
Tropical Fruit Wine Processing: An Approach to Nurturing the Entrepreneurial Culture among Students

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Abstract This project sought the significance of several less valued tropical fruits that can be processed into wine such as makopa, mabolo, duhat, banana, tomato and bignay. Wine processing in Quirino State University was established by the Quirino Young Entrepreneur's Association (QYEA) a recognized student's organization spearheaded and managed by the agriculture students which main goal is to serve as an avenue for financially challenged students to earn additional allowance while enhancing their entrepreneurial skills. The product's name is JAVEZ which was derived from the name of the first manufacturers. The wines are packaged in bottles with attractive and innovative labels. Initial produce was very limited in volume due to the very limited source of capital which is out of the student's money. During the group's various displays and product exhibits in provincial and regional events, the Department of Labor and Employment (DOLE) sought the business plan of the product thus providing the group with additional fund amounting to Php 216,000.00 for the enhancement of the entrepreneurship laboratory, provision of the processing equipment, packaging materials, labels and other materials thereby making the enterprise self-sufficient. Moreover, the laboratory is utilized as a training ground of students taking up entrepreneurship and marketing courses to further develop their skills in wine processing and related activities. The group was able to generate a Return on Investment (ROI) of 50% from the estimated cost depending on the kind of fruit used. Continuous monitoring and evaluation is done by the project management and adviser. A financial journal and income statement is to the auditor and advisers to assure sustainability of the project through profit sharing. All sales are deposited in the bank, in the name of the association care of the president and the treasurer wherein 70% is divided among its members, 20% goes to savings and 10% for maintenance. The QYEA continuously operates as a successful business enterprise, developing future entrepreneurs who create employment contributory to economic development. Wine products produced have been acknowledged by the Department of Science and Technology and the primary producer of local wines in Quirino and nearby provinces. Marketing strategy employed includes the integration of wine's health benefits through word-of mouth, fliers, bulletin advertisements, displaying at "pasalubong" centers and participating in different product exhibits in the country.

Keywords: entrepreneurship, innovation, culture

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Introduction

Entrepreneurship is known for its importance to the economy as it creates employment, improves the quality of life, contributes to more equitable income, thereby it eases social unrest and utilizes and mobilizes resources to make the country productive (SERDEF, 2009). Most studies have shown that there is a positive relationship between entrepreneurship and economic growth in terms of job creation, firm survival and technological change (Gorman, Hanlon *et al.*, 1997; Lena and Wong, 2003; Karanassios, Pazarskis *et al.*, 2006). Seminars, conferences and workshops are being organized every year across the world which emphasized on the importance of entrepreneurship to country, society as well as individual development (Béchar and Toulouse, 1998; Schaper and Volery, 2004; Matlay and Westhead, 2005). More specifically, entrepreneurship is a major engine driving many nations' economic growth, innovation and competitiveness (Scarborough and Zimmerer, 2003; Kuratko and Hodgetts, 2004). The key challenge in cultivating an entrepreneurial culture globally is figuring out the best ways to unleash the potential of all people to innovate, create, catalyze, be resourceful, solve problems and take advantage of opportunities while being ethical (Davis, 2002).

Entrepreneurship education is designed in altering students' state of behaviors and intend to make them understand entrepreneurship, to become entrepreneurial and to become an entrepreneur that finally resulted in the formation of new businesses as well as new job opportunities (Fayolle and Gailly, 2005; Hannon, 2005; Venkatachalam and Waqif, 2005). Thus, integrating entrepreneurship plays a vital role in nurturing this kind of culture among students.

Consequently, many colleges and universities in the country responded to the mandate of introducing entrepreneurial courses to students in promoting entrepreneurship. In the Quirino State University (QSU) entrepreneurship subject is incorporated in the different curricula. However, there are limited time and opportunities for the students to exercise their entrepreneurial capabilities and skills because after taking up the subject in entrepreneurship, they lack chances in applying what they have learned. Thus, the Quirino Young Entrepreneur's Association (QYEA) aimed at developing the entrepreneurial skills of the students by establishing enterprises like the tropical fruit wine processing.

