

Linking Research and Consumers through Adult Education Programmes for the Advancement of Small-scale Food Industries in Malaysia

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ABSTRAK

Kertas kerja ini menerangkan dan mengutarakan ciri-ciri program pendidikan dewasa yang dilaksanakan oleh Bahagian Teknologi Makanan, Institut Pembangunan dan Penyelidikan Pertanian Malaysia (MARDI) dalam usaha mempromosikan industri makanan di Malaysia. Secara khususnya, perbincangan memfokuskan kepada usaha yang dibuat oleh bahagian tersebut untuk mengintegrasikan aktiviti penyelidikan dengan program pengembangan.

Kertas kerja ini adalah berasaskan kepada satu kajian kes yang dibuat ke atas program tersebut. Data kajian telah dikutip melalui temu bual secara mendalam, pemerhatian penyertaan dan analisis kandungan data yang telah didokumentasikan. Program ini merangkumi tiga komponen asas iaitu mencipta teknologi yang sesuai dengan industri kecil makanan, menghubungkan antara inovasi dan pengguna dan membimbing pembelajar untuk memastikan perusahaan yang dijalankan itu berjaya dan dapat dikekalkan. Penelitian ke atas program menunjukkan ianya telah mengintegrasikan penyelidikan dan pengembangan seperti yang disarankan oleh Bennet (1989) dalam Model Kesalingbergantungannya. Kekuatan dan kelemahan pendekatan tersebut juga dibincangkan dalam kertas kerja.

ABSTRACT

This paper describes and highlights features of an adult education programme implemented by the Food Technology Division of the Malaysian Agriculture Research and Development Institute (MARDI) to promote the food industry in Malaysia. A study on the programme was carried out using indepth interviews, participant observation and content analysis of documented data. The programme encompasses three basic components generating technology appropriate for small food industries, interfacing between innovators and consumers, and coaching learners to ensure the enterprise becomes successful and sustainable.

The discussions focus on the efforts by the division to integrate its research and extension activities. Examination of the programme reveals that it integrates research and extension as suggested by Bennetts (1989) interdependency model. Strengths and weaknesses of this approach are discussed in the paper.

INTRODUCTION

The food processing industry is gaining ground as an important manufacturing sector in Malaysia. In 1994, the industry provided 8,684 new employment opportunities and generated a gross revenue of RM4 394 543 000 (Department of Statistics 1994). Malaysia's food industry is dominated by small food establishments which make up more than 73% of total food manufacturing enterprises. Small food establishments are those enterprises which have

paid-up capital of less than RM250,000 and fewer than 25 paid employees (Hussin and Adinan 1988). Generally, these establishments are located where the raw material is available. For example, if the products are fish crackers, shrimp paste, or fish sauce the establishments are normally found along the coastal areas. On the other hand, if the products are rice vermicelli, rice noodles or tapioca crackers, the industry is found in the rural areas and small town centres if the manufacturing process depends heavily on

imported materials, such as the production of soya sauce, bean curd or lipo-protein from soya bean milk, such establishments are located in the urban and suburban centres. Due to these variant locations together with related limitations, the small-scale food processing industry suffers a number of setbacks which call for technical management, financial, and market attention.

Sub-standard products, short-lived products, poor product appeal, low grade processing premises, low production efficiency, and storage of raw materials are examples of problems identified in the small food industry (Hussin and Adinan 1988). These problems are directly related to the knowledge, attitude and skills of the entrepreneurs themselves. Investigations in this area indicate that more than 90% of the small-scale food processors are not knowledgeable about the basic aspects of food science and technology. Their practices are based, to a large extent, on trial-and-error and passed-down knowledge (Hussin and Hussein 1988).

Both the New National Development Plan and the Sixth Malaysian Plan include specific statements to promote the growth of small-scale entrepreneurs towards innovation and creative production.

