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Enhancing Agricultural-Based Entrepreneurial Activity in Cagayan Valley using Technology Business Incubation (TBI) Model

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Abstract - Technology Business Incubator (TBI) is a facility where start-ups are hosted and business development services are provided. For would-be technology entrepreneurs and start-ups, the Department of Science and Technology- Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) -funded TBIs to offer technical services, facilities and office space to get their business established. The Cagayan Valley Small Ruminant Research Center (CVSRRC) at Isabela State University (ISU) is one of the first Agri-Aqua TBI in the country. The incubator operates using a model that complements expert, technology and facility. The incubator offered assistance in the form of technical/technological and enterprise counselling; financial and market linkages. During the incubation process, several interventions that are tailor-fitted to the needs of the incubatees were provided. After one-year of TBI operation, 15 incubatees were successfully graduated from the program. Moreover, the R&D facilities at ISU-CVSRRC were transformed into business development hubs that helps to improve business operation at the rural setting. At present, these incubatees have already established their own enterprises thru commercialization of ISU-CVSRRC mature goat technologies and other products and through commercialization of their own products. Because of this, 25 different products were already commercialized, 15 enterprises were established and 98 local employment offered. These outputs thereby facilitate market growth and increase in income from rural-based business. Indeed, the presence of an agricultural TBI facility can be considered as an effective catalyst of industrial, economic and social development and as an important tool to facilitate growth in in the countryside. Thus, in order to assist more entrepreneurs and sustain the initial growth obtained, it is recommended that the incubator should be institutionalized.

Index Terms—micro small medium enterprises (MSMEs), agriculture, aquaculture & natural resources (AANR)-based technologies, technology Business Incubation (TBI).

INTRODUCTION

One of the innovations that improve technology commercialization is the establishment of a technology business incubation (TBI). By definition, TBI is a process of nurturing business start-ups in technology- based enterprise. It is also described as an ecosystem where innovation is promoted and supported towards commercialization.

On the other hand, technology business incubator facilitates the economic development of the country by improving growth and survival of new entrepreneurial groups. It accelerates the establishment of start-ups by providing business professional services and work space with shared office facilities in support to early stage of growth. Because the nature of technology incubators is related to technology development, universities and research centers act as the main contributor to the development (Hannon, 2003; Mian, 1994). In the Philippines, established incubators are focused on information technology. However, mature agriculture, aquaculture and natural resources (AANR)-based technologies are also seen viable for commercial agribusiness ventures using technology incubation model. These technologies are also potential to be used in creation of wealth, employment and economic development. Thus, the establishment of agriculture-based incubator is considered in the country thru Department of Science and Technology- Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD).

The agricultural-based incubator is described as a place where the process of starting agri-business venture is catalyzed by supporting the entrepreneurs with agricultural technology, business consultancy, networking with management experts, venture capital funding, infrastructure and other facilities. The key to sustainable business incubation in agriculture is innovation, which is a process of envisioning and moving new and improved ways in creating value for an agribusiness (Campbell and Allen, 1987). As such, the affiliation of an agricultural-based TBI to a knowledge-based institution such as

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university or research institute facilitates access to expertise and equipment (Bolton, 1997). With the help of these institutions, start-up agricultural entrepreneurs can be developed. When incubatee graduates from incubation and leaves the incubator, it has the capacity to generate direct and indirect employment with income, assets and taxes (Lichtenstein and Thomas, 1996). These in turn contributes to sustainable country side development and economic growth.

Using TBI model as platform in developing the rural economy, Cagayan Valley Small Ruminants Research Center-Isabela State University (CVSRRC-ISU) was named as one of the pioneer agricultural-based incubator in the Philippines in 2017. Considering the established R&D facilities and technologies generated ready for commercialization, these assets were opened for private partners and micro-small and medium enterprises in order to promote agricultural-entrepreneurship in Cagayan Valley.

