Agriculture Extension and Its Roles in Ensuring Food Safety, Quality and Productivity in Malaysia

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ABSTRACT

Agri-Entrepreneurs and individual farmers as well as government agencies are equally important in ensuring sufficient and quality food supply in Malaysia. This concern can be resolved successfully through extension program that is being done by the Ministry of Agriculture and Agro-based Industry. The Department of Agriculture Malaysia is the leading agency under the Ministry of Agriculture and Agro-based Industry that involves in extension activities in food production. This paper briefly describes the current extension programs undertaken by the Department of Agriculture, Malaysia in food production system from farm to table. Transfer of technology and providing the related supporting services become the main focus in the implementation of extension programs. To ensure good quality and safe crop yields produced from farms for human consumption, Good Agriculture Practice (GAP) and sustainable agriculture development are being emphasized throughout crop production activities. Critical factors affecting crop yield quality, crop productivity and food safety are discussed.

Keywords: *farm to table, extension, critical factors, food safety, sustainable*

1. Introduction

The agricultural sector is one of the key sectors of international trade for its importance in supplying foods to the world's population. A country's resourcefulness in developing its agricultural sector is an indication of its ability to provide sufficient food for its population. In general, agriculture in Malaysia involves crops, fishery and livestock husbandry and all other related activities. Crops of economic value in commercial agriculture can be divided into two groups that is, plantation crops such as palm oil, rubber and cocoa, and food crops such as vegetables, cash-crops, fruits and paddy. Under the Third National Agriculture Policy (NAP3), the government is putting forward strategies and mechanisms to address concerns on agricultural development and the economy as a whole. Its concerns include food security, productivity and private sector investment in agriculture, enhancing exports and conservation as well as sustainable use of natural resources. Malaysia though blessed with fertile soil, abundant rainfall and suitable climate for food production is still a net food importer and has never achieved a food trade balance surplus. Realizing the opportunity and potential for the development of this sector, the government had declared agriculture as the third engine of growth to the economy. Thus, the development of agro food sector into a competitive entity that will contribute significantly to the national income has become a priority in agriculture development in Malaysia.

This paper focuses on the extension approach being undertaken by the Department of Agriculture (DOA) on activities in production, harvesting, processing and other related

activities of crops production. The objective of this paper is to describe briefly some of the critical factors affecting crop quality, crop productivity and food safety in ensuring food is safe from farm-to-table for human consumption. In the integrated from farm-to-table approach, the producer, processor, transporter, vendor and consumer all play vital roles in ensuring food safety and quality. Government regulators are then responsible for auditing performance of the food system through monitoring and surveillance activities and for enforcing legal and regulatory requirements.

2. Food Production in Malaysia

Under the Ninth Malaysia Plan (2006-2010), the agricultural sector in Malaysia will be revived to become the third engine of growth in the national economy. The emphasis is on *New Agriculture* which will involve large-scale commercial farming, the wider application of modern technology, production of high quality and value-added products, advancement of biotechnology, increased convergence with information and communications technology and the participation of entrepreneurial farmers and skilled workforce. According to the Ministry of Agriculture and Agro-Based Industry (MoA), the food commodities sub-sector is expected to grow at an average rate of 7.6 percent per annum through improvements in efficiency and productivity as well as expansion in hectare.

Achieving the objectives of NAP3 requires new strategic approaches and policy thrust to enhance the economic contribution and growth of the agricultural sector. Towards this end, NAP3 introduces two new strategic approaches namely the agro-forestry approach and product-based approach. With these new approaches, agricultural sector is expected to achieve growth rate as of 2.1% per annum. Despite the growth, the contribution of agricultural sector to GDP is expected to further decline from 10.24% in 2007 to 7.2% in 2010. This decline is consistent with the overall structural economic changes experienced by most developed economies. A stronger growth is also expected from the food sub-sector arising from intensified efforts in resolving supply-side constraints and strengthening of economic foundation for this sub-sector. Its contribution to agricultural value added is expected to increase from about RM6.5 billion in 2007 to about RM7.3 billion in 2010. The agricultural sector also registered one of the favourable growths during the Eighth Malaysia Plan period. During the period, the performance of the agricultural sector improved in terms of production, value-added and exports, driven by the utilization of new technologies, shift to large-scale commercial production, wider adoption of group farming system, increased market accessibility and better commodity prices. The agricultural value added grew at an average rate of 3.0% per annum during the Plan period, higher than the target of 2.0%, while in the Ninth Plan period, agricultural sector is targeted to grow at 5.0% per annum, as shown in Table 1. The projected production of major food commodities under the Ninth Malaysian Plan in year 2010 as compared to the production figures in 2000 and 2005 is shown in table below.

