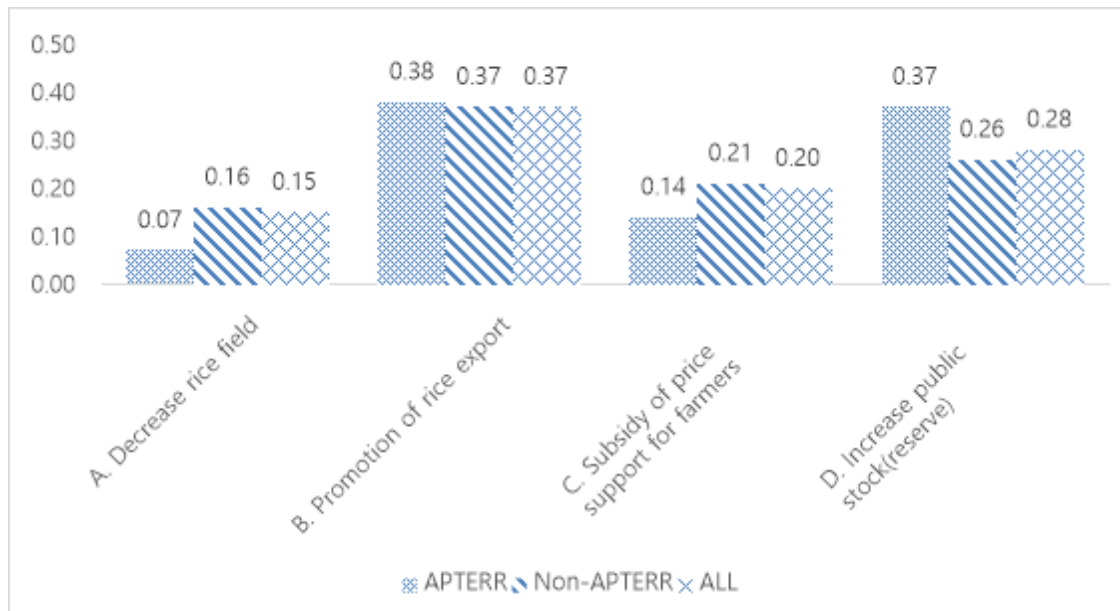
#### 4.3 Result of Boolean Analysis

Table 5 summarizes respondents' answers to whether APTERR can be a new policy alternative between countries, using Boolean analysis. Even in countries that belong to APTERR, there is a difference in the pattern of combinations of factors for each country. However, it is important to determine whether there are common policy alternatives among countries by deriving sufficient factors through their Boolean operations. This is because, among the multi-stream frameworks, the strengthening of the policy problem flow, such as the severity and repetitiveness of the food crisis resulted in a common policy solution for food problems among countries, and it demonstrates the conditions under which the APTERR system could be launched. It can thus be understood that establishment of APTERR is a result of the satisfaction of the interests among the participating countries. Namely, the establishment of a common policy alternative is

the result of accepting the idea that independent sovereign countries can maximize their own interest through international cooperation.