In the Philippines, there are various tropical fruits in the country. Most of these are "planted from heaven," meaning they had grown and existed by themselves with no special attention. They are considered as neglected fruits

because their value in the market is too low. Moreover, people do not recognize the health benefits of these fruits and potential for fruit wines and other processed products to make them more valuable. Thus, QYEA sought the significance of these less valued tropical fruits that can be processed into wine such as Makopa (Java Apple), Mabolo (Velvet Apple), Duhat (Black Plum), Banana (Saba), Lubeg (Philippine Cherry) and Bignay (Wild Cherry).

Filipinos are considered as wine drinkers whether hard wines or red wines. Wines are usually served on special occasions such as birthdays, weddings, anniversaries and other important occasions. Red wines are typically made of grapes but since we don't grow grapes in the country, all red wines made of grapes are imported, and it is quite expensive. But given the country's abundance in tropical fruits, wine makers and researchers are continuously exploring the possibility of making wine out of the available tropical fruits and would mean helping our farmers to market their produce, reduce agricultural product wastage and to promote the health benefits of fruit wines. Research shows that drinking fruit wines reduce the incidence of coronary heart disease due to its antioxidant properties. The alcohol content prevents the deposition of fats inside the arteries, reducing the incidence of atherosclerosis or arteriosclerotic vascular disease which is a condition in which an artery wall thickens as the result of a build-up of fatty materials such as cholesterol. It was also reported that it can reduce cancer cells. Dizon (2010) also revealed that there are a lot of benefits from drinking wine.

It is with the aforementioned reasons that the Quirino Young Entrepreneur's Association (QYEA) aimed to nurture the entrepreneurial culture among students through the tropical fruit wine processing enterprise. The enterprise has established livelihood for the students and continuously enhancing the entrepreneurial skills of the students while developing less valued tropical fruits into high value tropical wines.

Objectives

To establish and enhance Tropical Fruit Wine Processing as Educational Income Generating Enterprise of QYEA members.

Specific objectives:

1. To establish livelihood for the students.
2. To enhance entrepreneurial skills of the students.
3. To develop less valued tropical fruits to high value products.

Materials and methods

The establishment and operation of livelihood is the major venue for entrepreneurial skill enhancement of interested students and opportunity to earn income while studying. The establishment of the tropical fruit wine processing goes various procedures. Different processes are as follows:

a. Business idea generation

The students brainstormed on different business ideas and tried to produce prototype products out of their indigenous knowledge, sold and gathered feedbacks from customers.

b. Business planning

The students prepared business plan that corresponds to the requirement of the funding agency.

c. Fund Sourcing

The students submitted their business plan to the funding agency together with the other requirements such as accreditation of the organization to the university, accreditation of the university to the funding agency, list of officers and members, constitution and by-laws and other pertinent documents. After the approval of the proposal was the signing of the Memorandum of Agreement between the funding agency, the university and the association.

d. Formal establishment of the enterprise

The students purchased the equipment and raw materials primarily indicated in the business plan. Gathered/purchased in-season fruits, processed, packaged, labelled and market their products.

e. Capacity Building/Training of Students

The students who are directly involved in processing were sent to training. In the process, students were technically equipped specifically on tropical fruit wine processing. In addition, students were also trained in packaging and labelling as well as food safety.

f. Monitoring and evaluation

Monitoring was done on a regular basis by the enterprise management team and the faculty adviser.

Enterprise development goes beyond entrepreneurship education by helping students to access financial assistance that are needed to begin business operation and by providing more individualized attention to the development of a viable business idea. The implementation of effective youth development program, cannot be fulfilled without finding financial support. This is grounded on the fact that empowerment is not complete without corresponding adequate

funding provision for the trained manpower. The greatest challenge still remains financial intermediation (Awogbenle *et al.*, 2010).