REVIEW OF RELATED LITERATURE

In the Philippines, entrepreneurship is viewed as important to empower the poor, enhance improvement of production, and as an impetus to innovation. The 1987 Philippine Constitution recognizes entrepreneurship as an engine of economic growth and highlights the role of private enterprises in supporting equitable distribution of income and wealth, sustaining production of goods and services and expanding productivity, therefore raising the quality of life.

According to the Department of Trade and Industry report in 2018, there are 920,677 business establishments across the country. Based on this statistic, 99.56% or 828,436 enterprises in the country accounts as micro; 9.56% or 88,412 belonged to small enterprises and 0.41% or 3,829 were categorized as medium enterprises. Meanwhile, large enterprises made up the remaining 0.44% or 4,044.

Considering that most of the enterprises belong to the micro-entrepreneurs, there is a need to support their operation by providing assistance to make their products and services offered competitive. On the other hand, it was reported by the Philippines- Department of Trade of Industry that most of the local products in the market at present are marketed within the community only. One of the gaps identified is the absence of product's secondary information such as nutritional value, microbial sterility and best before information (shelf-life). Furthermore, the over-all appearance of the product is also not suitable for different market segments and not attractive to different costumers. However, considering that there is a need for capital or additional cost to provide this information, most of the entrepreneurs may not satisfy the requirements.

Technology Business Incubators (TBIs) are also known technology/business incubators, innovation/technology centers, science/research/technology parks, and business/seed accelerators. According to Smilor and Gill (1986), TBI offers a link between technology, entrepreneurial talent, and capital. TBI also provides tenant firms with a portfolio of new venture support infrastructure, including access to professional services (Sherman and Chappell, 1998), technology resources (Mian, 1996), networking (Bergek and Norman, 2008), and capital sourcing (Aernoudt, 2004).

The government support in incubation is important primarily by providing place for a technology to develop (Phan et al, 2005), otherwise it will remain in its embryonic stage. TBI also can be used to increase integration and provide enriched value-added services. Consequently, TBIs can also bridge mechanisms embedded within a dynamic innovation ecosystem has been explored with different levels of analyses including national, regional/local (Etzkowitz, 2002; Corona et al., 2006). This complementation thus creates a dynamic innovation ecosystem. As an organization the TBI mechanism's governance needs to be explored with respect to the relationships between management, client firms, and other key stakeholders. For example, university incubation programs need to address the TBI's role in bridging entrepreneurial firm-university relations as noted by Díez-Vial and Montoro-Sánchez (2016) take a step in this direction. At a micro level, an in-depth exploration of the incubation process is needed (Clarysse et al., 2005; Ahmad, 2014) to ensure that the entrepreneurs can survive in dynamic global environment (Baraldi and Havenvid, 2016).

In the Philippines, TBIs established were focused on information technology by providing services on e-commerce, financial management, online banking, android and computer applications and programs and games. However, considering that there are many matured technologies and products developed from the researches implemented on agricultural fields, DOST-PCAARRD launched the Agricultural and Aquatic (Agri-Aqua) TBI in 2017. The Agri-Aqua TBI framework was developed to fast-track commercialization of products and technologies and established new agri-business enterprises. This gave birth to the establishment of agricultural-based TBI, in which ISU-CVSRRC was identified as one of the new generation of incubators which was hosted inside the university.

OBJECTIVES

The objective of the paper is to present the mechanisms of an agricultural-based TBI model in enhancing the entrepreneurial activities in Cagayan Valley. Specifically, the study aims to:

1. Discuss the incubation process implemented;
2. Evaluate the effectiveness of the incubation program in the entrepreneurial activities; and
3. Determine the contribution of the incubator and the incubatees both to social and economic fields.

