

Boosting the Food Processing Industry Through Sustainable Food Innovation Centers



Figure 1. Food Innovation Centers throughout the Philippines

Food processing is a method used to turn raw products into food products. It is conducted through one or a combination of the following: washing, chopping, pasteurizing, freezing, fermenting, packaging and a variety of other processes. Food processing also entails adding ingredients to food, such as preservatives to lengthen shelf life or vitamins and minerals to improve nutritional quality (EUFIC, 2022).

Food processing is a dominant industry in the Philippines. Processing food can be segmented according to source: fruits and vegetables, fish, and marine products, meat and poultry products, or according to target products, flour and bakery products, beverage and confectionery, dairy foods, food condiments and seasonings, food supplements, bottled water; snack foods, and fats and oils (Trade Chakra, n.d.). The gross value-added production of the Philippine food and beverage processing sector climbed by 7% to \$32.5 billion in 2018, and by 31% during the preceding five years (2014–2018) (Singian, 2019). In addition, it accounts for nearly half of the total output of the country's manufacturing sector, which contributes around 23-24% of the GDP in 2019 (IFEX Philippines, n.d.).



Figure 2. Philippine Gross Value-Added in Food and Beverage Manufacturing CY 2014-2018 (Singian, 2019)

The increase in output is attributable to the growing number of local food processing businesses and establishments. In 2015, the Philippines Food and Drug Administration (FDA) tallied around 12,000 food processing establishments nationwide, most of which are owned by single proprietors belonging to micro, cottage, and small industries (Trade Chakra, n.d.). This is a significant increase from 500 food and beverage processors registered with the Food and Drug Administration in 2013 (Singian, 2019).

Despite this milestone, the food processing industry is encountering hurdles especially in innovating its technological capacity to develop nutritional yet profitable products that can compete with imported goods. A report from the World Integrated Trade Solution shows the disparity in the food products exported and imported by the Philippines in 2019 with the former amounting to USD 2.4 million and the latter USD 6.1 million.

Partner Name	Export (US\$ Thousand)	Import (US\$ Thousand)	Export Product Share (%)	Import Product Share (%)	Revealed comparative advantage	AHS Weighted Average (%)	MFN Weighted Average (%)
World	2,409,578.85	6,111,599.11	3.40	5.21	0.88	2.47	11.56
East Asia & Pacific	974,080.59	3,249,094.14	2.18	3.89		0.50	17.90
North America	613,337.12	1,590,070.53	5.03	17.49		3.78	3.78
Europe & Central Asia	469,998.19	683,826.64	5.30	5.82		7.39	7.39
Middle East & North Africa	183,122.56	10,261.92	20.85	0.26		10.94	10.94
South Asia	70,693.12	108,216.04	10.79	4.99		7.38	8.56
Latin America & Caribbean	48,999.28	419,372.06	4.32	25.00		1.85	1.85
Sub-Saharan Africa	6,754.76	18,868.74	3.63	9.53		6.72	6.72

Figure 3. Philippine Trade Statistics 2019 (World Integrated Trade Solution, n.d.)

Further, there is an urgent need to improve in the status of malnutrition and micronutrient deficiency among Filipinos as studies of the Food and Agriculture Organization of the United Nations (UN-FAO) illustrate continued prevalence of protein-energy malnutrition and micronutrient deficiencies across all ages. As a matter of fact, four (4) million (31.8%) of the preschool population are underweight-for-age, and three (3)

million (19.8%) adolescents and five (5) million (13.2%) adults, including older persons, are found to be underweight and chronically energy deficient, respectively. Likewise bothersome are micronutrient malnutrition, with vitamin A status of the country classified as severe subclinical deficiency impacting children aged 6 months to 5 years and pregnant women, and overweight and obesity affecting children, adolescents, and adults (UN FAO, n.d.).

Thus, the government must initiate effective policies and sustainable programs to capacitate local food processors with food processing equipment and services.

Food Innovation Centers

The Food Innovation Centers (FIC) were established through the High Impact Technology Solutions (HITS) program of the Department of Science and Technology in 2015. It serves as a hub for innovations, research and development, and technical support services for value-adding of fresh produce and development of processed foods in different regions in the country.

Food Innovation Centers provide an opportunity among local food manufacturers to improve and develop products using the four (4) locally designed and fabricated equipment: (a) spray dryer, (b) freeze dryer, (c) water retort, and (d) vacuum dryer. The spray dryer transforms liquids into powder instantly, while freeze dryer produces dried materials but prolongs shelf life and enables a more convenient way of transporting these materials.

Water retort improves shelf-life of food products even in non-refrigerated conditions, and vacuum fryer creates crunchy products that are low in fat and high in fiber with minimal changes in color and flavor.