Table 1: Projected Production of Major Food Commodities in Malaysia in 2010

Commodity	Metric Tonnes ('000)			Average Annual Growth Rate (%)	
	2000	2005	2010	Achieved in Eight Malaysian Plan	Achieved in Ninth Malaysian Plan
Paddy	2,141	2,400	3,202	2.3	5.9
Marine Fish	1,286	1,325	1,409	0.6	1.2
Aquaculture	168	250	662	8.3	21.5
Beef	17.5	28.5	45.0	10.2	9.6
Mutton	0.9	1.5	2.3	10.8	8.9
Pork	159.8	209.0	241.0	5.5	2.9
Poultry	714.3	980.1	1,295.0	6.5	5.7
Eggs	399.0	443.0	600.0	2.1	6.3
Milk (litres)	29.5	41.1	68.4	6.9	10.7
Pepper	24.0	19.1	30.0	-4.5	9.5
Pineapple	265.7	407.6	1,106.0	8.9	22.1
Fruits	993.0	1,586.9	2,555.7	9.8	10.0
Vegetables	404.0	771.3	1,133.3	13.8	8.0
Coconut	475.7	602.0	660.0	4.8	1.9
Cocoa	70	28	57	-16.7	15.5

Source: Ninth Malaysia Plan, Economic Plnning Unit,(2007)

Export of food commodities will be increased to achieve a positive food trade balance. The production of major food commodities will be increased to meet the percentage target of self-sufficiency level in the year 2010, that is, rice (90%), fruits (138%), vegetables (108%), fisheries (104%), beef (28%), mutton (10%), poultry (122%), eggs (115%), pork (132%), and milk (5%). However, under the new National Food Security Plan that was launched recently, these figures had been reviewed based from this recent data below.

Table 2: Self-Sufficiency Level of Major Food Commodities in Malaysia (%)

Item	2006	2007	2008

Crops			
- Rice	68.60	72.23	73.00
- Vegetables	89.00	89.00	76.00
- Fruits	107.00	105.00	104.00
Livestock			
- Beef	21.78	24.88	25.90
- Mutton	8.99	8.75	9.15
- Pork	96.87	96.91	96.60
- Chicken/Duck Meat	124.94	121.39	125.58
- Chicken/Duck Eggs	109.06	111.38	114.19
- Milk	4.59	4.69	4.80
Food Fish	90.00	92.90	95.20

Source : Agriculture Statistical Handbook 2008

3. Extension in Food Crops Production

The DoA provides professional and quality services in a wide range of agriculture fields including horticulture and other crops, entomology with respect to crop protection, soil management, agriculture engineering, seed technology, pesticide application technology, agriculture consultancy, remote sensing and facilitation of export and import of agriculture produce. The DoA extension service is to pursue three expectations:

i) To increase farm productivity through effective transfer of technology and research findings
ii) To effect attitudinal change amongst farmers so as to be more responsive to new technology and participate actively in agricultural development
iii) To increase the contribution of the agricultural sector to national economy through the promotion and development of specific crops.

The types of extension services that are currently offered by The DoA are listed as follows:

i) Advisory services in agriculture particularly in food crops
ii) Agriculture Training in food crops
iii) Consultation and investment
iv) Development of agro-based industry
v) Quality certification in production of food crops
vi) Enforcement of Agriculture Acts
vii) Issuance of export and permit licenses
vii) Technical support services

The current extension program in food production is focusing on commercialization of agricultural activities, modernized farming practices, improved post harvest handling, processing and marketing operations. The extension program also emphasizes on technology transfer from research agencies to extension agencies and finally to the clientele, comprising of farmers, entrepreneurs and investors. It is envisaged that from technology transfer activities, the farming community will be able to increase their income and have better quality of life.

In the past, the department's target group was the farmers in the rural area. Adjustment had been made to include almost all the people in Malaysia who involved in agricultural activities, either directly or indirectly. To ensure effectiveness of extension programs and to increase the efficiency of the extension services, target groups are divided into four categories based on income brackets as shown in Table 3 below:

Table 3: Clientele Categorization

No	Category	Annual Income	Extension Methods
1	Large scale agro-entrepreneur	More RM 5 million	Consultation, Incentive, Investment & Facilitation
2	Medium scale agro-entrepreneur	RM 1 million to RM 5 million	Consultation, Incentive, Investment & Facilitation
3	Small scale agro-entrepreneur	RM 200,000 to RM 1 million	Consultation, Visit, Discussion, Training
4	Micro agro-entrepreneur i) Micro entrepreneur ii) Farmer	RM 50,000 to RM 200,000	Visit, Discussion, Training and Seminar
5	Hobbies farmers, Potential farmers, NGO's, Department/Agency	unspecified	Visit, Advisory, Training, Study tour and Exposure

