INTERMEDIATE MOISTURE CONTENT (IMC) TECHNOLOGY FOR PRODUCING SMALL SCALE VIRGIN COCONUT OIL (VCO)

Dadang Supriatna

Background

Recently Virgin Coconut Oil (VCO) has been well known as a special premium product from coconut, even in the country where coconut tree cannot grow like in the USA or European countries. Compared to ordinary coconut oil, VCO has more nutritive values which are important for maintaining our healthy life.

According to CODEX STAN, 19-1981, virgin fats and oils mean edible vegetable fats and oils obtained by mechanical procedures and the application of heat only. They may have been purified by washing with water, settling, filtering and centrifuging only.

VCO has some internal and external functions and benefits for us The internal functions include: improving digestion and nutrient absorption, becoming healthy and immediate source of energy, promoting weight loss for obese people, fighting bacterial, viral, fungal and yeast infections (including Flu, herpes, candida), fighting parasites like tape worms, protozoa (e.g. *Giardia lamblia*), enhancing balances of thyroid functions, mitigating diabetes, strengthening the immune system, diminishing risk of atherosclerosis and heart disease, defending against osteoporosis and fighting dental decay, reducing strain on pancreas and enzymatic balance, reducing risk of cancer, helping to protect the liver against alcohol damage, becoming excellent oil for cooking, roasting, frying, baking and making salads.

Figure 1. The price of VCO in international market (source : http://www.mercola.com/forms/coconut_oil.htm)

The external functions are nourishing, firming and smoothing the skin, fighting ageing and wrinkling of the skin, fighting eczema, preventing

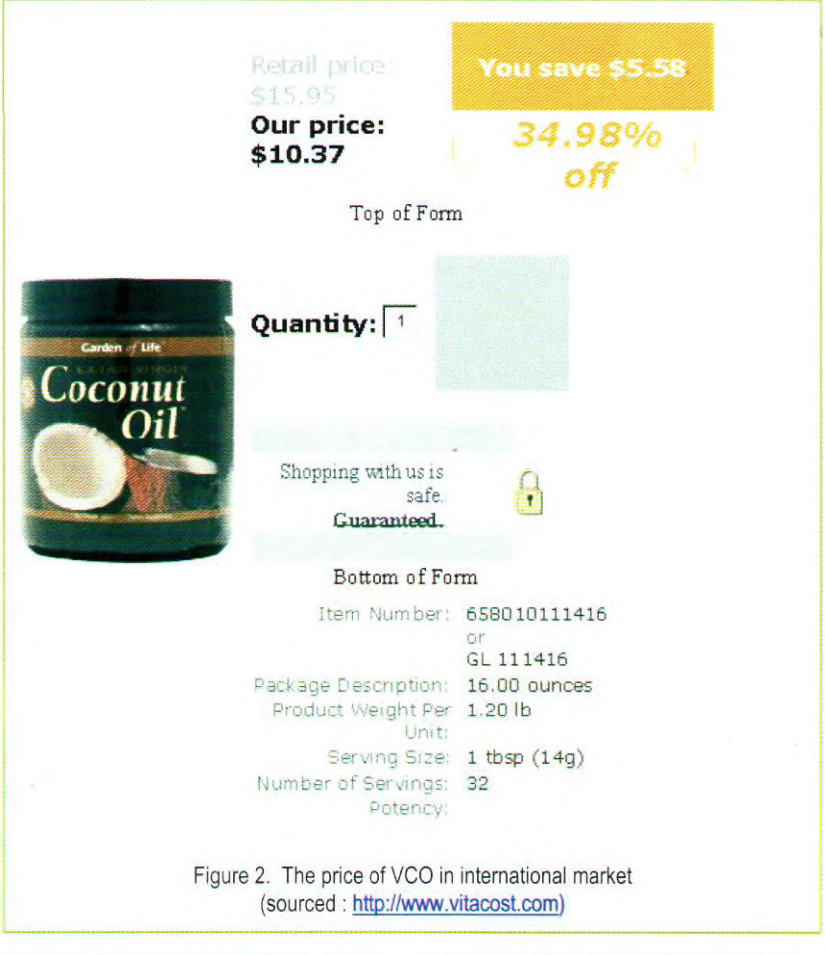


Figure 2. The price of VCO in international market (sourced : http://www.vitacost.com)

against skin cancer and age spots, invigorating the hair, making it gleaming, preventing dandruff, being excellent for massage oil and pre-and aftershave lotion. (Source: www.naturesecrets.com/coconutoil/index.htm).