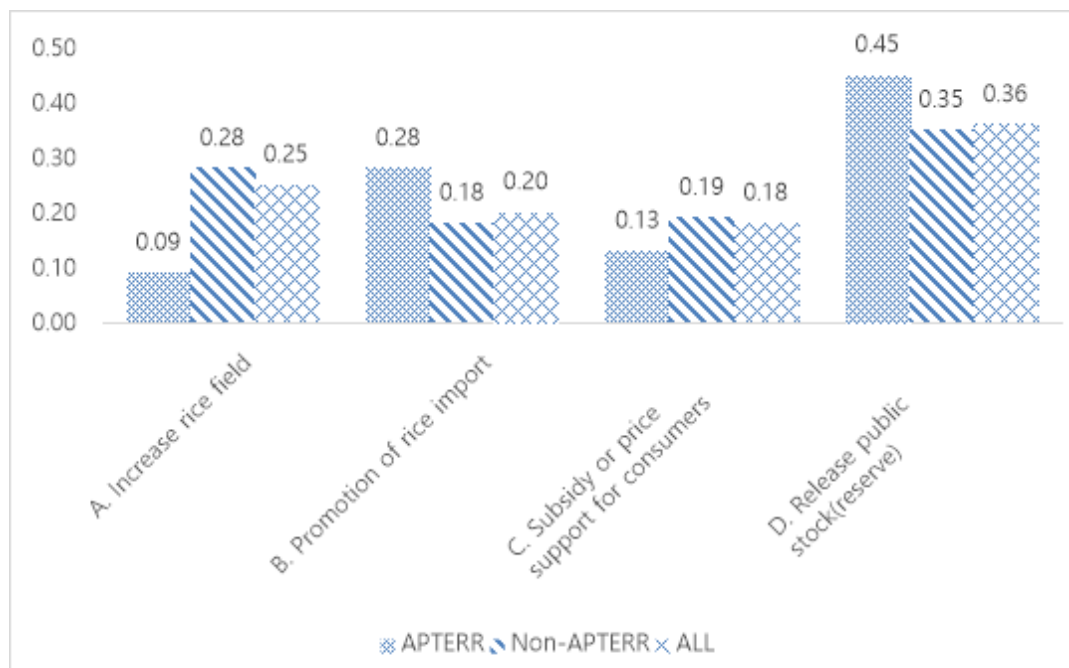
According to the results, the respondents who believed that there would be another food crisis in the future said that the successful settlement

of APTERR depended on whether there was a common policy alternative for severe and recurrent food crises among member states. On the other hand, respondents who did not think that the food crisis would recur said that there was a necessity for the APTERR system itself regardless of food crisis.



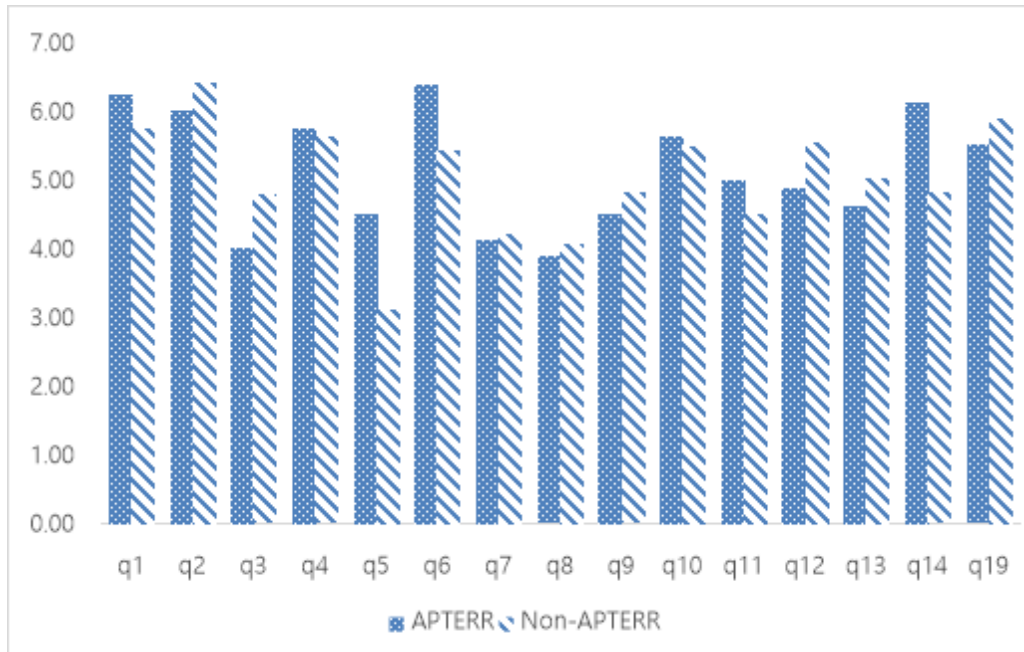
**Fig. 1. Policy preference by AHP in times of food sufficiency**

Note: The label of y-axis is relative importance which has unit range from 0 to 1