Source: Department of Agriculture Malaysia (2008)

a) Extension in Crop Production

Good Agriculturel Practice (GAP) is a standard guideline in implementing activities of technology transfer in the extension program. Under crop production, the focused activities are field preparation, selection of planting materials, weed and pest controls, and fertilizer application. For example in the paddy production, with regards to field preparations, land levelling and liming in paddy cultivation are crucial. Good land levelling in paddy planting will facilitate good water management in the field and enhance weed control. Application of lime in paddy fields at the right time and in right amount would reduce soil acidity. Use of good planting materials would produce good

crop yield. In paddy planting, the use of certified seeds is encouraged. Use of chemical fertilizers in crops is suggested for fast and effective plant nutrient uptake needed for normal plant growth and enhanced crop productivity. Organic fertilizers and manures are preferred for regular use to get benefits from long term effects as this practice improves soil structure, enhances soil microbial activity and harmonizes soil biodiversity. Biodegradable plant residues can be processed into compost. Organic fertilizers like compost, chicken dung, cow dung and bat guano are all good sources of plant nutrients and in certain instances can substantially replace chemical fertilizer and could be extensively use in organic farming.

Activities in extension such as visits and training of target groups are based on crop calendar and stages in implementing projects (Sofian, 2006). Periodic formal and informal feedback from the target groups is necessary. Farm record keeping is encouraged to all farmers as a tool of backtracking past farming activities for remedial actions especially to analyze what shortfalls or malpractices in using farm inputs and executing farm operations. Crop rotation is suggested as an important practice, especially in area planted with extensive and recurring mono-crop. The main purpose of crop rotation practice is to break the life-cycle and destroy noxious pests and diseases. Thus, pesticide usage is reduced. Less pesticide usage is seen to establish sustainability aspects of pest-predator vector relationship balance in farming ecosystems while maintaining an environmentally friendly situation.

Branding is a very important aspect and serves as a quality assurance for domestic and foreign consumers on Malaysia's agricultural products. The brand name and seal enhances image of the country's agricultural products, which in turn enhances demand in the global market. Thus, Malaysia's Best is a brand which represents the seal of approval from the MoA for food safety and quality.

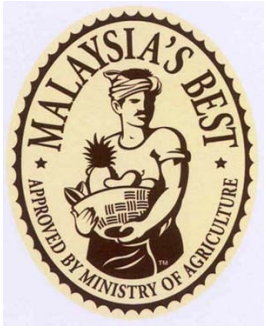

Figure 1: Logo Given to the Best Produce Coming from SALM Farms.

The Malaysia's Best brand is issued by the Federal Agricultural Marketing Authority (FAMA) for agricultural produce that follow the highest safety and quality standards set by the authority. Farmers participating in the Malaysia's Best program should have the Farm Accreditation Scheme of Malaysia (SALM). SALM is the Malaysian Farm Certification Scheme which started in 2002 and consequently implemented becomes a national program to recognize and certify farms which adopt Good Agriculture Practice (GAP) that operate in an environmentally friendly way yielding products that are quality, safe and suitable for human consumption.

Figure 2: Logo for Malaysian Farm Accreditation Scheme (SALM)

Conceptually in SALM, GAP is an integrated system to manage hazards associated with the elements of land, input, processes and output of agricultural production, in a good way to achieve productivity, sustainability, quality and safe produce in a socially acceptable, worker friendly and environmentally safe way.

Malaysian Organic Scheme or SOM is a certification program implemented by DoA to recognize farms which cultivate crops organically according to the criteria and requirements spelt out in the SOM Standard. The standard of Organic Agriculture for SOM is essentially based on the Malaysian Standard, MS 1529:2001 – The production, processing, labelling and marketing of plant based organically produced foods. In addition to this, the SOM Standard also encompasses rules or criteria which are derived from specific legal provisions of national laws to control the hazards that impact the environment, food safety and workers' health and safety.

Figure 3: Logo for Malaysian Organic Scheme (SOM)

Organic farming is a crop production system that avoids the use of synthetic fertilizers and pesticides, hormones, antibiotic, and takes measures to protect the environment including flora and fauna. Crop pests and diseases are managed by cultural, biological physical, mechanical methods and the use of bio-pesticides. Fruits, vegetables and other edible food crops from farms that are managed organically are safe from pesticide residues and other unwanted chemicals.

b) Pesticide Extension

Farmers are given training on the importance of using recommended rate of pesticide. Under pesticide extension program, the appropriate usage and judicious use of pesticide are emphasised. Under Pesticide Act 1974, awareness about agricultural chemical toxicity aspects and taking steps to ensure pesticide residues in crop yields during harvesting not to exceed the maximum residual level (MRL) are crucial. In this respect, the DoA monitors chemical toxicity levels in vegetables and fruits especially farm products for export markets. To identify presence of hazardous pesticide residues in crop yields, crop yield samples from farmer's plot are sent to analytical laboratory to the level of hazardous chemical residues in crop yields. The four major groups of hazardous chemicals of concern are dithiocarbamate, organo-phosphate, organo-chlorine and pyrethroid.

