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Research paper

Government Strategies in Confronting Climate Change to Ensure the Assurance of Food Security in Malaysia

Zahrul Akmal Damin[1]*, Ahmad Martadha Mohamed[2], Fauziah Ani[3], Lutfan Jaes[4], Khairol Anuar Kamri[5], Siti Sarawati Johar[6], Kamarul Azam Kamarul Azmi[7]

[1,3,4,5,6,7]Universiti Tun Hussein Onn Malaysia
[2]Universiti Utara Malaysia
**Corresponding author E-mail: zahruld@uthm.edu.my*

Abstract

Recently, food security issues have gained huge concern by the government due to unstable climate change. It seems there is a need for the government to formulate a strategy in order to enhance the security of food by confronting climate change, which will be able to not only lower production of food, but also to destroy food crops. This research intends to identify the strategies implemented by the government to ensure the security of food in facing climate change. Based on qualitative approach and design content analysis, 20 documents of annual budget presentation from 1994 to 2013 have been selected in order to gather data. Obtained data were then analysed to see the influence of climate change on food security, especially government's strategy in addressing climate change to ensure the assurance of food security. From the result of the analysed data, we found that there are five main themes, resulting from the government's strategies which are (i) preservation and conversation; 31.96%, (ii) risk management; 21.31%, (iii) financing fund; 18.03%, (iv) law enforcement; 16.40%, and (v) education and awareness; 12.30%. *It is hoped that the result of this research can help policy makers to create and improve strategies to deal with climate change, while at the same time protecting the country from any unforeseen circumstances related to food security issues.*

Keywords: *Climate Change; Food Security; Government Strategy*

1. Introduction

The issue of food security is actually dependent on agricultural sector (1). This sector is used to determine whether the food security is assured or vice versa. In developing countries including Malaysia, food security is an issue that always sparks anxiety (2). Thus, Malaysia has taken steps to produce food through agriculture while the shortage is supported by imports. However, agro-food sector has always been facing the issue of food security and Malaysia is no exception to this problem. Agro-food sector deals with prolonged heat conditions that cause drought and heavy rain, which then resulting in massive flood. These phenomena expose risks and threats to our own food production. Hence, this research intends to identify the strategy implemented by the government to ensure the assurance of food security.

2. Food Security Concept

The study of food security ensues from a development discourse which involves human security conceptual framework. This concept was introduced by Ul Haq (3) by discussing human life without threats, including from the aspect of food security. Although food security has been debated from as early as 1937, a re-emphasis on this issue has led to a wider scope of argument (4, 5). Until today, the concept of food security defined by Food and Agriculture Organization (FAO) has undergone several improvements by taking into account the ideas from Haq, and previously the World Bank (6). FAO (2001):

"Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life."

In line with that, as one of United Nation's member, Malaysia as well is seen as having responsibility to achieve the goal of this organisation (7). One of the approaches that have been taken by Malaysia is self-production of foods which are classified as strategic products. It includes the production of rice, fruits and vegetables, as well as poultry farming, and fishing industry (Ministry of Agriculture and Agro-based Industry, 2012).

3. Problem Statement

Climate change is capable of exposing food security to risks and threats due to the damages and destructions of food agriculture (8). This view is supported by Rosenzweig, Iglesias et al.(9) by asserting that climate change due global warming can affect food production. In Malaysian context, this concern has been raised by Damin, Mohamed et al.(10), that sees agro-food production being exposed to hot weather and heavy rain, which can cause drought and flood. In addition, Malaysia also faces two monsoon seasons, the northeast monsoon and southwest monsoon, which bring wet and warm weather. According to Change (11)*Intergovernmental Panel on Climate Change* (2007), temperature in Malaysia will raise between 0.4°C to 4.5°C by 2060. This change might cause the decrement of food production. For example, Ibrahim et al. (12) sees the ideal temperature for cultivation of rice is 25°C and an increase of 1°C according to (13) can decrease 3.44% of the

rice production. Meanwhile, a study by Hassan, Hashim et al. (14) has found that a rising temperature of 2°C has decreased rice production as much as 13%. At the same time, Malaysia is also exposed to excessive rain which can cause flooding. As a result, agro-food sector that includes production of rice, vegetables and fruits have suffered great damage and destruction. In addition, the government has to provide financial assistance to ease the burden of farmers as well as to improve agricultural infrastructure. In between 2008 and 2014, the agro-food sector suffered losses of RM219.8 million and the government spent RM 30.4 million for the purpose of financial assistance such as in Table 1. Therefore, the question arises on how the government develops a strategy to counter climate change in order to ensure food security is assured. This is because subsistence agriculture will not fully succeed if the threat of climate change is not taken into account when planning.

