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COMMERCIALIZATION OF CHEVON-BASED PRODUCTS THROUGH TECHNOLOGY BUSINESS INCUBATION

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A B S T R A C T

Goat production is regarded as integral component of agriculture in th Philippines. The animal is known as source of secondary income and emergenc cash among farmers in the rural areas. Considering its economic importance the university pioneered retailing scheme for goat's meat or chevon to addres the per head basis of purchase. To fast track the transfer and commercializatio of technologies, technology business incubation was offered. For this particula technology, it was transferred to a private company in 2021. The compan started to pre-commercialized the product using the integrated slaughterhous and meat processing facilities of the incubator. Several capability buildin programs were conducted to empower the company. As part of the company exit plan, an investment for the establishment of food processing was grantec With the presence of the facility, it will help attain steady growth in goa production, which in turn provides a stable livelihood for the rural-base farmers.

1. INTRODUCTION

Meat is an integral part of the human diet, as one of the major sources of dietary protein, fat, vitamins and minerals (Sans & Combris, 2015). As recorded in 2020, the global per capita consumption increased from 23.1 kg to 42.2 kg. Despite the fact that red meat is known as source of protein, fat, minerals and vitamins, it is also rich in saturated fat and cholesterol. Excessive consumption of red meat and its products is associated with increased risk of developing metabolic derangements including obesity, insulin resistance and metabolic dysfunction (Grunert, 2011).

Globally, consumers have become more health conscious and give attention to the effect of the food they eat. This has resulted in the emergence of a consumer category that demands healthful foods. Compared to other red meat such as beef and lamb, chevon has lower fat, saturated fat and cholesterol content (Madruga & Bressan, 2011) but higher in polysaturated fatty acid (Anaeto et al., 2010). This chemical profile makes chevon healthier meat in comparison to other red meats.

In the Philippines, goat raising is an integral part of farming activity and the animal is regarded as rural asset. Demand for chevon is also increasing in the rural areas especially in Northern Luzon and Mindanao areas. With the outbreak of African Swine Fever (ASF) and Avian Influenza, the demand for chevon and other meat increased.

The Isabela State University, as a government institution, is mandated to conduct research, development and extension-related activities to develop and enhance technologies and disseminate them to communities. In the process, farmers are the one of the common beneficiaries or stakeholders in technology dissemination. Since 2009, the university has been conducting several research and development projects to improve goat productivity. Aside from improving productivity, the university has introduced chevon retailing to transform per head basis of selling goats. Retailing of fresh, frozen and processed meat was offered to consumers and various products in vacuum-pack, can and meal box were initially commercialized.

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At present, the goat slaughtering and chevon cutting were approved as Philippine National Standard; while the canned and vacuum-packed products were registered as Utility Models. Considering that the readiness of the technology, it was offered for incubation. Technology Business Incubation is a process that speeds up the transfer and commercialization of technologies by offering both technical, entrepreneurial and financial assistance to the entrepreneurs enrolled in the incubation program or the incubatees.

This paper aims to discuss the process of chevon technology commercialization through technology business incubation and its effect to the goat food value chain.

2. LITERATURE REVIEW

Business incubation has become a key component of many regional and national economic development strategies, with the intention of supporting and accelerating business growth across all sectors, especially in the realm of technology-based economic development. However, it is important to note that business incubation programs can be an important part, but not the only part of an overall regional technology-entrepreneurship development program.

The National Business Incubator Association (NBIA) defines a business incubator as an economic development tool designed to accelerate the growth and success of new entrepreneurial companies by providing business support resources and services. In the traditional view, it is considered as a space, or real estate, however, the broader trend has been to expand this definition from "incubator" (a facility) to "incubation" (a process).

This process perspective includes facility types including universities, research/science/business parks, private centers, and even organizations without a physical presence through virtual incubators (Hytti & Maki, 2007). The incubator is about providing the technology entrepreneur with access to a range of capabilities that he/she may not have in their existing company structure and which the incubator provides access to in order to translate company ideas into sellable products and services.

Business incubation is now recognized as one of the key components of many regional and national economic development. The goal of the business incubation is to support and accelerate business growth across all sectors, especially in technology-based economic development (Summers, 2003).

In order to succeed, technology entrepreneurs need both strong technical and strong business management skills (Sheperd et al., 2000). Technical skills are defined as skills required to carry out the functions of the business, while business management skills, includes financial control to human resource management. Incubators help entrepreneurs to get the skills through the provision of business assistance and related services. Typical services included are consulting services, financial and legal services and the training and educational workshops (Hackett & Dilts, 2004).

