



Original Research Article

Food innovation program in the ASEAN

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ABSTRACT

The paper presented existing platforms of Food Innovation Center (FIC) Programs in the Association of South East Asia Nations (ASEAN). The FIC Programs of the ASEAN were briefly discussed in terms of (i) stimulus initiatives by respective government institutions, (ii) organizational structure of the Programs in collaboration with learning institutions, (iii) financial platforms coming from continuing government subsidies and income generated mostly resulting from the FIC services, and (iv) indicative success markers for the FIC Programs. The paper also discussed the different indicators that can be used to measure the success of the Programs including transfer and commercialization of developed technology packages for food processes and products. Significant key performance indicators for the Programs including: scientific publications, intellectual property protection of developed technologies and innovation, and package service assistance to industry and the community were presented. The income produced from royalties of IP and services rendered to clients as well as grants in the form of private and government financial aids to fund capability building of the FIC facility and manpower to further advance food-based STI as good success indicators of national FIC Programs were detailed. The paper showed how the triple helix relationship of the government so far provided for the development and operation of FIC Programs in the ASEAN. It was recommended that eventually the quadruple helix approach be considered as a more inclusive platform for the ASEAN FICs.

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INTRODUCTION

This paper puts forward the importance of FIC Programs in the Association of South East Asia Nations (ASEAN). This short communication was based on the presentation of the author for the Southeast Asian Regional Center for Graduate and Research in Agriculture (SEARCA) Professorial Chair Grant entitled *Functions of Government, Academe, and Industry in Philippine Good Innovation Centers for Regional Development* (2017), on projects of the author which were funded by the Department of Science and Technology-Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) including *Seminar-Workshop on Best Practices for Establishment and Operation of Food Innovation Center among ASEAN Member States* (2018), *DOST FIC Products for International Promotion* (2017), and *Development of Competence of the DOST Food Innovation Centers (FICs) and Recognition of Most Innovative Products* (2016), and on other related literatures on FIC programs. The role of the author as the Focal Person of the Philippines in the ASEAN Sub-Committee on Food Science and Technology (SCFST) greatly encouraged the development of this paper.

This paper seeks to inform about the food innovation requirement in the ASEAN, and the efforts of the Association to be at the forefront of the global food market and to aid the growing population of the region. It further delves into the concept, framework, and benefits of FIC program. The key roles of the government, academe, and industry in the establishment of FIC programs are also highlighted.

ASEAN and Economic Growth

The Association of Southeast Asian Nations (ASEAN) was established in 1967 by five founding members (ASEAN, 2012). Currently, ASEAN has ten member states (Mukim, 2005). The Association objective is to promote economic growth and regional stability of its member countries (US-ASEAN Business Council, Inc., 2017). So far, the ASEAN has been able to already influence the economic, political, and security environment of the region greater than what its members could achieve individually (ASEAN 2017a).

The Association established the ASEAN Economic Community in 2015 with the objective to provide a stronger foundation for development in the region by providing the means for further integration of the member states economies (ASEAN, 2017a). The AEC Blueprint 2025 laid out the strategic direction that the ASEAN leans to in order to achieve a unified economy for a united region and a globally competitive and competent Association for the people (ASEAN Economic Community, 2015). The Blueprint aimed to ensure that the ASEAN, as a single entity with an integrated economy, is mutually assimilated with the global community as an expanding single market of goods, services, skilled labor, and capital entity (ASEAN, 2008; Vinayak, Thompson, and Tonby, 2014) and as a single community attending to trade barriers (ASEAN, 2017a). The ASEAN is now considered as one of the most dynamic drivers of current global economy (OECD, 2017). The ASEAN collectively stood as the 6th largest economy in the world with a combined GDP of US\$2.55 trillion as of 2016 (ASEAN, 2017b).

Growing ASEAN Food Needs

Over the years, the combined population in the ASEAN grew to more than 650 million making the region the third largest market in the world (ASEAN, 2017a; The World Bank, 2016). Currently,

Indonesia is the most populous country in ASEAN with over 265 million people, followed by Philippines with 107 million people (International Monetary Fund, 2018). Population growth has been one of the driving forces behind the continuous transformation of the global manufacture and market systems for food which also affected the dynamics of food security (Asian Development Bank [ADB], 2013).