PROCEDURE/METHODOLOGY

Establishment of TBI at ISU-CVSRRC

In 2011, the Isabela State University (ISU) has created the Cagayan Valley Small Ruminants Research Center (CVSRRC) to cater goat and sheep R&D and extension programs. Under the assistance of DOST-PCAARRD, facilities have developed, which make the center more conducive for R&D activities, training ground for raisers and students. Today, the center is already equipped with facilities for production to include laboratories and farms and post-production using AA accredited slaughterhouse and FDA licensed meat processing unit. Most of the products developed from R&D implemented especially on semen processing and cryopreservation; and value-added chevon and mutton are already registered as intellectual property rights under IPO-Philippines. Today, the center has eight (8) approved Utility Models and three (3) approved trademarks. Moreover, the center is also known as venue for training programs such as goat production, forage production, semen processing, artificial insemination, slaughtering, and chevon processing.

Considering that CVSRRC has enough technologies and competitive products that are ready for commercialization as well as facilities that will be used to developed entrepreneurs, it was identified for technology business incubation activities under the National Agri-Aqua TBI Program implemented by DOST-PCAARRD. The operation of ISU-CVSRRC TBI was presented and approved by the ISU Board of Regents to legalized the activities including training programs offered, use of facilities by incubatees, commercialization of technologies and products and collection of fees from enrollment, toll service and license agreement signed.

Operation of TBI at ISU-CVSRRC

The ISU-CVSRRC TBI operates under the office University President, under the direct supervision of the Vice-President for Administration and Finance Services thru the Office of the University Business Affairs Office. The daily operation of the TBI is led by the Director of CVSRRC. In order to make the incubator more attractive to the prospect partners and incubatees, several experts were tapped to serve as mentors/ coaches. Their expertise ranges from animal production, food processing, marketing, financial management.

The TBI Model

The model for agriculture-based TBI highlights complementation between experts, technologies and facilities couples with support from the technology generator (the university through the R&D center). Using the technology portfolio, incubatees were let to choose which will suit to their need. The experts are also present during the process to guide them. Moreover, the facilities were also provided to the incubatees in the course of commercialization.

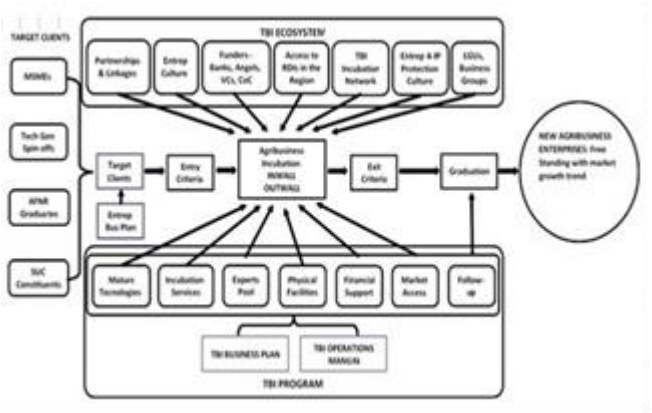

Figure 1. The Technology Business Incubation Model

Incubation process

a. Recruitment of incubatees

The services of the TBI was presented and promoted to different MSME thru advertisement and personal communication. They were invited to the center to further know the whole set-up during incubation.

In the process of incubatee selection, the incubator gave priority to the (1) entrepreneurs with idea or plan to develop a certain product but do not have capability to commercialized the proposed product, (2) with existing product but not yet commercialized due to lacking information required for retailing and (3) entrepreneurs who are willing to pay 8,000.00 incubation fee and have time to visit the incubator for coaching and mentoring. The incubatees also have an option to use the facility for the development and commercialization of their products or undergo inwall incubation; and they can have their option to establish their own processing or production areas to attain commercialization of products or be subjected to outwall incubation.

b. Participation to special training on technology business incubation. The TBI offered different training programs related to product development, business management, financial viability and marketing. This special training program was

developed based on the learnings from the Asian Institute of Management and Leaders in Innovation Fellowship attended by the Director of CVSRRC.

c. Identification of intervention and development of incubation program.