Table 1: Flooding according to Year, State, Total Loss and Provision of Assistance (RM Million)

Year	State	Total Loss	Provision of Assistance
2006	Johor	70.0	-
2007	Johor, Negeri Sembilan and Pahang	50.0	-
2009	Kelantan and Terengganu	5.2	-
2010	Kedah and Perlis	50.0	26.0
2012	Kedah and Kelantan	4.0	1.2
2013	Kelantan, Terengganu and Kedah	-	3.2
2014	Kelantan	40.6	

Source: Farmers' Organisation Authority (2007), Utusan Malaysia, 2008 January 8, Utusan Malaysia,
2011 January 22, and Utusan Malaysia, 2015 January 19

4. Methodology

This study uses qualitative approach. It refers to an approach to study phenomena that do not rely on statistic and more emphasis on word, rather than quantification in the collection and data analysis (15-17). Malakolunthu (18) says a study that uses a qualitative approach requires researchers to use open method without any fixed data. A good theme should be able to develop itself and supported by data and research findings. In term of the issue of food security, there are some researchers such as (19-21) who used qualitative approach to research.

4.1. Study Design

In terms of design, the study was conducted as a content analysis study, such as what (22) has done. However, in this study, analysed sources are from national planning and development documents. It has been conducted by using 20 annual budget presentation paper between 1994 until 2013. According to Burg (23), 10 years' period is enough in the context of data analysis for documents, by using the same design. These annual budget documents were studied since it contained policies about food security and agriculture. These documents are also a basic framework for each year policies, which contained goals and strategies for next year planning as well as basic achievements in previous year.

4.2. Sample of Study

This study only involves annual budget presentation papers in between 1994 to 2013. The justification as to why only documents in the time frame is used because the concept of idea about food security by *United Nations Development Programme* (UNDP)in the year of 1994 had asserting that all countries members including Malaysia must succeed the agenda. Based on qualitative approach and suggestion by Berg (24) the sample that was made is only at the level of words, phrases, sentences and any element related to the content in the text. According to Marican (25), this resolution viewed as 'purposive sampling' which plays a role to get the required data in order to answer research question.

4.3. Research Procedure

Budget presentation paper has been accessed at Ministry of Finance via its websitewww.treasury.gov.my. The analysis of the content was performed on those documents by investigating, sifting, selecting and setting the text context from the words aspect, phrases, sentences or any message printed under the theme of agricultural and rural development, especially about food security and basic food such as rice, fruits and vegetables. The coding system was developed through higher order theme and sub-theme to measure the data frequency.

4.4. Data Analysis

The analysis of data was made manually by researcher and has been checked by policy expert, Prof. Madya Dr. Ahmad Martadha Mohamed and three research methodology experts, Prof. Dr. Mohd. Sofian Omar Fauzee, Prof. Madya Dr. Mohd. Hasani Dali and Dr. Ishak Sin from the Northern University of Malaysia. Prior to that, researchers have developed the coding system through high order theme and sub-theme while at the same time they also have measured the data frequency. The results are finally presented, analysed and discussed based on delivery framework by (26).

5. Findings and Discussions

Results from the analysis show that there are five key themes, regarding to the government's strategy to address climate change to ensure food security is assured. The analysed raw data are used to develop the theme of (i) preservation and conversation which is 39 frequency or 31.96%, (ii) risk management which is 26 frequency or21.31%, (iii) fund financing which is 22 frequency or 18.03%, (iv) law enforcement which is 20 frequency or 16.40%, and (v) education and awareness which is 15 frequency or 12.30%. Detail of the finding are shown as in Figure 1 and Table 2.