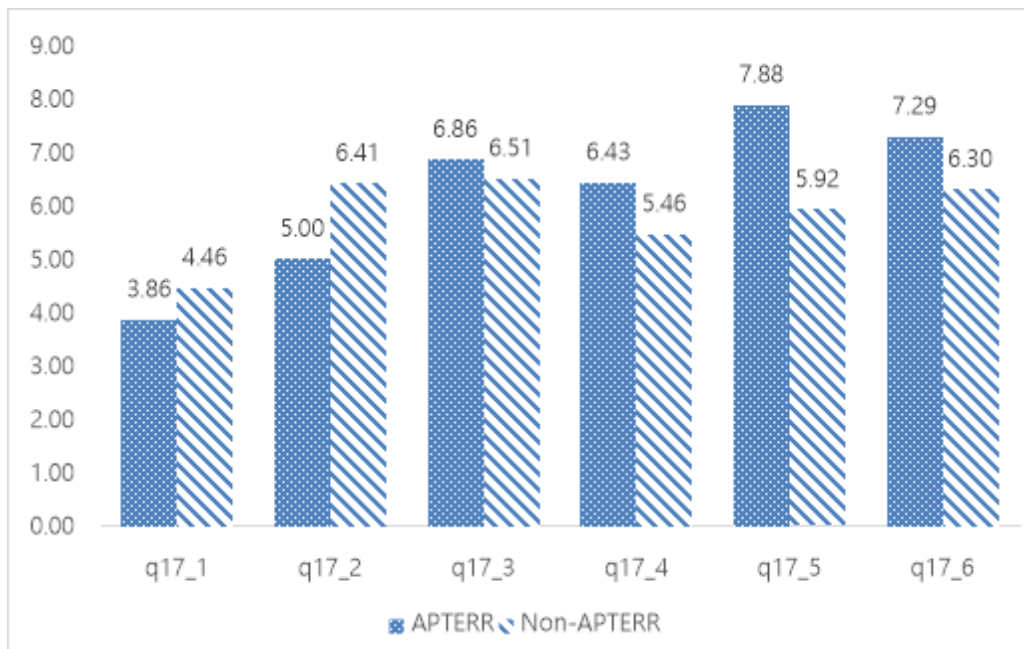


**Fig. 2. Policy preference by AHP in times of food deficiency**

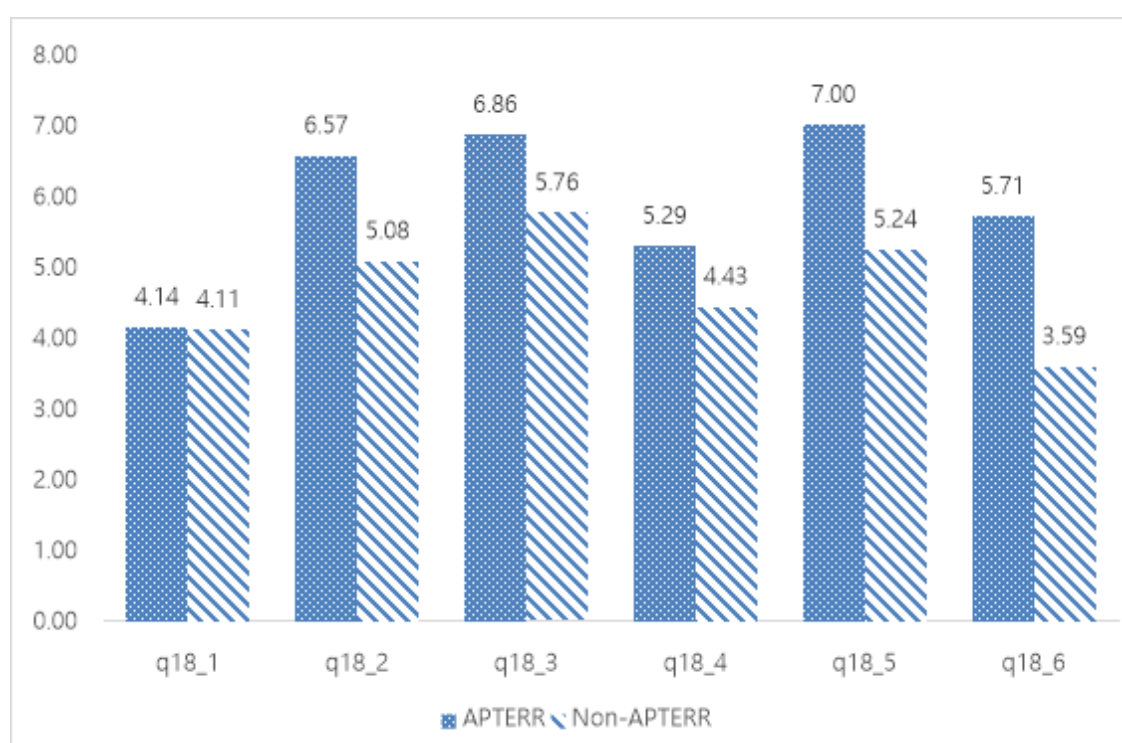
Note: The label of y-axis is relative importance, which has unit range from 0 to 1