The challenge on capital is a common issue to students primarily on the implementation of their business ideas. This was also experienced by the students who joined the organization. They started their livelihood project from a small amount of money amounting to more than three hundred pesos only, and this amount they were able to process wines like rice, cassava and taro. The alcohol content of the three products were tested by the Department of Science and Technology (DOST) having 16%, 11% and 9% alcohol respectively charged to product development fund of QSU-DOST. Government agencies had seen the students' determination and desire to develop wines, the Department of Trade and Industry (DTI) encouraged them to attend the training on fruit wine processing at the University of the Philippines Los Banos (UPLB). Hence, after the training, the students tried to develop four fruits as wine which are banana, bignay, mango and pineapple. However, two fruits only prospered as wine, the pineapple and bignay. In spite of the problems encountered (technical and financial), they never cease to develop other fruit wines. They explored processing other fruits that are available in the community such as duhat, mabolo, makopa and lubeg. Certainly, with their innovativeness, courage, passion, hardwork and enthusiasm, they were able to produce varieties of wines despite of the very limited volume produced due to their own very limited source of capital. During the group's various displays and product exhibits in provincial and regional events, the Department of Labor and Employment (DOLE) sought the business plan of the product thus providing the group with additional fund amounting to Php 216,000.00 for the enhancement of the entrepreneurship laboratory, provision of the processing equipment, packaging materials, labels and other materials thereby making the enterprise self-sufficient. The enterprise was established at the entrepreneurship laboratory of Quirino State University which is fully managed by the students who are QYEA members and supervised by a faculty adviser.

In terms of sustainability, regular monitoring and evaluation are being conducted. To motivate members, profit sharing was implemented wherein 70% is divided among its members, 20% goes to savings and 10% for maintenance.

Rather than accept youth unemployment as a curse to be endured, a globally shared framework of action for poverty reduction, wealth creation, employment generation and value re-orientation was discovered as a positive way out. Youth entrepreneurship is a youth development strategy that has become increasingly popular in recent years. Skills associated with entrepreneurship includes the ability to take initiative and creativity to seek out

and identify opportunities; develop budgets, projects resource needs and potential income; communicate effectively and market oneself and one's ideas (Awogbenle *et al.*, 2010). The table below shows the enhanced entrepreneurial skills of students in Quirino State University.

Table 1. The enhanced entrepreneurial skills of students

Enhanced Entrepreneurial Skills of Students	Number of Students Participated n=35
1. Business Planning & presentation	12
2. Marketing/selling	35
3. Wine processing & sourcing out packaging	10
4. Record keeping	12
5. Teaching/mentoring others	4
6. Management	35

Business Planning

Business plan is a guide in running a business. Business plans also provides information to investors before they grant a loan or financial assistance or invest in the business. Lack of planning is one of the major reasons for the failure of business.

Twelve (12) QYEA members attended the enterprise hatchery sponsored by the Santeh Foundation, where they were trained to prepare business plans and present their business plans to possible investors. Moreover, their business planning and presentation skills were enhanced by participating in business plan competition within the University and with other Universities and Colleges whereby they were awarded in the best business model category.

Marketing/Selling

Marketing is the process of moving the product from the point of production to the point of consumption. Marketing strategy employed includes the integration of wine health benefits on the label, through word-of mouth, fliers, bulletin advertisements, product display at “pasalubong” centers and participation in different product exhibits in the country. In this way, people in the community get to know their products. And after the exhibits, customers inevitably contact the student-members for their orders. While these students transact to the customers, their communication and other entrepreneurial skills are developed.

Wine processing and sourcing out packaging

Students acquired new technology, knowledge and skills in wine processing through training. The students attended training at the University of the Philippines Los Banos and they were exposed to the different sources of packaging materials.

Record Keeping

“Running a business without record is just like running a clock without hand”. One of the most important skills that students should have is to record their production, expenses, and sales for monitoring and evaluation. Twelve (12) students were directly involved in record keeping, ten (10) wine processors, the treasurer of the association and the auditor. The records are presented once a month in meetings to give updates. The treasurer maintains financial journal, cash flow and income statement.