5.1. First Theme: Preservation and Conservation

'Preservation and conservation' is a theme that has earned the highest frequency of phrases which is 39 times. This main theme represents 31.96% of all government strategies' in facing climate change in order to ensure the food security is assured. There are two sub-themes were built under this theme which are (i) preservation, and (ii) conservation. 'Preservation' sub-theme has been developed based on raw data such as environmental management, environmental preservation, sustainable environment will continue to be maintained. Meanwhile, 'conservation' subtheme is built based on supported raw data such as environmental conservation, enhancing conservation resource, and reforestation. In spite of environmental preservation and conservation having no direct relations to food security, both play a role to provide space and good atmosphere for farming activities. Hence, environmental preservation and conservation are important to ensure the climate to be at a good level and controlled. In fact, this strategy is the best way to handle the issue of climate change to ensure a sustainable food security, and the government is also seen to be committed towards this effort. Lesson learnt from Australia is very meaningful since despite having a high food security, the climate change has forced their government to preserve and conserve their environment (27). In fact, Smith and Gregory (8) has asserted that agricultural actors also must act in reducing the impact from environment in order to ensure the assurance of food security. This matter is important to avoid the argument that adaption to climate change is too slow, causing a negative impact to food security.

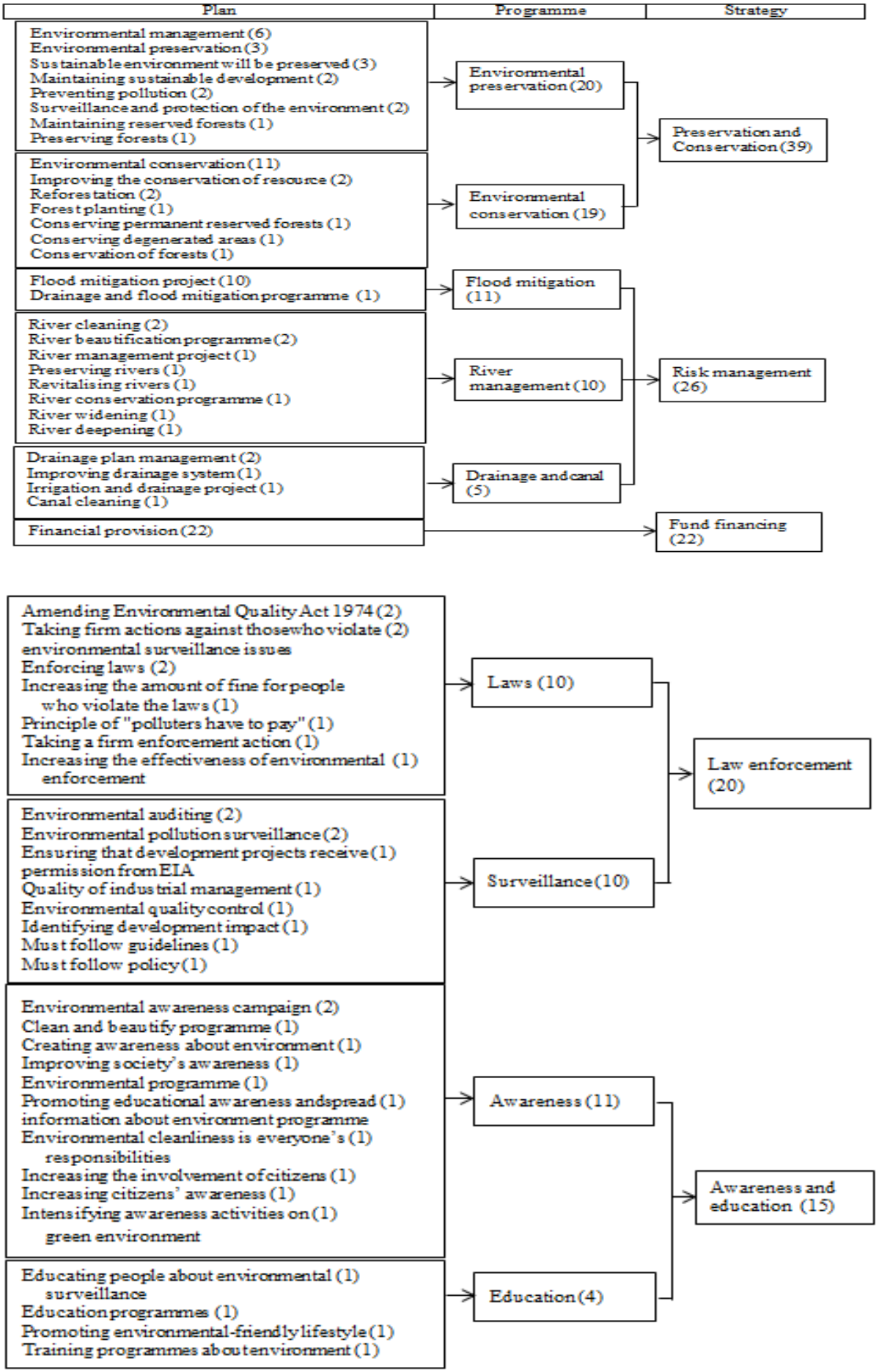

Fig. 1: Strategy Formation by the Government in Confronting Climate Change to Assure Food Security in Malaysia

Table 2: Frequency and Percentage of Government Strategies in Confronting Climate Change to Ensure the Assurance of Food Security

Theme	Frequency	Percentage
Preservation and conservation	39	31.96
Risk management	26	21.31
Fund financing	22	18.03
Law enforcement	20	16.40
Awareness and education	15	12.30
Total	122	122

Source: Document Analysis

5.2. Second Theme: Risk Management