**Fig. 3. Difference in response by APTERR and Non-APTERR country respondents**



**Fig. 4. Difference in response to policy preference in times of food sufficiency between APTERR and Non-APTERR country respondents**



**Fig. 5. Difference in response to policy preference in times of food deficiency between APTERR and Non-APTERR country respondents**

*Note: The label of y-axis is relative importance, which has unit range from 0 to 1*

## 5. DISCUSSION

This study is aimed at explicating the phenomenon of international cooperation and regional integration in case of a global crisis. First, this study examines the relationship between food crises and the institutionalization of intergovernmental cooperation to deal with them. Second, it examines the key determining factors for the institutionalization of intergovernmental cooperation to deal with food crises. This study focuses on the ASEAN Plus Three Emergency Rice Reserve (APTERR) as a successful case of the institutionalization of intergovernmental cooperation to deal with food crises, and examines the above two issues by administering questionnaires to two groups of individuals: agricultural officials of the ASEAN member states who attended a seminar in Thailand (23 participants) and officials and scholars of the ASEAN member states who attended a seminar in Vietnam (22 participants) in 2018.

It can be concluded that respondents in Southeast Asia are abreast of food security issues and took the 2007 and 2011 food crisis seriously. First, this study shows that certain circumstances, such as food crises, could

stimulate institutionalized international cooperation by providing more profound insight into the complex interplay among the governments of nation-states. Second, when nations share an understanding of a common policy alternative or solution, the institutionalization of intergovernmental cooperation to deal with food crises is more likely to develop successfully.

It is also demonstrated that “institutionalization of international cooperation” is possible through the sharing of common policy solutions under the condition of repeated and serious crises, and that participation in intergovernmental cooperation efforts such as APTERR is an exceptional phenomenon for the nation-states that emphasize autonomy and independence. Food crisis can be a problematic issue due to its severity and repeatability, but it is unlikely to lead directly to cooperation between countries. Intergovernmental cooperation is a more complex process, as policy decisions must be made between countries rather than by a single country. It is worth acknowledging the need for a common solution between countries seeking international cooperation as policy. In order for international cooperation to constitute a common policy



alternative, it is necessary to have factors such as a low cost of food transportation between nations, a high level of cohesion among participating nations, and a preference for public stockpiling of food.

This study has some limitations. Of the 45 respondents, 37 are from APTERR countries and 8 are from non-APTERR countries. Both 37 and 8 are not a large number, to begin with. Of the 37 APTERR respondents, more than half are from either Thailand or Vietnam (9 from Thailand and 13 from Vietnam), although there are 13 APTERR countries. The 8 non-APTERR participants are from India, Pakistan, or Sri Lanka, although there are about 180 non-APTERR countries in the world.

## 6. CONCLUSION

In conclusion, this study described fundamental issues regarding the institutionalization of cooperation; elaborated theories, concepts, and ideas from several researches that can be used to explain the phenomenon of international cooperation at institutional levels; dealt with the institutionalization of cooperation in terms of policy-making processes; and analyzed empirical evidence accordingly. This study highlighted the key issues of the relationship between food crises and institutionalization of cooperation while trying to identify key determining factors in establishing an internationally coordinated mechanism for food security. Throughout all these theoretical discussions and practical policy suggestions, this study draws attention to the radically different understandings that certain circumstances, such as food crises, could stimulate institutionalization of cooperation by providing a more profound insight into the complex relationships among the governments of nation-states which are still the dominant agents in the society of international politics.

## COMPETING INTERESTS

Author has declared that no competing interests exist.

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