Research and Extension Malaysia

Research and extension activities in Malaysia are divorced from each other. A number of agencies are responsible for extension while another set of agencies is responsible for research. Extension activities are carried out by multiple agencies which are organized according to commodity or commodity groups. For example, the Agricultural Department in each state is responsible for extension activities concerning all crops except rubber, oil palm, tobacco, and pineapple. The Veterinary Department carries out extension work on livestock and the Fisheries Department is responsible for extension activities on both freshwater and marine fish. All agencies mentioned are under the Ministry of Agriculture. The number of extension agencies operating in each district depends on the type of crops grown and other agricultural activities in the area but research is not found in any of these agencies mentioned. Research on the various commodities in the Malaysian agricultural sector is the responsibility of yet another set of agencies which

do not have any direct linkages with farmers. Research findings are disseminated to other agencies mainly through publications and in-service training. MARDI, for example, disseminates research findings to farmers through the Agriculture Department and the Veterinary Department. Thus the research and the extension functions are carried out by separate agencies. Having multiple agencies doing agricultural research and yet another set of agencies translating and disseminating the research findings to farmers certainly complicates matters for all those involved. Co-ordination between research and extension agencies is the responsibility of special units and committees. The effectiveness of the linkages under this system is described to be "mixed". Part of the problem, note Hashim and Fatt, is that "... each agency tends to jealously guard its responsibilities and tends to view attempts at cooperation and coordination as encroachment into the sanctity of its respective empires" (Hashim and Fatt 1984)

The Food Technology Division of MARDI, the subject of this study, is the exception in the Malaysian research-extension scenario described earlier as it carries out both research and extension activities and has linkages with the other sub-systems in the food industry which makes it exemplary.

The Ideal Research-Extension-User Linkages

This inquiry uses an "ideal" research-extension-user linkage as its conceptual framework. Added to this model is the view that the actors in each of the sub-systems have multiple roles in the knowledge creation-diffusion-utilization process. This framework guides the data collecting phase as well the analysis phase. Bennett (1989). presents three categories of conceptual models that describe the linkages between the research, extension, and user sub-systems in co-operative extension. The three categories are research-transfer models; adult education models; and interdependency models. The research-transfer models view researchers' activities as the starting point. Extension's activities begin only after there is an output from research. If the output is considered inappropriate, then Extension will conduct development and adaptive research to make the output more suitable to users. Bennett says that Extension's role in identifying and translating users' needs to researchers is regarded

as secondary in these types of models. Among models cited by Bennett that fit the research-transfer category are those by Feller *et al.* (1984) and Havelock (1969).

The adult education models (Bennett 1989) start with an assessment of needs (individuals, community, and societal level) by Extension. The availability of research outputs and other considerations are taken into account during the needs assessment. These models emphasize the role of educating the user over the transfer of technology or information. Models by Boone (1985) and Warner and Christenson (1984) are examples of adult education models given by Bennett.

The interdependency models (Bennett 1989) start with networking between the research, extension, and user sub-systems. In most aspects, this model is similar to the adult education model except that relationships, roles, and actions of both research and extension are considered concurrently and given equal emphasis and importance. These are also seen to be continuously influencing each other. Models by Beal (1982) and Bennett (1988) are examples of interdependency models. The networking role is central in the interdependency model. Below is Bennett's description of networking:

Networking is entering into, building, maintaining and relying upon linkages to assess needs, acquire resources and discharge responsibilities. Networking, helps to achieve communication, awareness, influence, coordination and cooperation among individuals, groups and organizations (Bennett, 1989).

For this inquiry the interdependency model is chosen as having the "ideal" research-extension-user linkages and relationships. The view by Compton (1989) describes the research-extension relationship. Compton (1989) states, "The generation, creation, or discovery (research) of knowledge must be paired with a concern for its dissemination, diffusion, and use (extension)." However, several perspectives need to be stressed here. The main role of the scientists as knowledge producers, subject-matter specialists as knowledge translators, extension agents as knowledge disseminators, and rural public/farmers as knowledge users needs to be

supplemented by a view that each category of actors has multiple roles. For example, scientists need to be viewed also as knowledge users and knowledge disseminators, while farmers/users may also perform the role of knowledge producers and knowledge disseminators.