'Risk management' is the second highest theme and it has 26 frequency of supporting phrases. This theme contributes to 21.31% of the government strategies in addressing the issue of climate change. There are three sub-themes under this theme which are (i) flood mitigation, (ii) river surveillance, and (iii) drainage and canal. 'Flood mitigation' sub-theme is made based on raw data such as flood barrier project, irrigation and flood barrier. Meanwhile 'river custody' sub-theme is built based on supported raw data such as river cleaning, river improvement, river widening, and river deepening. As for 'drainage and canal' sub-theme, it is developed based on raw data such as drainage control plan, repairing the drainage system, and irrigation and drainage project. Thus, risk management in agricultural activities should be taken seriously. A research from Dinh, Balica et al.(28) has found that the world food producing countries like Vietnam also gives priority to flood management. Not only do they build flood barrier, Vietnam also appears to used hydrodynamic model to simulate the flood to analyse the hazard level. According to QIU, Jin et al.(29),even in China, the improved drainage and irrigation management is not only to deal with flood but also to deal with drought. This method is seen crucial for farming activities since crops need good water supply to survive. The importance of risk management has also received attention by Jacobs (30) when his research shows apprehension on agricultural activities near Mekong river, which is exposed to danger if flood occurs. Therefore, this situation has stimulated the government to improve river management in order to minimize the overflow effect that occurs such as in Bertam River, Cameron Highland before.

5.3. Third Theme: Fund Financing

'Fund financing' is the third theme and it has 22 frequency of supporting phrases. It contributes to 18.03% from the overall efforts of the government strategy formation in facing the issue of climate change. Fund financing by the governmentis made at almost every budget presentation as shown in Table 3. The purpose of this theme is to provide good infrastructure for dealing with unstable climate change. By providing fund for construction of infrastructure, the food security can be enhanced. This has been supported by Wheeler and Von Braun (31) that food security can be enhanced by huge investments in adaptation and mitigation towards smart climate food system which is more resistance to the effect of climate change. Bala, Alias et al.(32) also supports the fund financing which is capable of increasing the production of food crops through intensity given, as well as the capability to raise the number of R&D.