Teaching/mentoring others

Teaching others is one of the best ways to learn. Wine processors of the association were invited or requested to teach wine processing in communities along with other students who wanted to have a research on wine processing. In this way, their skills are further enhanced by discovering other fruits to be developed as wine.

Management

Along the way of doing entrepreneurship activities, student's management skills were enhanced. They learned to spot opportunities, solved problems encountered, setting standards, financial management, time management and other important character traits were developed among the students.

Developing tropical fruits to wine

The Philippines is endowed with different tropical fruits which are not given importance, thereby leading these with low economic value. The fruits were not fully utilized for consumption and mostly they are just dropped to the ground or thrown away as waste.

Developing deserted products to high value foodstuffs would help the people in the community to realize an income. The Quirino Young Entrepreneur's Association is exploring on tropical fruits by processing them into wine to create economic value of these fruits and minimize wastage. The association developed the following wines: Makopa, Duhat (Black Plum), Lubeg, Bignay and Mabolo.

The Process of Wine Making



Figure 1. Flow of Wine Manufacturing

Fruit Must Preparation

Fruit must preparation vary depending on the kind of fruit to be processed. Medium hard fruits like mabolo, mango, pineapple and banana are peeled, cut or scoop the flesh then blend the flesh using a blender (1kg flesh: 3 liters of water) for few minutes. Soft fruits like bignay, duhat, makopa, lubeg, tomato can be macerated by hand or blender (1 kg: 3 liters of water). Dilution of the fruit with water facilitates extraction of the juice.

Mother wine preparation (starter)

Separate 10% of the total volume of the “must” (after adjustment of the sugar content). Place in Erlenmeyer flask or similar container and plug with cotton. Pasteurize it in boiling water for 30 minutes. Cool to 40-45 °C then inoculate with pure culture of wine yeast. The following strains of yeast can be used as inoculants: *Saccharomyces ellipsoideus*, *Sacch beticus*, *Sacch chivaleri*, *Sacch schezi*, and *Sacch fermmentati*. However, *S. ellipsoideus* was found to be the best yeast strain in producing wine (Ndip *et al.*, 2001). Ferment for 18-24 hours and inoculate in the prepared bulk of “must”.

Treatment of the Must

The treatment of the “must” is thus dependent on the kind of fruit used. Chemical sterilization with the use of potassium or sodium metabisulfite is employed to kill spoilage of organisms in the “must”. It is added at the rate of 5ml of 10% metabisulfite solution per gallon of fruit must. Leave space for addition in the starter then rise during the active fermentation. Plug the gallon jar with cotton let it stand undisturbed for 18-24 hours.

Fermentation of “Must”

To avoid contamination and unpleasant odors in wine, everything that comes in contact with the wine must be very clean. This is especially critical when cleaning the fermenting vessel. Just as there are weeds in the garden, so there are weeds in wines. There are micro-organisms that feed on alcohol and cause a poor flavor (Anon, 2005).

Fermentation of the “must” is done either by juice or pulp fermentation. The former is applied for light-colored fruits like mango while the latter is for dark-colored fruits.

Juice fermentation

Add the starter and ferment for 24-48 hours before the cotton plug is replaced by fermentation lock. Ferment at 25 °C for 3-4 weeks or until bubbling ceases as indicated in the fermentation lock.

Pulp fermentation

Add starter and ferment under aerobic condition for 4-5 days. Filter the “must” to separate seeds and pulp. Transfer the fermenting “must” in clean fermentation jars and cover with fermentation lock. Continue anaerobic fermentation for 3-4 weeks or until bubbling ceases as indicated in the fermentation lock

As cited by Aidoo (2011), Robinson (2006), Fleet (1998) and Mountney and Gould (1988) who reported that yeasts perform best within an optimum temperature range of 20°C to 30°C. They further stated that higher temperatures during fermentation may have adverse effect on the wine in stunning the yeast to inactivity and even "boiling off" some of the flavors of the wines. Keller (2010) in his work on fermentation stated that temperature range of 20°C to 30°C favor red wine fermentation whilst a temperature range of 10°C to 20°C was conducive for fermenting white wine. By definition, a white wine is a wine produced by the extraction of only the juice for fermentation.