After the training, incubation process commenced. The incubatees were evaluated to determine the status of their current enterprises and products. Based on the need assessment evaluation, the TBI then developed a program. The incubation program is basically set of interventions needed to establish their start-up enterprises and to push their products into the market. The intervention and the services provided by the incubator are the following:

1. Technical/ Technological assistance- these are activities that will help the incubatees to develop or improve their products thru enhancement of product quality, generation of secondary product information including proximate analysis, microbial and shelf-life test, improvement of packaging and label designs and standardization of production schedule as well as application of IPR such as tradename. Moreover, the mature technologies generated by ISU-CVSRRC such as goat semen processing using SemEx, artificial insemination and post- production activities including hygienic goat slaughtering, chevon prime cutting, manufacturing of canned chevon products under the tradename Chevon Valley were also packaged for commercialization.

2. Enterprise counseling- these are activities that will help the incubatees to increase their market reach and sales by providing guidance in business planning, development of business model canvass, marketing strategies and negotiation to retailing outlets.

3. Market promotion assistance- these are set of interventions provided in order to introduce the products to different costumer segments by conducting market studies and developing product catalogues, distribution of fliers and participation to trade fairs.

4. Financial linkage- an assistance provided to help the incubatee to secure documents and develop proposals to be submitted to loan agencies.

d. Application and testing of intervention

The interventions identified were applied and tested to evaluate its effectiveness. An incubation agreement was signed to make this process official between the incubator and incubatee.

The range of intervention offered by the incubator includes technical or technological, entrepreneurial assistance, marketing and promotion of products and linkage to finance institution where the incubatees can avail loan programs.

During the incubation period, the incubatees were allowed to visit the TBI for series technical and business coaching. They are given one-year incubation period before they are proclaimed as graduates. As they graduate from the incubation program, it is expected that their enterprise is already establish and their products are already positioned in the market. Moreover, as they exit from the incubator, the incubatees are allowed to visit the TBi for further menoring.

e. Securing of permits

Once that products developed are ready for commercialization, permits needed to establish and operate the enterprise were secured. These permits will determine how ready the entrepreneur for business operation.

f. Graduation

The incubate is declared graduate once all requirement including permits are secured and products were already having reach market places.

DISCUSSIONS OF RESULTS

Technologies for commercialization offered by ISU-CVSRRC TBI

The major technologies that ISU-CVSRRC TBI offers are focused on livestock production particularly on goat raising, semen processing, artificial insemination, livestock and poultry and food processing. On the other hand, considering that the incubation process entails provision of assistance to help the incubate position their products in the market, other agricultural technologies including wood processing and furniture development were also catered. Different curriculum was developed for each course offered to the incubatees.

Part of the technologies offered by the incubator are the mature R&D products developed by ISU-CVSRRC. Among the technologies offered for commercialization include goat production using artificial insemination as breeding tool, cryopreservation of goat semen, chevon processing and retailing of chevon prime cuts. The commercialization of these technologies was based on Technology Transfer Act.

At present, the incubator has developed six (6) curricula and able to commercialized four (4) ISU-CVSRRC technologies under the TBI program. The curricula developed are the following:

- Goat production enterprise,
- Goat semen processing enterprise,
- Enterprise on service provision thru goat slaughtering,
- Enterprise on chevon retailing meat processing enterprise
- Food processing enterprise
- Meat processing enterprise

The TBI Implementing Rules and Guidelines of ISU-CVSRRC Incubator and Manual of Operation inside the slaughterhouse and Meat Processing Unit were also presented before the ISU Board of Regents to legality of the operation.

Capacity building activities

On capacity building, there were three (3) formalized trainings conducted on Technology Business Incubation (October 2017, January 2018 and February 2018). The training highlights the topics on improved business management, development of Business Model Canvass, Financial Statement Analysis, Marketing Plan and requirement for Company Business Registration. These topics are basically the general subject matter required to establish or expand an enterprise. Furthermore, the incubatees were also taught to explore the financial feasibility of the business in which the projected capital with corresponding product sales can be determined to evaluate how the business will operate to reach certain degree of profit. From this activity, there were 45 individuals benefitted from the knowledge shared on improved business management and technology incubation.