In Pesticide Extension, the application in Integrated Pest Management (IPM) is taught to the farmers.. The IPM encompasses combination of biological, chemical, physical and cultural controls to ensure food is safe for human consumption. It involves in the recommended usage of pesticide. To ensure implementation of IPM is being done continuously, follow-up programs and visits by local extension officers are carried out on a regular basis. To strengthen IPM program, DoA periodically monitors the disposal of chemical containers. To date, the department has standard procedures for disposal of pesticide and weedicide containers.

c) Diagnostic Extension

Diagnostic extension service is carried out in Extension Clinics set up by the DoA in most district agriculture offices. It involves the diagnostic analysis of crop whereby extension workers of the Department diagnose symptoms of pest and disease attack, nutrient deficiency and other plant problems based on plant parts either root, stem, branch, leaf, flower or fruit. The extension worker on duty will function as a "plant doctor" and subsequently give the recommendation for remedy or corrective action to overcome the raised problem.

Figure 4: Logo for Plant Doctor

Farmers are encouraged to keep their farm records in order to facilitate diagnosing the probable causes of the problem and subsequently recommend remedial actions to resolve the problem.

d) Harvesting Extension

Harvesting Extension includes provision of advisory services at pre-harvest, harvest, and post-harvest activities. Proper planning and implementing in harvesting should be emphasized to reduce harvest loses. Appropriate pre-harvest operations are important to produce quality farm yields. Farmers are advised to do formative pruning and regulative pruning accordingly for establishing good plant stature, optimal plant branching development as well as for sufficient plant aeration, maximizing sunlight penetration and to reduce disease incidence of plant. Wrapping of fruits can greatly reduce pest attack and disease incidence and maintain good external appearance of fruit. Application of high calcium foliar fertilizer may help in development of fruit size. Farmers are encouraged to harvest their crop at the most suitable times depending on the maturity stage following the predetermined fruit maturity index according to type of crops. Fruits maturity index can be used to ascertain the level of ripeness of crop yield at harvesting to facilitate ample delivery time of farm products to marketing destinations either locally or for export markets.

e) Extension in Food Processing

This extension activity is to increase farmer's awareness of the importance of adding value to a product. Processing a low grade agriculture produce into fruit juice for instant, provide additional income to farmers. The purpose is to add value to potential raw agriculture products that could be processed, to avoid unnecessary wastage of fresh farm produce, and in certain instances to generate additional income to rural folks. It is well noted that processed food has the advantage over fresh product in having prolonged shelf-life. Thinned-out premature fruits in certain crops can be used for processing various types of preserved food. When food processing activities are carried out, food processors are constantly advised to adopt Good Manufacturing Practices (GMP) in their operations. In another scenario, food processing can provide the solution to the problem in excessive surplus of fresh farm products that cannot be marketed or glut due to oversupply of crop yield from farms. Issue in oversupply is treated in conjunction with the storage capacity of a farm and create opportunity in development of downstream activities in agriculture.

f) Marketing Extension

Department of Agriculture encourages farmers to be involved in contract farming so that farm products can be sold at fair prices according to grades and product quality specification. This is to ensure farmers deserve reasonably good farm profits in return for their hard work and efforts in farming operations. This can contribute for the sustainability of farm business in the long run. Farmers, either small or big timers, are encouraged to make formal agreement with buyers, wholesalers or retailers in contract farming for guaranteed market outlets. In the agreement, among other things, matters pertaining to timing, quantity, quality of product to be sold from farms were specified clearly in the contract document.

Farmers who encounter problems in determining market outlets are advised to make arrangements regularly with the Federal Agricultural Marketing Authority (FAMA) to

get marketing assistance and for timely marketing of their farm products. For small farmers who are interested in direct selling of farm products, they can seek assistant from FAMA to get involve in Farmers' Market organized by FAMA at specific township areas. Small farmers can also apply to participate in direct marketing program organised by Department of Agriculture to sell their farm products at certain allowable public premises or at vicinity of residential areas. In relation to selling of farm products, farmers are encouraged to have their own product branding, quality differentiation and packaging. Farm products either in fresh form or processed will have better marketable position when the aspects of branding and packaging are done well.

4. Conclusion

It is imperative that the impacts of extension programs would be able to increase farm income and productivity, boost food production, enhance food safety assurance, and enable surplus food produced be exported to other countries. In this perspective, planning and executing extension programs must get continuous support from various parties including stake-holders in food production. Current market environment demands agricultural products of a certain level of standards and quality. Consumer's preferences are moving toward safe foods and at the same time convenient of preparation. Good Agriculture Practice which is based on standards and following principles in food production and technological advancement in agriculture should be the guide-post for extension activities to provide food from farm-to-table that is safe for human consumption.

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