The ASEAN region has grown from being the 7th largest economic power in the world in 2014 to the 6th after the AEC integration agenda with a combined GDP of US\$2.55 trillion in 2016 (ASEAN, 2017a). It was reported that the ASEAN has an upward growth projection in 2017 from 4.8% to 5.0 % (ASEAN, 2017b). The integrated economy of the ASEAN shows a more stable growth compared to the individual economic growth of the member states (ASEAN, 2017b). However, ADB (2013) discussed that despite the economic advancement and structural transformation, over 60% of the world's poor and hungry is still found in Asia (ADB, 2013).

The AEC adopted the *ASEAN Integrated Food Security (AIFS) Framework* and the *ASEAN Multi-Sectoral Framework on Climate Change: Agriculture, Fisheries and Forestry towards Food Security (AFCC)* to systematize its approach to food security. The ASEAN member states (AMS) have implemented numerous cooperation projects which include sharing of information, crop production, postharvest processing and handling, training programs and trade promotion initiatives (ASEAN, 2017a). For the success of the AEC in achieving its long-term goals, it has been cited that additional efforts should be extended to enjoin further the micro, small, medium enterprises (MSMEs) of the region to become key players of the AEC (Minh, 2017a, 2017b).

ASEAN food innovation strength

As the member countries of the ASEAN grow economically through proven collective efforts as the manufacturing hub in the region, the Association expressed in *Investing in ASEAN* their desire to be at the forefront of global economic development (ASEAN, 2017a). The ASEAN, as mentioned in the publication, takes on the challenge to be globally competitive in terms of food, agriculture, and forestry products (ASEAN, 2017a). In doing so, three possible routes for development can be undertaken, namely: (1) increase intra-regional and global trade, a primary objective of the AEC; (2) entice multinationals for more production, in order to counter the increase of labor costs in China; (3) and apply big data analytics and disruptive technologies, for the ASEAN manufacturing firms to keep up with multinational counterparts (Abonyi, 2012).

The immediate problem with international trade are the technical barriers due to different set of standards on food labelling, product registration, and authorization of food ingredients (Postma, 2013). It has been reported that the ASEAN Food and Beverage Alliance (AFBA) sought to harmonize food policy and standards for fair trade of safe and high-quality food (Postma, 2013). Through this, MSMEs in the ASEAN would be able to easily export products, enter new markets, and grow trade potential. The greater challenge in venturing intra-regional and global trade, as Abony (2012) explained, is to innovate products, production processes, and business systems as a response to the growth of the market and the integration of regional markets to more developed countries. Opportunities for innovation continue to unfold to address novel customer constraints, preferences, and market niches brought by the difference in demands and characteristics between the ASEAN region and other developed countries (Abony, 2012; ASEAN, 2017a).

The ASEAN, through the ASEAN SCFST, works towards creating an innovation-driven economy with deep science, technology, and innovation enculturation through the establishment of Food Innovation Centers (BusinessMirror, 2017). In the 49th meeting of the ASEAN SCFST held in Malaysia in 2018, the Philippines opened the concept of Food Innovation Network ASEAN (FINA) strategic planning project. The concept of FINA revolves on the idea of an online virtual space wherein the network of FIC programs all over the ASEAN region can pool ideas and work hand-in-hand to provide greater opportunities for the materialization of food innovation ideas.

Food Innovation Center (FIC) Program defined

Food Innovation Center program was described as a research and development hub that could possibly provide infrastructure for technology development on food processing and quality evaluation, and generally includes technical support systems for marketing, business structuring, and food safety regulation compliance (Babcock, 2008). These Centers for food product development and innovation are established to promote regional food processing initiatives, maintain localized food autonomy and promote self-sufficiency by concentrating the value-adding efforts for agricultural resources within respective communities where the raw materials are sourced (Babcock, 2008). The FIC program therefore is primarily designed to serve the food product development needs of a given community. Figure 1 indicates conceptual functions the Philippine FIC. Each of the Philippine FICs established in the different region of the country was envisioned as a facility where stake players in the food product development can conceptualize, develop prototypes, and produce market samples of innovative products to assist food producers, processors, marketers, and entrepreneurs.