Interventions applied to incubatees

The incubation program was properly assessed based on the actual status of the product, available technologies and facilities and market size. As part of the development of incubation program for a certain product, market study was also conducted to check the current demand and costumer segment.

There were 15 incubatees who are enrolled in incubation program and signed the incubation agreement under the ISU-CVSRRC TBI project. These are small entrepreneurs with products that were sold in local stores in the communities in Isabela, Nueva Vizcaya and Quirino.

An example of the detailed intervention that the TBI offered are presented in the table below.

Table 1. List of interventions from the incubator

Proposed Products	Current Market Size	TBI Interventions		
		Technical/ Technological	Entrepreneurial/ Marketing	Financial
Chevon Valley Foods	Local	Use of ISU-CVSRRC facility for production and Improvement of packaging	Improvement of business plans and negotiation to retailing outlet Development of product catalogue, product promotion in trade fairs	None
Slaughter goats	Local	Production using controlled breeding program and use of AI	Improvement of business, production and marketing plans Promotion of stocks thru social media and news bulletins	None
Frozen semen and AI service provision	Local	Goat semen processing using *SemEx* and cryopreservation	Development of business model canvass and improvement of marketing plans Negotiation	None

			with LGUs and other agencies with goat program	
Breeder and slaughter goat	Local	Production using controlled breeding program and use of AI	Improvement of business, production and marketing plans Promotion of stocks to raisers	None
Fresh pork and processed meat (longganisa, ham and tocino)	Local	Preparation of documents for FDA registration, IPR Application, Label and Packaging improvement	Development of business model canvass and development of business plans Development of product catalogue, product promotion in trade fairs	Linkage to DOST program for entrepreneurs
Fresh and Processed meat	Local	Improvement of meat handling, development of tradename	Development of business model canvass and development of business plans Development of product catalogue	Linkage to DOST program for entrepreneurs
Meat products	Local	Preparation of documents for FDA registration, Standardization of production procedures Label and Packaging improvement	Improvement of business model canvass and business plans Development of product catalogue, product promotion in trade fairs	
Salted eggs	Local	Standardization of production procedures Label and	Development of business model canvass and development	

		Packaging improvement	of business plans Development of product catalogue, product promotion in trade fairs	
Native cake	Local	Standardization of production procedures Label and Packaging improvement	Improvement of business model canvass and business plans Development of product catalogue, product promotion in trade fairs	Linkage to DOST program for entrepreneurs
Bread	Local	Improved packaging and label	Development of business model canvass and development of business plans Development of product catalogue, product promotion in trade fairs	Linkage to DOST program for entrepreneurs
Processed fruits, nuts, root crops and vegetables	Local	Improved packaging and label	Improvement of business model canvass and business plans Development of product catalogue, product promotion in trade fairs	Linkage to DOST program for entrepreneurs
Herbal tea/ local fruit wines	Local	Preparation of documents for FDA registration Standardization of procedures Label and Packaging	Improvement of business model canvass and business plans Development of product catalogue, product	Linkage to DOST program for entrepreneurs

		improvement IPR application	promotion in trade fairs	
Customized furniture	Local	none	Improvement of business model canvass and business plans Development of product catalogue	Linkage to DOST program for entrepreneurs

Moreover, the over-all presentation of the products was also improved by enhancing the packaging and label design to attract more customers. Secondary product information including shelf-life and proximate analysis were also added to meet the requirements of supermarket.

Effect of incubation program to entrepreneurial activity of the incubate The incubation program provided is considered an effective intervention and mechanism to improve the entrepreneurial activities of the incubatees. For instance, in the case of Mr. Allan Mina, the adoption of controlled breeding and use of AI are effective tools in goat production. Using these interventions, the farm is guaranteed for continuous breeding of purebred stocks. After 1-year incubation, the herd population has increased from 80 heads 150 heads of purebred stocks at present.