Figure 4. The four (4) locally designed and fabricated equipment (FIC Task Group Report, 2020)

Through FICs' product development, food safety and regulations, food packaging, nutrition labelling, product costing, marketing strategies, and product testing services, micro, small, and medium enterprises (MSMEs) in urban and rural areas became more effective in technology application, deployment (transfer), and commercialization enabling them to compete with imported products while promoting sustainable economic growth and productivity in the macro level.

There are currently eighteen (18) FICs established in the regions through the rollout of locally designed and fabricated food processing equipment which was completed in three (3) batches. From 2017-2020, the FICs has developed 9,893 product concepts, 1,413 product prototypes from the product concepts, 312 packages of technologies (POTs) from the prototypes, 282 IP applications filed as of 2020 and 36 Licensing Agreements signed, and at least 5,464 clients served (FIC Task Group Report, 2020).



Figure 5. No. of product concepts developed (FIC Task Group, 2020)



Figure 6. No. of product prototypes developed (FIC Task Group, 2020)

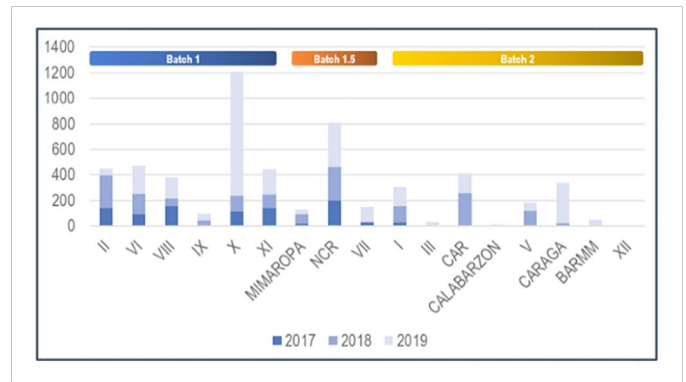


Figure 7. No. of clients served (FIC Task Group Report, 2020)

Even with the aforementioned accomplishments, the DOST saw the need to ensure the sustainability of Food Innovation Centers in order to uphold its objectives of developing food products that increase health and wellness and promote nutrition among Filipinos.

Challenges to Sustainability of Food Innovation Centers

Project sustainability implies self-sustainability, continuance in performing and delivering project services and benefits to its target beneficiaries after the funding period has ended. Devising strategies for long-term viability of FICs is crucial considering the DOST Executive Committee decided that funding for the program will only be until June 2022 (FIC Task Group Report, 2020). Below are the challenges to sustainability of FICs according to the 2020 FIC Task Group Report and Key Informant Interview (KII) conducted with FIC project leaders and managers.

1. Underdeveloped machines, as well as incompetence in their operation and maintenance.

Prior to deployment in FICs, operators undergo a two-week training that covers familiarization of equipment parts and accessories, their features, functions, maintenance, and fixes to quick maintenance-related problems. Nevertheless, according to an assessment report in 2018, issues on equipment operations, repair, and maintenance persist.

The common concerns validated during the assessment were clustered and classified

according to the four major aspects as follows: (a) design, (b) workmanship, (c) operation, (d) maintenance.

Maintenance and operations of the FIC are the most common concerns. The assessment points out the issue on availability for replacement of easily worn-out equipment parts and components. It also highlighted the inadequacy of technical skills and experience of operators in relation to the equipment requiring constant thorough inspection.

In terms of equipment design, the proponent/implementing agency aimed to localize it for cheaper fabrication cost. However, the unprecedented roll out of equipment, which were still in the design stage, due to urgent demand has resulted to some equipment requiring enhancing, upscaling, and revisiting to improve the configuration, control system, and built of easily worn-out parts/components. Eventually, the roll out of underdeveloped equipment has compromised the product development.

In terms of workmanship, there was lenient implementation of policy on quality assurance which resulted to unguarded testing of fabricated equipment. The issue on workmanship correlates to the concern on equipment design because the equipment fabricator had to make technical adjustments to the equipment considering it was still in the research and development (R&D) stage when it rolled out to the Food Innovation Centers. In the same vein, poor workmanship of equipment reflects the competency and proficiency of fabricators/manufacturers to deliver quality equipment, as the FIC Task Report noted that there were frequent maintenance and repairs conducted (FIC Task Group, 2020).

These common issues must be addressed systematically as these negatively affect the utilization and productivity of equipment in FICs.

2. High turnover rate

FIC support staff/operators are hired on a contractual or part-time basis only. Due to lack of security of tenure, FICs suffer a high rate of human resource turnover. This has a direct impact on the FICs' operations, and without ongoing training and capacity building for new operators, the equipment will not be adequately utilized or maintained.

During the implementation of the roll out projects, the DOST-ITDI and DOST-MIRDC had trained 109 personnel to work in the FICs. After completing the assessment, the Task Group noted that less than 50% remain in service to the FIC with only 1 or 2 operators staying for some FICs and others have completely new set of operators. This poses a risk on the knowledge and skills management of the centers as they go back to the hiring process and training the basics.