Based on the above mentioned benefits of VCO, processing coconut meat into VCO is more beneficial and prospective than producing cooking oil. Data obtained from the Internet indicated that VCO's have a good price even 5 up to 10 times the cooking oil price. Please refer to figure 1 and 2.

Fig. 3. Grated Coconut Meat Drier

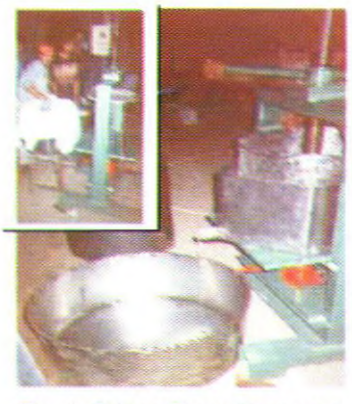


Fig. 4. Bridge Press Equipped with Jack Press

VCO's Processing Technologies

There are many processing technologies for producing VCO. These technologies include fully mechanized and sophisticated technology, enzymatic technologies, fermentations technologies, aqueous processing technologies, and Intermediate Moisture Content (IMC) technologies. This article will describe VCO produced by IMC technology.

The IMC technology is based on the coconut oil processing technology developed by Natural Resources Institute (NRI) England in the early 1990s. The NRI, then, tested the finding and conducted the research in four developing countries i.e Tanzania, Cote d'Ivoire, Ghana and Sri Lanka. In Indonesia the IMC technology was adopted and improved by Center for Agro-Based Industries (CABI) Ministry of Industry and Trade based in Bogor, West Java.

In line with the definition of the "virgin" given by CODEX, the VCO processing with the IMC technology uses low mechanical pressing, low heating without adding any chemical substances. The processed oil is then purified by washing with water, followed by decantation, vacuum drying, carbon activated deodorizing, filtering and vacuum drying.

The advantages of the IMC technology for producing VCO compared to other technologies are:

- It can be applied in the small scale industries
- All of the equipment can be manufactured locally
- The entire process can be completed in one day
- This process produces a high quality oil which meets the quality requirements of the virgin coconut oil
- The byproduct, low fat dried coconut grated meat, can be used as an ingredient in producing cake or feeds.

The main equipment to be used in IMC technology developed by CABI comprises of grater, dryer, bridge press equipped with jack press, washing tank, and vacuum drier. The supporting equipment is jerrycans, balances, bottles, plastic buckets, and axes. For running the process, a processor needs one 10 KW - 24 HP electric generator, which can be operated by 5 people as operators and one manager. The photograph of some equipments can be seen in figure 3 and 4. The output capacity is 50 kgs VCO a day. The detail of VCO product quality manufactured by CABI using IMC technology is given in Table 1 below.

Table 1. The nutritive value of VCO produced by CABI

No	Analitical parameter	Value
1.	Moisture Content (%)	0,08
2.	FFA (%)	0,05
3.	Acid value (mg KOH/g)	0,10
4.	Iodine value (g Iod/100g)	6,82
5.	Lauric Acid C12 (%)	49,92
6.	Miristic Acid C14 (%)	24,17
7.	Palmintic Acid C16 (%)	10,04
8.	Stearic Acid C18-0 (%)	2,87
9.	Oleic Acid C18-1 (%)	6,03
10.	Linoleic Acid C18-2 (%)	0,99