Aging or Racking

Racking is the process of clearing wines from the deposits of dead yeast cells and other insoluble matter which has gradually built up during fermentation of the “must” and subsequent storage of new wine. Wines are usually racked twice after the completion of fermentation. Periodic racking stimulates the clarifying and maturing of new wines. The simplest way of racking is to siphon the clear wine using plastic tube or slowly pour out from the original container into another clean container. Care must be exercised not to make too much movement on the jar so as not to disturb the sediments. Place the funnel line with clean/sterilized cheese cloth on sterilized jars. Add 5ml of 10% sodium metabisulfite solution per gallon of wine to inactivate the yeast.

Harvesting and Bottling

Clean the bottles by thoroughly washing each with antibacterial liquid detergent solution, rinse with clean water then drain. Add sanitizer solution and cover with aluminum foil. Stand for 30 minutes and sanitizer solution is drained prior to filling. Bottles can also be sterilized in a pressure cooker or dry oven, if available. Be sure to cover each bottle with aluminum foil prior to sterilization (Sanchez and Dizon, 1983). Sterilized corks/caps by making soaking in 1 sulfite solution with small amount of glycerin for two hours then drain and dry briefly.

Fill the bottles with aged wine. Bottles must be filled up to 1-1.5 inch headspace. The availability of an automatic filling and sealing machine will shorten the time of filling. Cover the bottles with cork or aluminum cap right after filling. Newly bottled wines should be placed in a slanted or tilted position for 2-3 days to check for leaks. Finally, seal the bottle with heat shrink cap seal.

Labeling

After visual inspection, wipe-dry the bottles and label properly. Tracking codes should be attached per bottle for easy identification of the batch in case problems arise during storage and distribution.

Preparation of Yeast Culture

A. Preparation of agar medium. For 200 ml of distilled water, add 7.80 g of dehydrated potato dextrose agar (PDA) medium. Heat until the agar component of the medium is dissolved. Distribute the medium in test tubes (7ml/tube) and cover the tubes with aluminum foils or 2 layers of old newspapers fitted with rubber band to prevent entry of moisture into the tubes during sterilization. Sterilize in a pressure cooker or autoclave at 15 psi for 15 minutes. Cool the tubes in a slanting position to make agar slants. After cooking, keep the tubes in refrigerator until used.

B. Preparation of PDA – Potato infusion 200ml, dextrose 20ml, agar 20 ml, distilled water 1 liter. To prepare the potato infusion, boil 200g sliced, unpeeled potatoes in 1liter distilled water for 30 minutes. Filter through cheese cloth. Mix in other ingredients and boil to dissolve. Autoclave 15 minutes at 121 degrees celcius.

C. Inoculation and incubation. Observe aseptic techniques during inoculation of slants with stock yeast culture. Open the tube of yeast culture and obtain a loopful of the yeast cells using flame sterilized and cooked wire loop, then streak onto the newly prepared PDA slants. Incubate the tubes at 30-32 C for 24-28 hours. This will serve as source of inoculum in the preparation of mother starter for wine fermentation.

Equipment and Materials Used in Fruit Wine Processing

The equipment required for fruit wine production varies according to size of operation, but basically consist of the following (Duncan and Acton, 1972 cited by Sanchez).

1. *Fermentation vats and containers.* Enamel, glass, wooden, oak, earthenware as well as plastic containers are suitable for wine making. Metal containers should never be used because the acid content of the fruit can dissolve small amount of metal from the container. The presence of trace metals in the wine in concentrations as low as few parts per million can cause objectionable metallic off-flavor and can endanger the health of consumers.