In the case of Mr. Rofel Gamiao, an increase was noted in the number of meats sold per day after he improved his business plan and started to developed meat products. Before he enrolled in TBI program, they can only dispose at least 1 head of pig/day. However, considering innovations applied, they can now sell both fresh and processed meat from four heads of pig daily. The same improvement was noted from the experiences of Ms. Jenny Buyuccan. Before applying improved handling of meat and developing business plans, her sales has improved from 1 head to 2 heads of pig daily.

For entrepreneurs who are engaged with meat processing, an improvement in the volume of products disposed was observed when production is standardized and the over-all appearance of the product improved by enhancing the packaging and label design. For instance, Ms. Charity Buduan can only sell at least 15 kilos of processed of meat before she enrolled in TBI; and after implementing the interventions identified, she can now dispose at least 50 kilos of processed meat daily. Furthermore, in the case of Providers Food, initially, they can only sell 50kgs of their products daily or 300 kgs on six-working days. After they undergo incubation, they can now process 600kgs of meat on the same period.

Furthermore, for the entrepreneurs who are engaged with processing food products, an increase in sales was also achieved by applying the interventions recommended by the incubator including improvement of product quality, packaging and labels. On the other hand, the improvement on business plans also contributed to the increase in sales. For example, the native cakes sold by Mr. Felix Recto can now be transported outside Region 2 with improved production schedule and packaging. Likewise, the processed fruits, nuts, root crops and vegetables produced by Ms. Eliza Tomas can now be sold in different outlets as its secondary information became available couples with improved packaging and labels. In the case of Ms. Mary grace Millan, after her exposure to the incubation program her bakeshop expanded from 1 outlet to 13 outlets in their municipality.

In the case of Ms. Julie M. Cuyangan, the sales from the tea she produced from different locally available raw materials known to have health benefits started to increase after following the recommendations set by the incubator such as improving the over-all appearance of the product, improvement of packaging and label. In order to reach more customers, the business plans were improved coupled with improved promotion of the products. Her products also have its own trade name at present, in which by essence, it is the best representation of the quality of the product being promoted.

Also following the set of interventions identified by the incubator, the sales from the local fruit wines of Ms. Rebecca Basilio has increase which is brought by standardized production process, improved labels and promotion of the products. At present, some bottles of the wine have reached markets in Metro Manila.

Aside from these products, intervention such as improvement of business model canvass and promotion were effective interventions in the case of Ms. Janet Buyuccan. Her family's furniture manufacturing business has started to received more clients after it was promoted to different institutional clients. Furthermore, their business also expands by improving the business plans.

On top of these improvement is a market study conducted for each enterprises and products. An analysis of the market and its customers was conducted to determine how the product will move in the market, the trends in the market that the products should satisfy and customer's capability to buy the product. The market study is an important tool in evaluating the product's fate in the market and using the results of the evaluation, adjustment was made to fit the product to the existing market. Furthermore, this activity is also conducted to establish new market for the products.

Commercialization of ISU-CVSRRC Technologies

Through the incubation program, License Agreement was signed between ISU and ISU Multi-purpose Cooperative for the manufacturing and commercialization of canned chevon products under the tradename Chevon Valley. The private partner was allowed to use the ISU-CVSRRC facility during production with certain fee collected. In support to this commercialization initiative, the incubator helped ISU Multi-purpose Cooperative to secure distribution agreement with the and the Filipino Investor Producers Society Cooperative (FIPSC) in Metro Manila. This agreement became instrumental in improving the market of the products. At present, the cooperative is producing at least 1000 cans of processed chevon monthly.