Thus the study attempts to reveal the roles of the actors within the research-extension-user system in the Food Technology Division of MARDI and identify the strengths and limitations of the system.

METHODOLOGY

This paper is based on information from three sources, MARDI personnel, food industry entrepreneurs, and documents. In-depth, unstructured interviews were carried out with selected MARDI officers involved in planning and implementing the research and extension programmes and with entrepreneurs involved in the programmes. Informants were selected purposively based on their involvement and their ability to provide insights into the objective and nature of the programmes. Guided by the research question, six officers and four entrepreneurs were interviewed for a total of 23 hours. The interviews were recorded in the form of field notes. Data from interviews were supplemented by documents provided by the informants, including reports and papers related to the programmes carried out by the Food Technology Division. In addition, observations were also made during visits to the MARDI offices and during a visit to a food processing factory. At MARDI, training on food processing, client consultation process and research facilities observed. Visit to the food processing factory provided first-hand information on the operation of the factory and the processing work. From data obtained, descriptions of the programmes were made and the draft of the report was given to MARDI officials for validation.

The Programme

Historical Perspective

As stated earlier, research and extension activities are generally divorced from one another in Malaysia. The MARDI Act stipulates that MARDI shall carry out only research in agriculture and that research findings be made available to the extension agencies for the purpose of dissemination to, and application by, the target

groups. In line with the act, the Food Technology Division of MARDI (formerly known as Agriculture Product Utilization Division) only conducted research in the utilization of agriculture produce until 1981. The research findings were documented into reports and publications but no formal extension activities were carried out.

However, since 1970, *ad hoc* training and advisory services were provided to those who requested them (Adinan and Hussain 1984). Due to increasing demand for advisory services, a direct communication channel with small food operators was established in 1982 with the creation of the "development" branch to complement the research branch of the Food Technology Division. The development branch carries out the following programmes (MARDI, 1993a):

1. Food Information Development
2. Food Project Development
3. Food Industrial Development
4. Food Extension Services
5. Training for the Food Industry
6. Food Quality Control Services

All six programmes form linkages through which research findings are communicated to consumers. This paper focuses on four of these programmes: Food Extension Services, Food Information Development, and Training for the Food Industry.

Food Extension Services

The objective of this programme is to provide advisory services to the local food industry towards upgrading of production technology and product quality (MARDI 1992). The services include regular visits (every 3 months) by MARDI officers to selected small food industries. During those visits advice is given on processing-related problems such as processing technology, quality control, machinery layout, product diversification, packaging and labelling, food regulation, hygiene, and sanitation. Services are provided for those entrepreneurs who seek MARDI's advice and who receive some financial assistance from government or semi-governmental agencies. This includes food processing establishments that receive financial assistance under the World Bank Special Project. Most of the advisory services in food processing

are provided by MARDI alone. However, in cases where the entrepreneurs receive financial assistance from other agencies, MARDI collaborates with those agencies in providing the advisory services.

Beside providing advice on a scheduled basis for the entrepreneurs at their production sites, MARDI also responds to inquiries made by both existing and potential entrepreneurs through telephone, letters, and personal visits to the research stations. In order to reach a wider audience, particularly potential entrepreneurs, MARDI often organizes and participates in exhibitions related to the food industry.

Food Information Development

The major output of this programme includes newsletters, flyers, pamphlets, and booklets on various aspects of food technology. These are disseminated to both potential and existing entrepreneurs. To date more than 80 different publications on completely packaged technologies have been made available to clients.

Training for the Food Industry

Various courses are developed and offered to potential and existing entrepreneurs in the food industry and also to personnel from extension agencies. The main objective of the programme is to introduce to participants the new technologies in food processing and quality control (MARDI, 1993b). The courses are provided in two forms — scheduled and unscheduled.