2. *Stirring paddle.* These should be made of hard wood and suitable dimensions depending upon the container and the amount of the must.

3. *Measuring sticks.* This should be carefully graduated or marked off for accuracy in measuring the must especially in opaque containers like plastic. Marking on the sticks can be made for each measured gallon of water poured into the vat. The sticks should a few inches longer than the container.

4. *Fruit crushers and juice extractor.* Although fruits can be easily crushed by hand, mechanical fruit crusher and extractor are convenient to use especially when making large quantities of wine.

5. *Pressing bags and strainers.* The fruit is strained after maceration to separate the juice from the fruit seeds and pulp. Large stainless colanders with relatively with relatively large holes is excellent for removing the bulk of course fragments. If wines need to be strained more thoroughly, cheesecloth may be used and placed in a colander for support.

6. *Measuring devices.* The ingredients to be used must weighed or measured by volumes. A digital weighing scale, measuring cup and spoons, and graduated cylinders are very useful.

7. *Fermentation locks.* These devices are used for sealing the fermentation to escape and at the same time prevent the entrance of air to the must. It also allows the pressure inside and out-side the fermentation vat to remain equal at all times. The rate at which gas bubbles through then lock is indicate of the rate of fermentation.

8. *Funnels.* These are used in transferring the must to the fermenting vats.

9. *Dippers.* They must be useful in transferring the fruit must from one container to the other.

10. *Siphons.* They come in handy in decanting the finished wine. A length of plastic or tygon tubing can serve the purpose.

11. *Bottles.* Wine bottles of uniform size and with long neck are recommended. Usually dark colored bottles are used for red wines and light colored bottles for white wines.

12. *Stoppers.* Cork and plastic stoppers are usually recommended for use because they are readily available.

13. *Sacchometer*. This is used for measuring the sugar content of the must. It could be a Baume hydrometer or a hand refractometer.

14. *Vinometer*. This instrument measures the strength of alcohol present in wine. This one of the most valuable and indispensable instruments in wine making.

Table 1. Fixed investment of a small scale fruit winery with the capacity to process 400 kilograms per month

ITEM	QTY	Unit Cost	TOTAL Cost	SOURCE DOLE	QSU
Land and Building	1	300,000	300,000		300,000
Weighing scale – digital	1	3,430	3,430	3,430	
Basin/tray	4	250	1,000	1,000	
Pail	4	190	760	760	
Knife	4	150	600	600	
Chopping Board	4	100	400	400	
Waring blender	2	6,000	12,000	12,000	
PH meter	1	2,500	2,500	5,000	
Funnel	4	100	400	400	
Graduated cylinder (1000ml)	2	2,000	4,000	4,000	
Wooden ladle for stirring	4	100	400	400	
Portable Refractometer	1	8,500	8,500	8,500	
Fermentation Vat	100	180	18,500	18,500	
Erlenmeyer Flask (1000 ml)	20	450	9,000	9,000	
Test tube (16x150)	100	25	2,500	2,500	
Gas stove with tank	1	4,000	4,000	4,000	
Pipet	2	85	170	170	
Stirring rod	2	50	100	100	
Fermentation lock	100	200	20,000	20,000	
Measuring cups	2	100	200	200	
Stopper	100	20	2,000	2,000	
Siphon hose	10	8	80	80	
Strainer	4	150	600	600	
Aging bottles/Jar	4	1,600	6,400	6,400	
Capping machine	1	4,000	4,000	4,000	
Industrial Blower	1	3,500	3,500	3,500	
Alcohol Meter	1	2,500	2,500	2,500	
Alcohol lamp	2	55	110	110	
Refrigerator	1	15,000	15,000	15,000	
Table with Chairs	1	5,000	5,000	5,000	
Sub-Total			427,650	127,650	300,000