Moreover, the artificial insemination technology is also adopted by commercial goat farms across the country. At present, the technology is used for breeding their stocks. For example, in a farm located in Angadanan, Isabela, 97% of conception rate was recorded. Today, the farm has 800 heads of does.

The goat semen processing technology was also now adopted by a private commercial farm in Tarlac City, Tarlac. A community-based goat semen processing laboratory was established to maximize the use of the breeder bucks raised in the farm. At present, the laboratory is capable of producing cryopreserved goat semen and was able to distribute the processed goat genetic materials to different local government units in Region 3 with goat production programs implemented.

At present, there were 15 incubatees who graduated from the incubation program at ISU-CVSRRC incubator. Thy already established their enterprises and currently engaged in commercialization of their products. There were 25 products commercialized to include as slaughter and breeder goats, canned chevon, chevon prime cuts, processed meat, processed fruit, nuts, root crops and vegetables, wine, tea, and different furniture. From the time of their exit in the incubator up to present, improvement in the market growth is observed.

The improvement of products as well as business management, couples with effective marketing strategies were factors identified that lead to market growth. In the case of the graduates of the incubation program of CVSRRC-ISU, 33% of them recorded a 100% growth in the market, while the rest (67%) generated 50% increase. The detailed presentation of market growth is tabulated in Table 2.

This improvement is important factor to achieve the goal to accelerate the business. Basically, as the market grow, the business expands. Production has to increase as well as its manpower.

Table 2. List of ISU-CVSRRC TBI Graduates and Enterprise Economic Improvement

Name of Enterprises Established	Market Growth	Number of hired personnel	Improvement of sales
ISU Multi-purpose Cooperative	100%	2	100%
AQU CHICKBOY	50%	7	25%
LANCE JANA	100%	2	100%
Junia Butic	100%	2	20%
Jenny Buyucan	50%	1	60%
Providers Food	100%	0	40%
Rancho Martin Integrated Farm, Inc.	50%	22	100%
Agricomponent, Inc.	50%	0	0
Agri Global-nurture, Philippines Inc.	50%	0	0
Melizabeth Food Products	50%	6	50%
Arvyl's Wine	50%	4	30%
MJ's Health Products	50%	3	100%
Gamilla Bakery	50%	2	100%
Francing Moriecos	50%	5	100%
RB Furniture	100%	3	10%

Employment and economic benefits

According to evaluation made, thru the start-up enterprises established, local employment was augmented as additional 98 local employment were offered by the entrepreneurs assisted by TBI (Table 3).

With the increase in production level, the gross income improves in which at present, it ranges from 15,000.00 to 200,000.00 monthly. The increase in sales is attributed to the improvement of products, its distribution to market and its competitiveness.

Environmental Impact

Aside from social and economic impact that the incubator addressed, environmental factors also became a concern among incubatees. As their enterprise grow, their production system was standardized to minimize hazard that can be contributed to the nature. Each of the enterprises established secure environmental compliant certificate (ECC) to ensure that waste products are disposed properly.

Intellectual Properties Applied

As technologies commercialization is based on the approved Intellectual Property Rights, the incubator also offers assistance to IPR application particularly on trademark. At present, there were six (6) trademark applications and four (4) of which were already approved. With the approved trademark, license negotiations can now be facilitated.

Impact of the presence of agri-based TBI in the university

As part of the commitment of the university to empower its stakeholders, different and development facilities were established in support to technology development, improvement and verification. Among the laboratories that were established in support to livestock production include semen processing laboratory, slaughterhouse and meat processing facilities. These facilities were instrumental in the development of technologies and products at CVSRRC.

At present, with the vision of the university to commercialized all technologies offered and to address the government's call to improve rural business operation, these facilities were offered for incubation purposes. Thus, today, these laboratories cater not only conduct of R&Ds and have expanded its operation to cater the needs of rural-based enterprises. Because of this transformation, technologies are now commercialized for the benefit of more stakeholders.

