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BIOREACTOR DOWNSTREAM PRODUCT TECHNOLOGY TRANSFER - GINSENG AND TONGKAT ALI INNOVATIVE CHOCOLATE PRODUCTION TRAINING IN CAPACITY BUILDING PROGRAM TO INCREASE SMALL MEDIUM INDUSTRY (SME) ENTREPRENEURS

Seri Chempaka Mohd. Yusof
Normazlin Ismail
Mohd. Fauzi Haris
Sobri Hussein
Mohd. Suhaimi Jusoh

Malaysian Nuclear Agency, Bangi, 43000 Kajang, Malaysia

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Abstract: *Present economic constraints are a huge challenge to the ability of subsistence of low income and poor community groups and is even more significant in urban areas where the cost of living is very high. Malaysian Nuclear Agency has collaborated with PUSPANITA MOSTI (The Association of Wives and Women Civil Servants Malaysia – Ministry of Science, Technology and Innovation branch) to carry out the project of Capacity Building Programme using MOSTI Social Innovation Fund as to increase sources of income of the communities and as encouragement to become SME (Small and Medium Industry) entrepreneurs. The project was implemented by transferring the production technology of innovative chocolate Gitachoc Delight that contains extracts of Ginseng (Panax ginseng) and Tongkat Ali (Eurycoma longofolia) to help communities increase their income by producing it as a selling product due to the production process that is easy and does not require a lot and expensive equipment and materials. This product is a type of chocolate that contains Ginseng and Tongkat Ali extract derived from the roots of the culture bioreactor system rather than raw materials harvested from the wild forest or in farms. Ginseng is a plant species that have roots which takes 5-6 years to mature and can be harvested. While Tongkat Ali is a wooden forest plant species which takes 20 years to mature. With the availability of Pilot Plant Bioreactor 1-ton System, Ginseng root can be harvested after 40 days and Tongkat Ali after 60 days after cultivation. This technology gives continuous standardized supply of raw material that are not influenced by the factor of geography and environment, without the use of soil and free from pesticides and other contaminants. The project participants were divided into three groups which were PUSPANITA members who wishes to become an entrepreneur, wives of community support*

groups and the urban poor who were single mothers, disabled people and low-income groups around the Klang Valley. A total of 150 participants took part in this project included 14 participants with disabilities with hearing and speech. Participants attended series of intensive practical training in production of chocolate products and online marketing. A total of 18 chocolate production workshops, 7 chocolate products marketing online workshops and an internet entrepreneur seminar was conducted completing the programme.

Keywords: *Innovative Chocolate, Ginseng, Tongkat Ali, Bioreactor, Capacity Building Programme, Training, Entrepreneur, Community*

Introduction

The constraint of today economy had become a huge challenge to low income community groups especially in urban areas where the cost of living is very high. They are also lacking knowledge and alternative ways to increase their income with low resources. Malaysian Nuclear Agency collaborated with PUSPANITA MOSTI (The Association of Wives and Women Civil Servants Malaysia – Ministry of Science, Technology and Innovation branch) to carry out the project of Capacity Building Programme using MOSTI Social Innovation Fund as to increase sources of income of the communities and as encouragement to become SME (Small and Medium Industry) entrepreneurs. The project was implemented by transferring the production technology of innovative chocolate named Gitachoc Delight that contains extracts of Ginseng (*Panax ginseng*) and Tongkat Ali (*Eurycoma longofolia*) to help communities increase their income by producing it as a selling product due to the production process that is easy and does not require a lot and expensive equipment and materials.

Tongkat Ali (*Eurycoma longifolia*) and Ginseng (*Panax ginseng*) are well known herbs among Asians. Today, they have been sought after by the Europeans and Western people for the benefits to health. Various parts of *Eurycoma longifolia* have been traditionally used for antimalarial, aphrodisiac, anti-diabetic, antimicrobial and antipyretic activities (Bhat & Karim, 2010). Although there are many other legitimate medical areas of interest in *Eurycoma longifolia* (as evident from the quote included above), most Southeast Asians consume it for the plant's impact on sexual arousal. Already in 2001, Malaysian scientific researchers opened their peer-reviewed, Medline-archived report on the effect of *Eurycoma longifolia* on laboratory rats with the statement that *Eurycoma longifolia* Jack commonly known as Tongkat Ali has gained notoriety as a symbol of man's ego and strength by the Malaysian men because it increases male virility and sexual prowess during sexual activities. Alike *Eurycoma longifolia*, both American ginseng (*Panax quinquefolius*) and Asian ginseng (*Panax ginseng*) roots are taken orally as aphrodisiacs, nourishing stimulants, and in the treatment of type II diabetes, as well as for sexual dysfunction in men. The root is most often available in dried form, either whole or sliced (Ang & Cheang, 2001).