Profitability of Wine Processing

Table 2: Cost and return analysis of 100 kilogram of fruits

Revenues	Banana	Pineapple	Makopa	Lubeg	Bignay	Duhat
Cash						
Sales - 400@170	68,000	68,000	68,000	68,000	68,000	68,000
Total Revenues	68,000	68,000	68,000	68,000	68,000	68,000
Expenses						
Cash						
Fruit	2,500	3,500	1,500	2,500	2,000	3,000
Sugar	5,000	4,500	5,000	5,000	5,000	5,000
Wine yeast	5,000	5,000	5,000	5,000	5,000	5,000
Sodium Metabisulphite	200	200	200	200	200	200
Labor	8,000	8,000	8,000	8,000	8,000	8,000
Electricity/Water	1,000	1,000	1,000	1,000	1,000	1,000
LPG	850	850	850	850	850	850
Bottle	12,800	12,800	12,800	12,800	12,800	12,800
Label	500	500	500	500	500	500
Supplies	300	300	300	300	300	300
Transportation	2,300	2,300	2,300	2,300	2,300	2,300
Contingency	1,923	1,948	1,873	1,923	1,898	1,948
Non-Cash						
Depreciation	3,480	3,480	3,480	3,480	3,480	3,480
Total Expenses	43,853	44,378	42,803	43,853	43,328	44,378
Net Income	24,147	23,622	25,197	24,147	24,672	23,622
Cost per bottle	109.63	110.944	107.00	109.63	108.31	110.94
	23	79	73	23	98	48
ROI	56.16%	54.94%	58.60%	56.16%	57.38%	54.94%
*Supplies - soap, masking tape, pen, alcohol, foil, cotton						

Every 100 kilograms of fruits can generate 400 bottles of wine. The price of fruit wine is PhP 170 per bottle with a total revenue of PhP 68,000. The enterprise was able to generate a Return on Investment (ROI) of more than 50% from the net income over the total investment. The ROI vary depending on the kind of fruit used. Generally, fruit wine processing is profitable and viable enterprise.

In terms of sustainability of the enterprise, continuous monitoring and evaluation is done by the officers and adviser. All sales are deposited in the bank, in the name of the association care of the president and the treasurer. Profits are also shared among the members as motivation and encouragement wherein 70% is divided among its members, 20% goes to the savings and 10% for maintenance.

Conclusion and recommendation

Due to the successful implementation of the tropical fruit wine processing enterprise as reflected by the number of students who joined the group, skills that were enhanced and the positive net income generated, enterprise development is an important mechanism to entice the entrepreneurial culture in the university. Moreover, tropical fruit wine processing is a profitable agribusiness enterprise, since it encourages the students to produce more and subsequently the enterprise contributed considerably to the welfare of farmers and students. This will gradually inspire the students to become financially independent with their profitable venture.

To expand the market of tropical fruit wines, promotion on the health benefits should be done. Likewise, documentation of raw materials, development of more advance technology on wine processing and regular capability building should also be conducted for sustainability of the enterprise.

References

- Aidoo, P. A. (2011). Effect of Brewer's Yeast (*Saccharomyces cerevisiae* var. *ellipsoideus*, Baker's Yeast (*Saccharomyces cerevisiae*) and dual culture (*Saccharomyces cerevisiae* var. *ellipsoideus* and *Saccharomyces cerevisiae*) on the fermentation of pineapple juice into wine. (Master's Thesis). Kwame Nkrumah University of Science and Technology.
- Awogbenle, C. A. and Iwuamadi, C. K. (2010). Youth unemployment: Entrepreneurship development program as an intervention mechanism. *African Journal of Business Management* 4:831-835.
- Ndip, R. N. (2001). Characterization of yeast strains for wine production: effect of fermentation variables on quality of wine produced. *Appl Biochem Biotechnol* 95:209-20.

Sanchez, P. C. (2014). The Prospects of Fruit Wine Production in the Philippines. Department of Food Science, University of the Philippines at Los Banos, Laguna, Philippines. Retrieved from <http://www.bar.gov.ph/chronicle-home/archives-list/102-july-2010-issue/397-bignay-pinoy-posh-red-wine>.