3. Uncoordinated processes and procedures for the overall operation of the FIC.

FICs are established in each region of the country to serve as a hub for innovation, R&D, and support services for value-adding of fresh produce and development of processed foods. Although it exists in different regions, it complies with general governmental requirements (FIC Task Group Report, 2020). Compliance to government requirements, policies, manuals, guidelines on consultancy, use of facilities and rental fees, among others, are necessary for the overall operation of FICs. However, only six (6) out of fifteen (15) FICs as of 2020 had secured a License to Operate from the Food and Drug Administration (FDA) exhibiting adherence to food safety requirements and commitment to product quality. In addition, the assessment report on FICs shows that host institutions have varying procedures or arrangements on provision of services, use of income, management of Intellectual Property Rights, among others.

4. Difficulty sourcing and utilizing ingredients, packaging materials, and equipment supplies.

Because most FICs are located outside of the National Capital Region (NCR), sourcing ingredients, packaging materials, and equipment supplies from that region is complicated. Moreover, lack of coordination on utilizing raw materials/agricultural produce in their respective regions has resulted to duplication in products/technologies developed.

Recommendations

Technical and Operational Recommendations

1. Operation and maintenance

- **Administer extended regular training on operating equipment.** FIC operators must also be qualified and properly trained/skilled not only on the operations but also on the maintenance and troubleshooting of the equipment. The two-week training may be extended to cover these areas, if they are not yet included in the program, or conduct extensive actual simulation regarding these areas.
- **FIC to produce a harmonized operations manual.** The manual will unify varying procedures adopted by host institutions in terms of provision of services, use of income, management of Intellectual Property Rights, among others. It will also systematize policies on the application procedure for obtaining a License to Operate (LTO) from the FDA as food manufacturer, which is one of the prerequisites for the operation of FICs.
- **Develop technology development roadmap to eradicate, if not minimize, duplication of products.** The roadmap will be based on priority commodities in the region or prioritization of research areas.
- **The FIC to identify priority commodities essential for research and product development.** This will lessen expenditures on unnecessary commodities and more budget allocation on commodities indispensable to operation
- **Maintenance protocols/procedures must be thorough and properly documented.** This guarantees that maintenance is regularly conducted to efficiently keep the equipment running in a pristine condition. Technical support services and supplies of parts and components must be accessible by adhering to a defined organizational structure which prescribes the required number of operators and by expanding the network of suppliers and establishing further collaborations with farmers

and other producers of priority or focus commodities.

- **Implement stricter policies on quality assurance and testing of fabricated equipment.** This will guarantee compliance to the design and safety requirements, among others. It requires meticulous selection and qualification of equipment fabricators for licensing and accreditation.

2. Design and workmanship

- **The design of equipment be revisited for enhancing and upscaling of the units.** Based on the accumulated performance data of each equipment, the engineers should revisit the design to improve the configuration, enhance the control systems, and replace the easily worn-out parts and components with sturdier materials.

Policy Recommendations

1. Human resource

- **Capacitate contractual and part-time operators through extending permanent employment.** Providing permanent employment to operators will reduce high retention rate as this provides security of tenure for the operators and enjoy the benefits accorded to regular or permanent employees.
- **FIC to adopt a defined organization structure.** The organization structure shall illustrate the required number of staff and their corresponding competencies that will serve as guide in the hiring process and capability building of staff.
- **FIC to engage graduates of Department of Science and Technology- Science Institute Education (DOST-SEI) Career Incentive Program.** These graduates may be employed as operators and/or researchers applying their highly technical skills and knowledge acquired from the CIP program to complex equipment issues.

2. Institutional

- Spearhead collaboration with LGUs. The collaboration will involve product development for nutrition programs of LGUs which may be legally supported through issuance of ordinances and other regulations.
- Expand partnerships with other government agencies. The FICs may partner with the Department of Education in a nationwide program which will develop and administer nutritional food to malnourished children in all public schools. Similarly, it may also partner with the Department of Health in promoting healthy diet among Filipinos through delivering ready-to-use therapeutic food for malnourished children and adults. Further, FICs may collaborate with the Department of Trade and Industry on programs and activities to expand its reach to more potential and existing MSMEs. Through these partnerships, stakeholders will be able to fully utilize the services of FICs while keeping it sustainable.
- The PCIEERD may lobby a bill that will highlight the need to maintain Food Innovation Centers as it is instrumental in advancing public interest, particularly public health.

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Acknowledgments:

Mr. Dennis Santiago (Project Leader)
Ms. Theresa Marie Chan-See (Project Leader)
Ms. Aleah Orendain, (SRS I, ITDD)
Ms. Tarhata Mariano (Senior SRS, ITDD)
Ms. Ana Mithuzela Espingol (Former SRS II, ITDD)

Highlights of PCIEERD's stance on policy issues related to industry, energy and emerging technology sectors through the coordination of the Policy Unit and the PCIEERD Technical Working Group for Policy Review and Development

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