Recent studies have also shown that ginseng root suspension cultures could be induced for accumulation of phenolic compounds with high antioxidant properties useful for human health (Mohammad Babar Ali et al. 2005a; 2005b). Ginseng is a plant species that have roots which takes 5-6 years to mature and can be harvested. While Tongkat Ali is a wooden forest plant species which takes 20 years to mature. With the availability of Pilot Plant Bioreactor 1-ton System, Ginseng root can be harvested after 40 days (Rusli et al. 2014) and Tongkat Ali after 60 days after cultivation. This technology gives continuous standardized supply of raw material that are not influenced by the factor of geography and environment, without the use of soil and free from pesticides and other contaminants. Tongkat Ali and Ginseng extracts from mass propagated roots derived from

bioreactor technology have similar profiles as extracts derived from normal cultivation and non-toxic through cytotoxicity test using the brine shrimp (Seri Chempaka et al. 2012a).

The consumption of Tongkat Ali and Ginseng are mostly through beverages and capsules. However, some manufacturers do not use the extracts in their products; whole powdered roots of Tongkat Ali are used instead, and this may affect the health of the consumers, especially on their vital organs. A simple, safer and easier consumption of the extracts is through incorporation into chocolate confectionery products. Chocolate is the most suitable carrier that can mask the bitter taste of Tongkat Ali extract (as compared to biscuits and cakes) and combination with ginseng extract gives the chocolate a unique and exotic taste (Seri Chempaka et al. 2012b). Gitachoc Delight is introduced as energy chocolate confectionery that acts as energy booster and blood circulation enhancer with the combination of Tongkat Ali and Ginseng total extracts from mass propagated roots derived from bioreactor technology (Sobri et al. 2014). The chocolate product has good potential as a carrier for introducing unique ingredients, for example herbal extracts from soilless cultivation for the advancement of the food industry. The objective of this project was to provide intensive training at Malaysian Nuclear Agency in producing chocolate products that containing Ginseng and Tongkat Ali extracts to the low-income groups in an effort to build-up an attempt to increase sources of income of the communities and as encouragement to become SME (Small and Medium Industry) entrepreneurs.

Methodology

This project was carried out by the committee members of PUSPANITA MOSTI (The Association of Wives and Women Civil Servants Malaysia – Ministry of Science, Technology and Innovation branch) and staffs of Malaysian Nuclear Agency using MOSTI Social Innovation Fund as to increase sources of income of the communities and as encouragement to become SME (Small and Medium Industry) entrepreneurs.

The tasks were executed as mentioned below:

a) A committee consisting of PUSPANITA members and staffs of Malaysian Nuclear Agency was formed to carry out specific tasks in the project. Meetings were held from time to time to monitor the progress of the activities in the project and to resolve problems arise in executing the tasks. The purchasing and preparation of facilities, equipment, raw materials, training kits and other related services were done before the trainings begun using the fund given.

b) The committee was responsible for choosing the suitable candidates from the low-income groups around the Klang Valley as participants. The project participants were divided into three groups which were PUSPANITA members who wishes to become an entrepreneur, wives of community support groups and the urban poor who were single mothers, disabled people and low-income groups around the Klang Valley.

c) The committee members are divided into two groups, namely, a group conducting for chocolate production training and the second group conducting online business and marketing training.

The project activities were carried out in 6 months period during year 2016 as followed to the milestone involved (Table 1).

Table 1: Milestone of The Project Activities Regarding the Duration Time for Each Activities

Activities	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Determination of project team and participants						
Purchasing of equipment, raw materials and training kits						
Preparation of training kits and facilities						
Training of production of chocolate products						
Skill monitoring in producing quality chocolate products and meets the standards						
Training of online business and marketing of chocolate products						
Skill monitoring in handling communication networks with public using online medium such as Facebook, Tweet and Blog						
Entrepreneurship seminar						
Preparation of project report						

The production of the chocolate in this training was based on the formulation of chocolate that contains Ginseng and Tongkat Ali extracts in Standard Operating Procedure (SOP) of Preparation of Gitachoc Delights - Ginseng and Tongkat Ali Enriched Chocolates (Seri et. al. 2016). The extracts were prepared using Standard Operating Procedure (SOP) of Preparation of Tongkat Ali Extract from Tongkat Ali Roots-Bioreactor (Seri Chempaka and Sobri, 2016a) and Standard Operating Procedure (SOP) of Preparation of Ginseng Extract from Ginseng Roots-Bioreactor (Seri Chempaka and Sobri, 2016b).