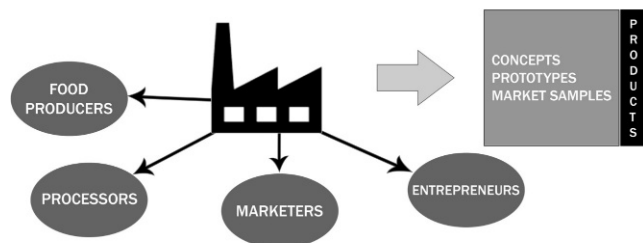


Figure 1. Philippine FIC conceptual function.

The Oregon State University FIC (OSU-FIC) considers three areas of excellence within its facility namely: (i) a product and process development group to help start-up and established businesses bring products to market, (ii) a consumer sensory facility, and (iii) a food safety hub for education and testing (OSU, 2018). The Rutgers University FIC in New Jersey, USA, on the other hand, was designed for food business incubation with an international soft landings designation service to support foreign food industries to establish their presence in the US market (Rutgers, 2016). The soft landings designation of an FIC indicates that it can help a company from another country land softly i.e., the facility has the capability to help with business viability and sustainability (Rutgers, 2016; Chen, Watson, Cornacchione, & Azevedo, 2013). Although the FIC programs are generally dedicated to serve the food product development needs of its community, its involvement to national and even international efforts for food businesses also exist.

ASEAN FIC Program

Some of the ASEAN member states have already formally established their respective FIC programs dedicated to address national food processing and innovation concerns. Singapore established in 2007 the Food Innovation Resource Centre (FIRC) as a joint venture between Singapore Polytechnic and Spring Foundation (FIRC, 2016). Thailand FIC program is championed by the Thailand Institute of Scientific and Technological Research (TISTR) (Center for Innovative Health Food, 2018). The FIC programs of the Philippines and Malaysia are both sponsored by their respective Department of Science and Technology (DOST), in the Philippines thru its research and development institute for industry and its various regional offices (Industrial Technology Development Institute, 2013), and for Malaysia thru the Malaysian Agriculture Research and Development Institute (MARDI), Malaysia (MARDI, 2018). The Indonesian FIC program presently exists distinctly as a network of manpower from various sectors of the government, academe, and industry working together to mainly downstream innovation of their local agro-foods. Downstream innovation was previously described as the system of converting existing technologies into economic value, i.e. commercialization (Bhardwaj, 2010). The FIC programs of the rest of the AMS are yet to be formally established as of 2017.

FIC Stimulus from government institutions

Amongst the AMS with existing FIC programs, the establishing champions of the Centers were fundamentally national government research ministries or departments that stewarded the conceptualization of the innovation hubs and which provided for the start-up financial infrastructures. Figure 2 shows the pillars of an FIC program which primarily includes the government ministry as the FIC program champion, science, technology and innovation (STI) institute as the manager, and the higher education institutes as the implementor.

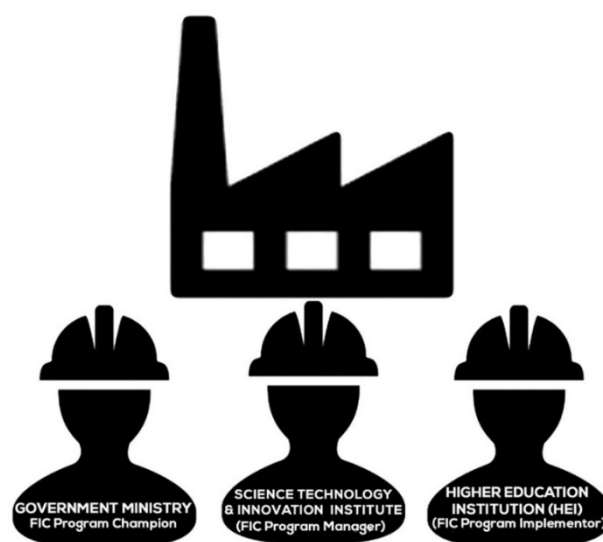


Figure 2. ASEAN Builders of the FIC Program.