CABI's VCO product has a high value of lauric acid 49.92% as seen in Table 1. Lauric acid has been recognized for its unique benefits for the immune system, especially its antiviral, antibacterial and antiprotozoal functions. As a comparison, lauric acid value of VCO, as could be seen in the following web http://www.naturodoc.com, is 46,0 %, which is lower than that of manufactured by CABI. The VCO produced by CABI also has a good physical

Fig. 5. VCO produced by CABI

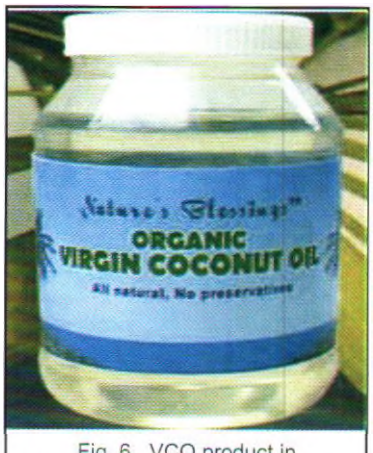


Fig. 6. VCO product in the Internet (www.naturoc.com)

Table 2.
The supporting data to evaluate the VCO techno-economic study

1. Factory's output capacities 50 kgs VCO a day
2. Three whole coconut equal to 1 kg of grated fresh coconut meat
3. The price of coconut is Rp. 1200 per nut (US$0.13)
4. Selling price of VCO product is Rp. 28.000,-/kg (US$3.11)
5. The average yield 20% (w/w)
6. Working day is 300 days a year
7. Labour is 5 people
8. Wages Rp. 25.000 a day (US$2.78)
9. Salary of Manager 1 person Rp. 1.000.000 a month (US$111)
10. The by product is not sold yet

appearance in terms of clearness as indicated in the figure 5 and 6.

Techno economic study

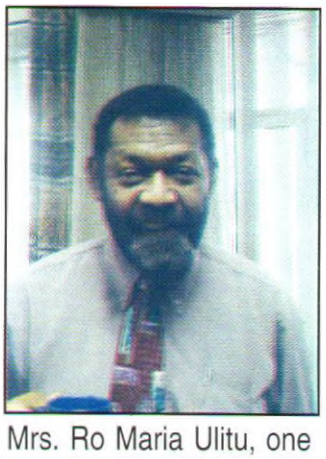
A techno-economic analysis was carried out at this project to assist in the evaluation of the systems when applied in the industries. Based on this evaluation, it is concluded that running the VCO processing is viable to be carried out because the value of IRR (Internal Rate of Return) is 31.47% and Payback Period is 3 years or 36 months. The supporting data which are used in the techno-economical evaluation was described in Table 2.

Based on sensitivity analysis, the visibility of running the VCO processing is significantly affected by the fluctuating price of coconut, selling price of the product, and the yield. The 5% changes of the coconut or VCO price will influence the value of IRR. Meanwhile the changes of capital investment even up to 15% do not influence the visibility.

The price of equipments of IMC technology for running the VCO processing is US$ 24,944. (Based on the exchange rate of 9000 per US $).

Dadang Supriatna.is a Researcher at Center for Agro-Based-Industry (CABI), Department of Industry and Trade, Government of Indonesia.

OBITUARY



The Chairman, Members of the APCC Countries and APCC Secretariat deeply mourn the sudden and untimely demise of **Mr. Samisoni Ulitu.** He was one of the most senior APCC National Liaison Officers (NLO) for Fiji, Chairman of APCC during 2000 and Deputy Permanent Secretary, Government of Fiji for 7 years (1998 – 2004).

He was born on 4 January 1947 in Fiji. His good educational background and a wide range of experiences had made him entrusted with various important positions by the Government of Fiji. APCC has lost one of its friendly and resourceful NLOs. Passed away on 25 May 2004, Mr. Ulitu is survived by his wife, Mrs. Ro Maria Ulitu, one daughter, Mrs. Railala W. Bauleka, and two grand children. We pray the Almighty for the comfort of the family. May the departed soul of late Samisoni Ulitu rest in peace.