In training of production of chocolate products and training of online business and marketing, a few workshops were carried out in two months period due to the numbers of participants. Each workshop was carried out in 4 -5 hours in the chocolate processing facility and 3 hours in online training facility. Each participant was given a starter kit (chocolate molds, mixing utensils, weighing utensils, chocolate preparation manual book, apron, note book and etc.) to start their activities at home after the training. The hands-on training was conducted using Manual Book of Producing Chocolate Products containing Ginseng and Tongkat Ali Extracts (Seri Chempaka and Normazlin, 2016). In training of online business and marketing of chocolate products, each participant was

given a note book, handouts, a thumbdrive and online sale guide book. Training modules on production of chocolate products and on online business and marketing for chocolate products were developed (Bruhad, 2009; Newstrainers.wordpress.com, 2009). The trainings were carried out using training modules that briefly described in Table 2 and Table 3.

Table 2: Training Modules on Production of Chocolate Products That Contain Ginseng and Tongkat Ali Extracts

Time	Content/activity	Materials
10 min	Briefing on sanitation in working area, utensils, equipment, storage of raw materials, processing of chocolate products and packaging of finished products	Briefing slides, LCD projector, LCD projector screen
15 min	Practices on handling related tools and equipment in producing chocolate that contains Ginseng and Tongkat Ali extracts.	Equipment and utensils
20 min	Exposed to various important steps in the processing of chocolate including proper and accurate weighing of the materials, the use of tools, utensils and equipment, proper handling and storage of raw materials, chocolate and the finished products, the sanitary of the personnel, the processing spaces and storage areas.	Raw materials, equipment, utensils, manual book
2 hours	Practices on the process and the producing of the chocolate products in a clean, acceptable state and gets a good quality products and meets the standards. In this practical the participants were trained to produce chocolate products in various forms using chocolate molds. The products produced must be attractive, neat and creative and also meet the standard of taste, appearance, hardness and ensured that each product has a consistent shape and weight and similar to its design.	Raw materials, equipment, utensils, molds
2 hours	Practices on packaging of chocolate products in creative form and the packaging are clean, safe and meets the customer preferences. This training is provided to ensure that target groups handle the packaging in clean, non-hazardous, airtight and attractive. Packaging materials, container handling and storage methods are also emphasized in this training.	Packaging materials, plastic casings, boxes

Table 3: Training Modules on Online Business and Marketing for Chocolate Products

Time	Content/activity	Materials
15 min	Briefing on handling the computer, internet, creating marketing blog, Facebook, Instagram and Tweet	Briefing slides, LCD projector, LCD projector screen
2 hours	Practices on handling the computer, internet, creating marketing blog, Facebook, Instagram and Tweet. The participants were trained intensively on writing sentences, uploading pictures and handling communication networks with public using online medium such as Facebook, Tweet and blog.	Computer and handouts on how to start creating marketing blog, Facebook, Instagram, Tweet and handling the computer and internet.
1 hour	Practices on conducting online sales, accounting and product deliveries. This training introduced steps on handling online sales including advertising, communication with buyers, handling orders and emphasized on deliveries, payments and receipts.	Computer, note book, pendrive, online sale guide book (Miliza, 2016)
Half day	Entrepreneurship seminar - This seminar exposed participants to the professional way of doing online business especially in entrepreneurial aspects, marketing management and business plan preparation.	Briefing slides, LCD projector, LCD projector screen, online business guide book (Umar, 2016)

Results and Discussion

A total of 150 participants took part in this project included 14 participants with disabilities in hearing and speech. Participants attended series of intensive practical training in production of chocolate products (Figure 1 and 2) and online marketing (Figure 3). A total of 18 chocolate production workshops, 7 chocolate products marketing online workshops and an online entrepreneurship seminar was conducted completing the programme (Figure 4).

Results from this project showed a few outcomes can be gained and became impacts of the project not only to the communities but also to the agency. One of the important outcomes was new entrepreneurs among disabled people, single mothers, housewives and low-income groups were established. With the training, this community had the opportunity to venture into business with minimal capital, easier way in marketing products through online without the need for rental shops. A total of 80 participants had been involved in online businesses and 20 participants already received orders for chocolate products. Another outcome was training modules for production of chocolate products with Ginseng and Tongkat Ali extracts and business and marketing through online were developed. These training modules can be used continuously by the agency to train other communities to develop entrepreneurs and commercialized the products. Commercialization of the product not only leads to cooperation with big companies but with online marketing and sales by these new entrepreneurs can also reached to local and foreign markets. Each participant was given a certificate of completion of training at the end of the entrepreneurship seminar programme (Figure 5).