2.1 Case studies of different incubators

a) Drexel University Center for Entrepreneurship

The Drexel University Center for Entrepreneurship works very closely with the university's Office of Technology Commercialization. In this model they are actively working to spin out new technologies from the university through the incubated companies. The Baiada Center contains significant incubation space for student teams creating businesses while at Drexel. This space has been conceived in direct response to student input as a unique, full-service incubator, with mentoring and collaboration space for the entrepreneurial community at Drexel.

b) Boston University Business Incubator

Boston University's Business Incubator hosts up start-up companies that are engaged in commercializing new technologies and financed through leading venture capital firms, accredited angel investors, and corporate and government sources. The mix of companies includes Life Sciences, Bio-tech, Medical Devices, Photonics, Clean Energy and Engineering. Unlike Drexel, the companies originate from within Boston University (BO) or from outside of BU. The Business Incubation Program is designed to:

- Facilitate the successful commercialization of revolutionary new technologies through the creation and support of new companies.
- Contribute to student education in Technology Entrepreneurship and Commercialization.
- Foster an entrepreneurial environment among faculty and students of the university.
- Create strong interactions between Boston University and the greater Boston business and financial communities.
- Contribute to economic development of the region by launching new businesses and job creation.

2.2 University of Central Florida Incubation Program (UCFIP)

The University of Central Florida Incubation Program (UCFIP) and its community partners is to facilitate smarter, faster startup and growth of emerging companies as a major source of regional technology-based economic development (TBED). The entrepreneurs begin to mature their ideas in the Venture Lab, as a partnership with researchers, academicians, and students before entering into the technology incubator. As part of the early-stage technology ideas and assessments, it is to align with preliminary market exploration. Once eligible to participate in the UCF Incubation Program, applicants should meet the following criteria:

- Company demonstrates strong market for products or services.

- Company offers potential for significant job creation in Central Florida area.
- Company plans to remain headquartered in Central Florida.
- The office of the President/CEO will be located in the Incubator (unless off-site or virtual applicant).

2.3 The DOST-PCAARRD-ISU Agri-Aqua Technology Business Incubator

The DOST-PCAARRD-ISU Agri-Aqua Technology Business Incubation capitalizes on the availability of technologies, experts and facilities in offering incubation programs. With this, the project has gained several outputs that contribute to the regional economic stability during the time of pandemic as well as in recovery and improvement at post-pandemic time. As of December 2022, there are 23 incubatees accepted for basic, continuing and co-incubation programs. These incubatees adapted the technologies on goat and duck (itik pinas) production, rice and forage production, food production in cans and vacuum packs for ready-to-cook and ready-to-eat products. There are 48 products developed or improved which are under pre-commercialization or commercialization stages. Selected products are also now registered under the Food and Drug Administration. There were 55 different information materials developed either in print or media to promote these products. A dedicated social media was created to support information dissemination; while a local radio station was tapped to air the campaign material for the ATBI program. Furthermore, on IPR management, the project was able to file 14 utility models, 14 trademarks and 17 copyrights.

3. METHODOLOGY

3.1 Assessment of the technologies

Mature technology is defined as a technology whose scientific background is well understood and has been utilized for a long time that possible flaws and problems has already been eliminated. Using this definition, the university evaluated all technologies developed on goat through the years. Aside from this, the presence of Intellectual Property protection is one of the factors considered.

3.2 Organization of pool of technology generators and experts

To facilitate efficient transfer of the technologies, the technology generators and experts were pooled together. This human resource and asset are the key factors that will support the transfer of technologies. They served as trainers for the various capability building programs and coaches during the commercialization phase of the technology.

3.3 Incubation process

The program follows the standard process of incubation from recruitment, incubation and exit or graduation. The recruitment of possible technology adopters is done by presenting the technologies to technology transfer day and other related activities. The interested adopter will signify its interest to enroll in the incubation program. Once enrolled as incubatee, the incubator will facilitate the development of the business plan and its business model canvass. Using these documents, the technological needs of the incubatee will be identified which will be written in the curriculum development.

Aside from the technical intervention, the incubator also provides coaching/mentoring on business, financial and entrepreneurial management. These sessions are conducted to ensure technology commercialization.

4. RESULTS AND DISCUSSION

4.1 Assessment of the technologies

Two university developed technologies on goat slaughtering and chevon canning were identified as mature and ready for commercialization. These technologies were assessed using technology readiness level (RTL). These technologies were rated at 9 wherein actual system proven in operational environment and thus considered as ready for deployment.

4.2 Incubation process

These technologies were transferred to an incubatee, the Agricom Best Foods Corporation in 2021. The company started to pre-commercialized the product using the integrated slaughterhouse and meat processing facilities of the incubator. Several capability building programs to include technologies on goat slaughtering, meat cutting, food processing, guidelines on good manufacturing practices and food processing facility were conducted to ensure that technology will be transferred efficiently and the food produced will be safe for human consumption.