Primary financial resources of the FIC programs coming from the government ministries included some facility and equipment outlays, manpower development support monies and initial support for start-up operating expenses. Aside from champion government

ministries responsible for the establishment of FIC in the ASEAN, STI institutes became part of the mechanism of the government to set-up the establishment of the FIC programs in the AMS. The government STI institutions act as program managers for the FIC programs. The STI institutes primarily draw implementing initial activities for the FIC program to help plan for long-term objectives of the establishing ministries for the innovation hubs. The eventual physical locations of the FIC programs are either in higher education institutions (HEIs)/academe facilities or government-run research and development institutions. The identified incubators of the FIC programs are locations that could provide diversity and supply for expert manpower complementing each other in the quest for innovative food product development initiatives. Likewise, the innovation locations of the FIC programs can ensure sustainability of research and development activities because the incubators can access grants for in-house research activities and earn income for facility service engagements and royalties from intellectual properties (IPs) sold or shared.

ASEAN FIC Organization

Figure 3 details the Philippine model of an FIC facility operation housed in a local academic institution. Relevant to the establishment of the FIC program are government institutions with establishing roles and STI with managing roles. Academic institutions are reasonably the identified eventual locations of the FIC programs based on the wealth of expert resources to drive innovation activities in the facility. Some academic institutions are now identified as entrepreneurial institutions able to be involved in development and marketing of its IPs as a result of innovative efforts (Philpott, Dooley, O'Reilly, & Lupton, 2011).

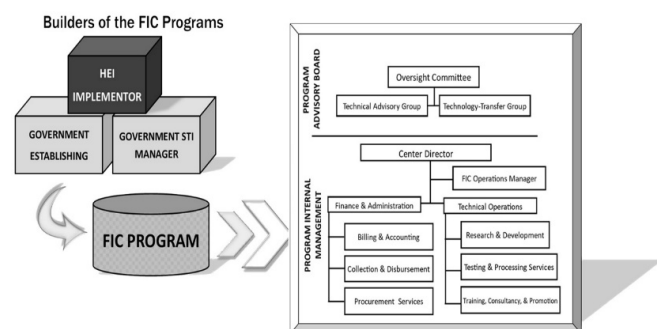


Figure 3. Philippine Model of FIC Program.

Leaders of the various institutions, both the government and academic institutions or their assigned alternates, form part of the oversight committee to the Philippine FIC program organizational set-up. The FIC Program benefits from the oversight group in addressing scientific and management concerns and planning for future directions of the FIC Program. This oversight committee functions as a technical and management advisory arm of experts from the government and the university itself.

Internally, the Philippine FIC program model facility is led by a director together with an operations manager. The technical operations of the FIC program is focused on three areas namely: (i) research and product development, (ii) technical services including product testing and processing services and, (iii) extension activities

inclusive of training, consultancy and promotion of technological innovations produced from the FIC. The training and consultancy can be handled by the FIC personnel themselves or it can utilize affiliate experts from the university pool of human resource. Also, within the operation of Philippine FIC program model operation is a finance and administration division controls the flow income and expenses of the facility.

FIC Financial platform and sustainability

A general concept for the sustainable financial structure of FIC programs in the ASEAN is presented in Figure 4. The FIC programs, with its expert personnel and technical facility, are expected to earn and access operating funds. Broadly, the functions of the government as establishing institution of the FIC Program in collaboration with either STI institutions or HEIs are: to help conceptualize, design and initially provide for costs related to facility development, procurement of equipment, and recruitment and training of significant manpower. Eventually, the FIC program incubator in either an STI or HEI carries the burden of ensuring sustained operation with adequate financial support. The strategies per FIC program to attain financial stability are highly dependent on each facility locus.

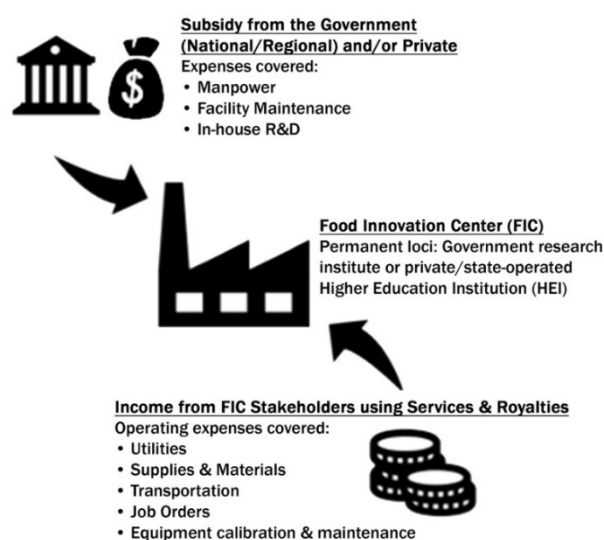


Figure 4. General sustainable financial structure of ASEAN FIC Programs.