The monitoring progress for this project was conducted following these steps:

a) Progress of participants in online business was monitored through the Group Facebook medium that has been built (Figure 6).
b) Each participant was followed up (calls and emails) to know current status of their business and sales of the chocolate products

Corrective action that can be taken to improve the project in term of execution of the project after training:

a) Longer range of time of the workshops – the participants have more knowledge and practices in producing quality products and developing sales in online medium.
b) Accessibility of the participants to use the processing facility to produce chocolate products temporarily.
c) Invite participants into exhibitions that involved in food products to introduce them as chocolate producers and sellers.

Through this project, comprehensive training provided based on the training modules gave an opportunity for knowledge enhancement for the community and they will be able to increase their household income and a few benefits achieved were recognized such as:

a) The increase of entrepreneurs among low income groups and disabled people lead to increment of income that range RM50/day from selling products through online.
b) Increasing numbers of trainers for entrepreneurship training and online business and marketing.
c) Created new sub industries – chocolate with Ginseng and Tongkat Ali extracts and other products.

The sustainability of the project was expected to include:

a) The training modules can be applied to the community to form new entrepreneurs - colloboration with National PUSPANITA (PUSPANITA ministries and other states), disabled people associations - 200,000 target disabled people registered in the Department of Social Welfare (JKM).
b) "Train the trainers" - attendees who are capable of controlling workshops and training (multiplier effects).
c) Interested companies to sign agreements to market the chocolate products.
d) Interested participants in cultivation of Ginseng and Tongkat Ali roots through bioreactor technology as well as to become suppliers /sale agents of Tongkat Ali and Ginseng extracts for food products.

Conclusion

This project created trained SME (Small and Medium Industry) entrepreneurs and improved the standard of living of low-income groups. In line with the aspirations of MOSTI, this project was an example showing the ability of a research institution in increasing the income of the community using the products and technologies available. This project met with MOSTI Commercialization Year program that aimed to commercialization the products developed by the agency under MOSTI. Commercialization of the products to local community can improve the economy of the country by raising the socio-economic of the people.

Figure 1: Briefing on Sanitation in Working Area, Utensils, Equipment, Storage of Raw Materials, Processing of Chocolate Products and Packaging of Finished Products

Figure 2: Training the Participants with Disabilities in Hearing and Speech on Production of Chocolate Products That Contain Ginseng and Tongkat Ali Extracts.

Figure 3: Training the Participants on Online Business and Marketing of Chocolate Products Contain Ginseng Tongkat Ali Extracts

Figure 4: Participants Attended an Entrepreneurship Seminar in Completing the Training Programme

Figure 5: Certificates of Participation Were Given to Participants for Completion of Training at The End ff The Entrepreneurship Seminar Programme

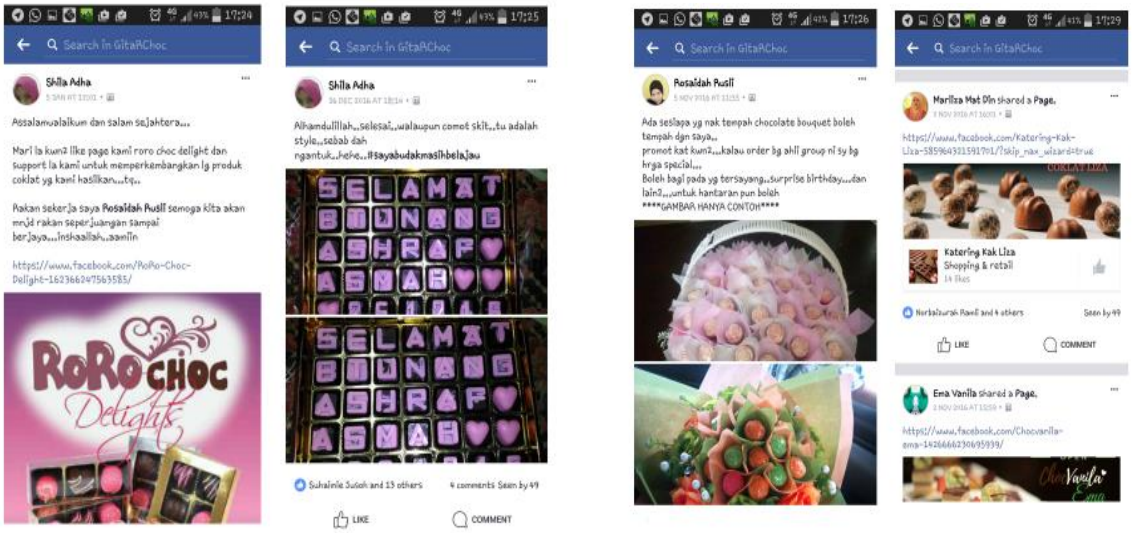

Figure 6: Group Facebook Was Developed to Monitor the Progress of Participants in Online Business of Chocolate Products

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