Table 3: Fund Financing in ConfrontingClimate Change to Assure Food Security

Budget	Provision	Purpose of Expense
1995	RM 122mil.	Preventing pollution, controlling toxic waste an ness campaign programmes, as well as train gramme about environment.
1996	RM47.7mil.	Environmental conservation programme.
1997	RM265.4mil.	Organising drainage plan and flood mitigation erosion prevention programme, irrigation and project, river management project, controlling th
		of air and water, cleaning and beautification pr and forest development plan.
1998	RM 142mil.	Increasing the awareness about environment, laws andcontrolling the quality of the environme
1999	RM 265mil.	Integrated land use planning, usage and develo sustainable natural resources, conservation of area, and maintaining reserved forest area.
2000	RM 15mil.	Efforts on enforcement, surveillance and obser the environment on top of the establishment of ronment Institute of Malaysia.
	RM 4.4mil.	Promoting educational awareness and spreading information about environment.
	RM 11.8mil.	Projectto get facilities for the surveillance of environmental pollution.
2001	RM 85mil.	Efforts on enforcement, surveillance and obser the environment on top of completing the Env Institute of Malaysia, as well as a contract on river cleaning.
2004	RM 680mil.	Flood mitigation programme.
2005	RM 194mil.	Education and awareness programme, and the ment of management strategies as well as the tion of highlands.
2006	RM 370mil.	Nationwide drainage and flood mitigation programme.
	RM 114mil.	Revitalising rivers and river confluents.
2007	RM 716mil.	Canal and Flood Mitigation Programme.
	RM 107mil.	River management programme to overcome flood problems and pollution.
2008	RM 1.1bil.	Nationwide flood mitigation project.
	RM 120mil.	Nationwide programme of conservation, cleaning and river beautification.
2010	RM 20mil.	Awareness programme about keeping the env green and practicing environmental-friendly life
2011	RM 1.9bil.	Funding environmental conservation project.
2012	RM 1bil.	Implementing Flood Mitigation Plan (RTB) in Perlis, Perak and Johor.
2013	RM 2bil.	Increasing the production and usage ofgreen technology-based products.
2014	RM 40mil.	Widening and deepening of Bertam River, Cameron Highlands.

5.4. Fourth Theme: Law Enforcement

'Law enforcement'is the fourth theme that has 20 frequency of supporting phrases. This theme has contributed to 16.40%from the overall efforts of government strategy formation to deal with climate change. There are two sub-themes under this theme which are (i) laws, and (ii) surveillance.'Laws'sub-theme development is made based on raw data such as amending the Environmental Quality Act 1974, taking firm action against those who violate environmental surveillance issues, enforcing the laws, and raising the fines for rules violations. As for 'surveillance'sub-theme, it is built based on raw data such as environmental auditing, pollution control, ensuring the development project approved by EIA, and controlling the quality of environment. Based on the above findings we can conclude that law enforcement plays a big role in providing good environment for food security. Firm actions by the government against those who violate the regulations are able to reduce climate change and local weather as well as to provide good environment for agricultural activities. This is because agriculture requires a suitable climate and weather especially for particular crops. In contrast, if the climate change and weather occurs in uncontrolled manner, it will cause the damage or destruction to agro-food activities. Hence, society and agricultural actors must abide the regulations and environment laws (33). Furthermore, Lal (34) based on his study suggests that fees for ecosystem services can be a useful strategy to promote sustainable agricultural development.

5.5. Fifth Theme: Education and Awareness

The fifth theme is 'education and awareness'. This theme has 15 frequency of supporting phrases which contributes to 12.30% from the overall government strategy formation in dealing with the issue of climate change in order to ensure the assurance of the food security. There are two sub-themes under this theme which are (i) awareness, and (ii) education. 'Awareness' sub-theme is built based on raw data such as environmental awareness campaign, creating a widespread awareness about environment, raise public awareness, and environmental programme. As for 'education' sub-theme, it is built based on raw data such as education about environmental surveillance, educational programme, promotion of environmental-friendly lifestyle, and training programmes about environment. All approaches that are related to raising public awareness are taken in conjunction with the government policy to ensure a secured environment. Albeit small, this effort is important to ensure local climate is at a good level and does not interfere the agro-food activities. According to Nunez and Pauchard (35), social awareness about this matter is high among developed countries, but still at a low level among developing countries. Meanwhile, Idrisa, Shehu et al.(36) has found that educational programmes that have been strengthened can provide a positive input to the knowledge for development and agriculture.

6. Conclusion

Plans for food security in Malaysia which include agro-food products are actually supported by government programmes and development strategies. The findings of this study show that Malaysian government, in confronting the climate change issues to ensure the assurance of food security has implemented strategies to carry out preservation and conservation (31.96%), risk management (21.31%), fund financing (18.03%), law enforcement (16.40%), and education and awareness (12.30%). However, in order to deal with the issue of climate change, government needs to also focus on 'research and development'. Studies on the genetic characteristics of food agriculture that is more capable to deal with climate change while at the same time capable of higher production is a strategy that should be focused on. The aspect of crops resistance to diseases as well is worth being researched. This is because the development of this study will enable the production of crops that have more resistance against climate change. Hence, an expanding understanding on 'research and development' which is critical towards the relations between crops and climate change ought to be studied in Malaysia as a support towards a more assured food security.

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