In Malaysia and Thailand, the respective FIC programs are partially sustained by the government-run research institutions nurturing the facilities. On the other hand, Singapore and the Philippines permanently situated their FIC facilities in private or state-operated academic institutions. For those FIC facilities situated in government-run institutions, subsidy from the national or regional government is generally provided to cover for costs related to personnel, facility maintenance, and necessary in-house R&D expenses. Essentially, the FIC facility is also expected to earn and help cover its operating costs, which may include utilities, supplies and materials, transportation, job orders, and equipment calibration and maintenance. It should be emphasized that in order to achieve long-term financial sustainability, every FIC program should be given the right to earn its own and use the funds to cover its operating expenses.

Success Indicators of ASEAN FIC programs

Among the cited ASEAN FIC program success indicators include developed technologies and the eventual transfer for commercial use the product or service packages from the facility. The registration IPs based on STI activities are also good gauges of success of the FIC programs. Each FIC facility earns not only distinction from protected IP assets but also generate earnings in the form of royalties for their facilities and experts. The kinds of intangible assets developed in the FICs may include improved or novel formula product formula, processing procedure, packaging concept or developed equipment. These assets are considered IPs that can be subjected to protection claims for exclusivity of use. The types of IP protection may include patents, utility models, copyrights and trademarks. Publication of scientific and technical papers in reputable journals likewise delivers recognition to the FIC program and also marks the role of an FIC as a functioning research facility. The Malaysian FIC program highlighted the relevance of rewards, incentives, and recognition to FIC personnel to further drive the innovative.

Tripe Helix Approach FIC Program

It has been reported that essential to regional growth is the dynamic interactions between government, academe, and industry within an administrative area for development (Etzkowitz and Zhou, 2018). This interaction is to help drive inclusive national economic prosperity. The collaboration between these three discreet segments forms the nucleus of Triple Helix Approach (THA) (Etzkowitz and Leydesdorff, 1998) that encourages innovation and economic improvement thru knowledge- or innovation-focused regional inclusive growth (Etzkowitz and Leydesdorff, 2000; Etzkowitz, 2002; Gunasekara, 2006). The THA is a helpful deviation from the more linear and bi-lateral relations of academe-industry, government-academe and government-industry. Figure 5 presents the responsibilities of the three stake players of an FIC program. A fundamental in the THA is to benefit from the role of Higher Education Institutions (HEIs) in innovation (Kolehmainen et al. 2015).

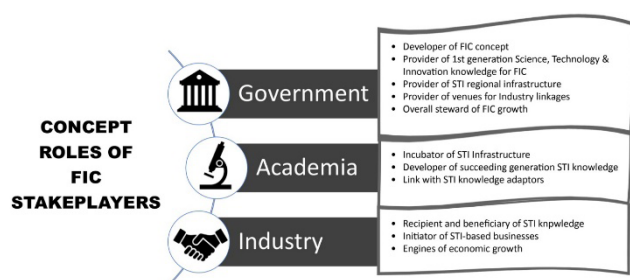


Figure 5. Concept Roles of FIC Stakeplayers.

Summary and Recommendation

The paper presented systems for operation and management of FIC Programs in the ASEAN. These systems were briefly detailed in terms of: developmental initiatives by government institutions, organization structure of the Programs as incubated in academic institutions, financial structures resulting from government subsidies and income resulting from FIC services, and success indicators for the FIC Programs. Success markers of the FIC

Programs were discussed covering transfer and commercialization of developed technology packages for food processes and products. The performance indicators of FICs were further detailed to include scientific publications, IP protection of developed technologies and innovation, and package service assistance to industry and the community. The THA of the government was emphasized to be the platform for government-academe-industry development and operation of FIC Programs in the ASEAN.

As a recommendation, the appreciation of the FIC THA should eventually graduate to the inclusion of a fourth helix that embodies both the immediate and even wider communities interfacing and affecting priorities of the FIC in its efforts to provide public good. This new approach is called the Quadruple Helix (QH). The QH approach can provide essentially a clearer understanding that the end beneficiaries of FIC generated innovations and technologies are not just the industries but rather should even extend to the wider community since these are the ultimate end users as consumers.

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