1. Scheduled Courses

Scheduled courses are categorized into either basic or advanced courses (Wan Rahimah 1986). In basic courses, participants are given a complete technology package on the processing of a certain product. This includes processing principles, method of processing, quality control of ingredients, process and product, packaging and presentation, cleanliness and sanitation, cost of production and good manufacturing practices. Advanced courses are designed by discipline or certain processing aspects such as quality control, packaging, and sanitation. The participants for a particular course are normally limited to those who want to learn more on certain aspects of the industry. Some of the advanced courses are carried out in collaboration with agencies that request them for their staff or clients. Certain

advanced courses involve international agencies like Japanese External Trade Organization (JETRO) and United States Food and Drugs Administration (USFDA).

Courses are planned in advance based on projected demand of the clientele. Course schedules are communicated to the public through newspapers, radio, booklets and on individual basis through extension agencies. Usually application surpass available seats. All those above 18 years old are eligible for a course. These courses are self-financed through charges made on the participants. These certificates are viewed favourably by financial institutions for loan approvals.

Courses are conducted by researchers from various specializations. A course usually involves both the theoretical and practical aspects of a process. Participants listen to lectures, observe demonstrations and carry out activities in laboratories.

2. *Unscheduled Courses*

As the name implies, these courses are conducted from time to time to meet the clientele's request. They normally deal with subjects not listed in the scheduled courses such as post-harvest handling of fruits, food canning and marketing. They also serve as an introduction to potential entrepreneurs who have not yet decided on the type of industry they would like to operate. After completing this course, participants are encouraged to attend the scheduled course of their choice.

Food Industrial Development

A number of projects are carried out under this programme, including research-oriented projects and projects designed to improve selected food industries. An example of the latter is the "adoption scheme" which deals with small- and medium-scale food industries. The objective of the scheme is to produce successful entrepreneurs who are able to operate efficiently and produce products of consistently high quality. This service is provided through comprehensive and intensive guidance on appropriate and efficient production technology, analytical facilities, quality control system, packaging and marketing of products, and business management.

Generally, this scheme involves three phases which last for approximately three years. Phase

one seeks to assist the entrepreneur in solving his immediate, major problem. It starts with ensuring that the client meets the specified criteria:

- i. Has a registered factory;
- ii. Is currently engaged in food production;
- iii. Has problems with marketing strategy;
- iv. Has some technical problems.

Then it proceeds with identification of major problems faced by the entrepreneur. Based on the problems identified, the entrepreneur is given appropriate recommendations and training. His current products are analysed and recommendation on specific product specifications and requirements will be given. To improve his productivity, proper plant layout and machinery are suggested. Advice on financing opportunities and marketing strategies are also given.

The strategy in phase two is to improve the product and plan for diversification. This is achieved through introduction of new product formulation, equipment, more conducive and hygienic working areas and liaising with machine supplier and financial institutions.

With the utilization of new machinery and the adoption of recommended processing practices, the third phase proceeds with the aim of helping the entrepreneur to enlarge his business into becoming a medium-scale enterprise through production of new products. The entrepreneur is also advised on food regulations and other requirements of the successful food industries.

The adoption scheme is carried out through involvement of a team of researchers from different areas of specialization. Matters related to machinery and the processing line are under the jurisdiction of the engineer. He assigns the layout and equipment and co-ordinates with machine supplier to ensure that the machines meet the specific industry requirements. The food technologist makes recommendations on food formulation, sanitation and quality control. The economist ensures that the recommendations are not only technically feasible but also economically viable. The whole team participates from preparation of the research proposal (which is also used for loan applications) to locating markets for the product. This is carried out through consultation and regular (at least once

a month) visits to the industry. Most of the advice and training take place at the factory which also serves as a site where trials on actual application of recommended machinery and processes are carried out. As such, the adoption scheme serves as a 'learning laboratory' for both researchers and clients.