To sustain commercialization of the products, the university organized the goat raisers in the region, conducted capability building activities on science-based goat production using the Farmer Livestock School on Goat Enterprise Management (FLS-GEM). A total of 403 goat raisers from Echague and Jones in Isabela and Abulog, Baggao, Tuao, Iguig, Rizal, Sto. Nino, Sta. Ana and Sanchez Mira in Cagayan were organized and trained. These organized raisers were able to produced 1531 heads of goats produced from the cooperating farms, which is translated to 57% increase in the population. Approximately 13,000 kgs of live slaughter goats were produced.

Once trained, the goat raiser association was link them to the company as source of raw materials. In 2021, 3.3 metric tons of chevon were processed into various products.

In goat production, a raiser can earn 2,200.00 per head of goat for slaughtering. For this particular project, it is recommended that each farmer should raise at least 5

does so that at least 5 kids will be produced every breeding cycle and will turn into slaughter animal after a year or 11,000.00 per breeding cycle. Moreover, there are does that can deliver 2 kids, hence the profit margin will increase.

On processing, the processor can earn 2,675.00 from carcass and entrails. The value for canning varies depending on the variant of chevon ready-to-eat. The cost to produce per can varies from each variant. For *adobo*, the cost to produce is 82.14, while 83.74 in *kaldereta* and 133.33 for *kilawin*. On the other hand, the number of cans produced from 12.5 kgs of chevon also varies for each variant. For *adobo*, 75 cans are produced, 93 and 62 cans respectively for *kaldereta* and *kilawin*. Because of this, the profit also varies from each variant. The highest profit is obtained from kalderata at 7,149.03, followed by adobo at 5,839.12 and kilawin at 2,206.36. The profit from each variant can be due to the number of cans produced.

Food processing is a critical element in the food supply chain. It is a detailed process that is necessary to convert raw materials to edible, functional food products (Knorr et al., 2020). For goat's meat or chevon, processing into various products is not a common activity as compared to pork, beef, chicken and fish until 2009 when ISU through DOST-PCAARRD introduced ready-to-eat chevon in cans.

Goats contribute largely to the livelihoods of livestock keeping households of low- and medium-input farmers, many of whom have few resources beyond their smallholdings and livestock (Boyazoglu, et al., 2005).

Globally, there are many values chain projects that are implemented to improve aspects of food security (Conceição et al., 2016). The integration of the value chain approach and food security is presented in terms of three recognized dimensions of food security according to USAID as follows:

1. Consistent availability of appropriate food, from domestic production, commercial imports or donor;
2. Individual access to appropriate food from expending income or other resources; and
3. Proper utilization of food, as determined by proper food processing and storage techniques, adequate knowledge and application of nutrition and child care techniques, and adequate health and sanitation services.

With the incubation program, the technology was able to address the entire food value chain of goat by promoting technologies across the segments (Devendra, 2015). Through this scheme, the raisers are assured that they have steady market to their produced at the right selling price (Bayudan-Dacuycuy et al., 2020.).

In 2022, as part of the company's exit plan from the incubation program, an investment for the establishment of food processing facility outside the university was made. The establishment of the facility is supported by DOST-PCAARRD Start-up Grant Program. With the presence of the facility, it will help attain steady growth in goat production, which in turn provides a stable livelihood for the rural-based farmers. Once the new facility will operate, it can also create domestic jobs.

4. CONCLUSION

Universities serve as source of knowledge, technologies and other resources in today's innovation-driven society. The presence of technology business incubator inside the university strengthens its capability to link with government and non-government agencies, industry and society. In essence, TBIs act as an accelerator of commercialization of the research outcomes, as lead in innovation and as prime mover in creating and enhancing entrepreneurial society. As observed in this project, in accepting incubatees the incubator must consider the maturity of technologies to be transferred, the presence of experts to guide the incubatees and the presence facilities where technology transfer will be conducted. Aside from these, promotion is also an important key to attract clients. On the other hand, proper selection of incubatees and tenants should also be considered to fully implement the roles of the incubator. Furthermore, the incubators and incubatee's goal should be aligned to achieve the objectives of TBI. Aside from proper selection of incubatees and assessment of technologies for the incubation, partnership with other agencies is also crucial in the incubation process. With limited funds available, it is important that the activities will be coordinated with agencies with the programs with MSMEs to complement with the activities. In this way, more outputs will be achieved, and more government programs will reach the target client. Lastly, with the implementation of technology business incubation program, MSMEs were added as one of the main clients of the university, an addition which is important in fulfilling its goal as driver of innovation. Indeed, with commercialization of chevon technologies under the technology business incubation program, the process becomes more organized and all segments of the food value chain from producers to processors to consumers were tapped. Moreover, the system likewise demonstrates that producers and processors or entrepreneurs can work together to respond to food-industry market trends. Lastly, with the business incubation, new industry can be formed from the technologies developed various researches, addressing the call to create innovation-responsive economy.

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