On the other hand, the incubator has generated an income of 939,433.00 within a year from enrollment fee of incubatees, license fee and toll service charges from using the facilities. The generated income serves as fund to finance other projects, maintenance of the facilities, conduct of product development studies and capability building in support to TBI operation.

Policies Developed

The ISU Implementing Rules and Guidelines for TBI Project was approved by the Board of Regents governing the university on July 2017. The IRG will serve as basis for the over-all implementation of the project as well as the guideline that will cover the researchers or entrepreneurs in commercialization of products.

Moreover, the Manual on Good Manufacturing Practices for ISU Slaughterhouse and Meat Processing Operation has already been approved by the National Meat Inspection Services (NMIS). Today, the facility can accommodate processing of meat products (both from large and small animal) for nationwide distribution.

There were also two (2) protocols developed on meat plant production protocols that covers source of raw materials, plant hygiene and sanitation and pest management and one meat processing guideline covering good manufacturing practices. These protocols were endorsed to and approved by Food and Drug Administration as part of the meat processing facility accreditation by FDA.

These policies were helpful in the proposed institutionalization of TBI operation. It is expected that once the facility is institutionalized, more entrepreneurs will be benefitted.

Developed as model on agricultural-TBI operation

Although considered as new, the agri-based TBI at ISU- CVSRRC now serves as pattern of emerging university-based TBI across the country. At present, SUCs visited the incubator for benchmarking activities. At present, the ISU-CVSRRC TBI has assisted Western Mindanao State University, Sultan Kudarat State University, Don Mariano Marcos Memorial State University and Laguna Polytechnic State University in crafting their portfolio and incubation programs.

CONCLUSIONS

Incubators have become a ubiquitous phenomenon in many parts of the world and are viewed as a tool for promoting the development of technology-based growth firms (Bergek and Norman, 2008). Business incubators play a key role in providing assistance to promising entrepreneurs, particularly in the initial stages of their firm's lifecycle. In general, the affiliation of a TBI to a knowledge-based institution such as university or research institute facilitates access to expertise and equipment (Bolton, 1997). With the help of these institutions, start-up entrepreneurs are developed; by creating jobs for themselves. It should be noted that thru TBI installed in universities or research station nurtures entrepreneurs who create enterprises. When entrepreneur leaves incubation, it has the capacity to generate direct and indirect employment with income, assets and taxes

(Lichtenstein and Thomas, 1996). These in turn contributes to sustainable economic growth.

Just like in experiences encountered at the ISU-CVSRRC TBI, after two-year of operation, much have been accomplished in promoting agricultural-based incubation. The model exhibits complementation between experts, facility and technology. This complementation is sustained by the support of the university. In the ISU-CVSRRC TBI, its presence helps the micro and small entrepreneurs to improve their business operation by developing more competitive products, business model canvass, enhancing marketing tools, improving market share, widening market reach and reaching to various customer segments by market matching. With the short period of time, it was noted that number of agricultural-based products, market growth of the enterprises, profit of the incubatees, and availability of rural employment have increase. Indeed, technology-based entrepreneurship is an important tool to fast track economic development in agricultural sector and that the role of technology business incubator is vital in the development of start-up business in the rural areas.

Lastly, the presence of the TBI in the rural areas has proven that the facility can help the government attain the socio-economic agenda of the present administration. In particular, the agri-based TBI can be an important tool to (1) increase competitiveness and ease in doing business by continuously assisting the entrepreneurs to produce more competitive products and services through provision of necessary skills and knowledge, (2) promote rural and value chain development leading to increase in agricultural and rural enterprise productivity and tourism and (3) promote science, technology, and the creative arts to enhance innovation and creative capacity towards self-sustaining, inclusive development.

RECOMMENDATION

In order to assist more entrepreneurs, institutionalization of the agri-incubator at ISU-CVSRRC is hereby recommended. When this effort is sustained, more enterprises can be established, thereby improving the Gross National Domestic (GDP) of the small entrepreneurs in the rural areas.

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