The Research Programme

The Food Technology Division conducts both applied and "fundamental" research. The areas of applied research are food handling, storage, processing, packaging, engineering, and food marketing while the fundamental research areas are food science and food safety (MARDI 1990). Identification of research problems may come from three sources. One source is the directions and guidelines formulated at the national level by various ministries. The second source is the demands from related industries or sectors. The third source is the personal and professional interests of MARDI personnel.

Researchers at the Food Technology Division who are operating in the "researcher" mode usually devote about 80% of his/her time to research and the remaining 20% to development work. This may include extension and training activities as well as being "on call" for troubleshooting activities.

DISCUSSION AND CONCLUSION

The Food Technology Division of MARDI integrates research and extension in a manner that resembles the interdependency model discussed earlier. Research officers of the division form extensive linkages with food industry entrepreneurs (including potential entrepreneurs), suppliers of raw materials and machines, loan agencies, and others related to the food industry. The collaboration between these groups occurs at all phases of the research-development process.

In the Food Technology Division, not only are the two functions integrated, but the research officers are actually performing the role of researchers, subject-matter specialists, and extension agents. As stated earlier, the officers in the research branch of the division carry out 80% research activities and 20% development/extension activities while the research and extension work load is reversed for the research officers in the development branch. This multiple role enables officers to keep abreast of

research as well as extension issues and problems in both the laboratory and in the industry. Related to the multiple role is the team approach, with the team of researchers that includes food scientists, engineers and economists and their collaboration with extended agencies.

A brief description of an actual project may illustrate the point mentioned above. A team consisting of food scientists, engineers, and an economist worked with producers of a traditional snack and with officers of a state development agency to set up a commercial production of the traditional snack. Food scientists worked with the local snack producers to adapt the formulation for commercial production. Engineers helped with the factory layout and design of machines. Local machine fabricators participated to produce and install a prototype machine at the factory site. Studies were made on processing, mechanization, and economic aspects. The outcome was a total, comprehensive technological package for the commercial production of the traditional snack. Improvements over the traditional method were shorter processing time, longer shelf-life, better packaging, improved product quality, efficient and hygienic production-site, and higher economic potential.

Participation by the various groups like the one described above helps establish the linkages and interdependent relationships described. By working together at the production site the various groups were able to see beyond the confines of the group's area of specialization. The on-site research by the MARDI officers enables them to see problems in the "real world". It also allows them to evaluate the effectiveness and impact of the package technology in "real world" settings. Where possible, immediate corrections and refinements can be made; the problem would be investigated at the most basic level.

Another strength of the Food Technology Division is that the programmes are targeted at specific groups. The stratification of the clientele is taken into considered. The clientele groups are categorized according to the nature of the enterprise, the size of the operation, and the development stage of the enterprise. For example, budding entrepreneurs are given more "basic" training to help them get established. The established entrepreneurs, on the other hand, are given coaching at their own production

sites. The differing needs between small-scale, medium-scale, and large-scale operators are also taken into account. For example, separate training programmes are designed for each of the three size categories.

Certain suggestions however can still be made to improve the research-extension system in the Food Technology Division. The number of officers with the expertise and experience to effectively carry out both the research and extension functions is relatively low. While they have demonstrated their ability to carry out both functions, this capability is developed through years of experience. The acquisition of this capability can be speeded up in two ways. One is to include an adult education discipline in a more systematic manner.

The advantages of having direct linkages between researchers and other groups in the food industry were discussed earlier. This set up, however, limits the number of clientele that can be reached. To overcome this situation, front-line workers are needed to concentrate on the proven technological packages and in areas where there are relatively few problems. This will ease up some of the demands currently faced by the researchers without affecting the linkages.

This study has demonstrated some actual practices that serve to highlight certain facets of the interdependency model of research-extension-user linkages. By viewing the research-extension-user system through the lenses of this model, more meaningful participation by members from all sub-systems at every phase of the research process can be made. Within this context, the research process is seen as the knowledge creation-diffusion-utilization process.

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