

# Feasibility Analysis of Establishment of Euphorbia hirta Extract-Fortified Honey Industry

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## Feasibility Analysis of Establishment of *Euphorbia hirta* Extract-Fortified Honey Industry

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**Abstract.** During this last decade, the highest death rate in Indonesia was caused by degenerative diseases, such as heart disease, hypertension, and diabetes. Life style, including consumption pattern with lacks of vitamins, minerals, fiber, and antioxidants is suspected as one of the main causes. Modern functional food is designed to accommodate the practical uses and its main function to supply some deficient nutrients. Honey fortified with extract of *Euphorbia hirta* was designed as functional food to comply the practical uses and as health beneficial food, especially for its special function as strong antioxidant. This works analyzed the feasibility of establishing a functional food industry for honey fortified with *E. hirta* based on local resources. The aspects observed included marketing aspects, technical aspects, legal aspects, management aspects, and also financial aspects. From the measurement of financial aspects, we obtained that net present value of the business was Rp197,535,270.00, net benefit and cost ratio was 1.72, internal rate of return value was 48.27% with payback period for 2.1 years. The business will reach break-even point by selling 18,509 bottles of products. Considering the values of the analyzed financial parameters, the business is declared feasible to be implemented.

**Keywords:** antioxidant, *Euphorbia hirta*, feasibility study, functional food, honey.

### 1. Introduction

Degenerative diseases (heart disease, hypertension, and diabetes) are the leading causes of Indonesia's death rates. This is one of the strategic issues in the health sector. Lifestyle, one of which is unhealthy consumption patterns, is the main trigger for increasing the cases. Functional food is an alternative that is considered to reduce degenerative diseases' potential because its antioxidant content can ward off free radicals. Functional food products have been predicted to become the main trend of the food industry in the future due to increased public awareness of the importance of health amid an unhealthy lifestyle and a declining environmental carrying capacity.

Indonesia is awarded a large support capacity in the development of functional food based on local resources. Various parties outside Indonesia consider the potential for functional food from Indonesia to be very diverse and have promising development prospects. The Indonesian people's culture is also known to have an abundance of local wisdom in various functional food, herbs, and medicines.

Honey is a functional food product used as a therapeutic drug [1]. Honey contains antioxidants consisting of enzymatic and non-enzymatic antioxidants [2]. Enzymatic antioxidants consist of catalase, peroxidase, and glucose oxidase. Non-enzymatic antioxidants consist of proteins, carotenoids, organic



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acids, amino acids, Maillard reaction products, and more than 150 polyphenolic compounds, including flavonols, flavonoids, catechins, phenolic acids, and derivatives of cinnamic acid [3].

Apart from honey, local natural ingredient that also can be developed as medicine and act as active sources of antioxidants is *Euphorbia hirta* Linn. *E. hirta* is included in the list of Indonesian Herbal Pharmacopoeia with quercitrin as the active compound and is well known in the traditional medicine system in China (*Traditional Chinese Medicine* - TCM) [4]. *E. hirta* is also an important plant because of its chemical compounds such as flavonoids, terpenoids, and active compounds such as alkaloids and polyphenols. It also has antibacterial, antiseptic, antifungal, and anti-inflammatory properties [5]. Therefore, it is listed in the Chinese Pharmacopoeia.

Based on the description above, honey processing with the fortification of *E. hirta* extract is considered to have the potential to overcome degenerative diseases in Indonesia. However, the potential for high market demand has not correlated with honey's massive availability and production. Therefore, it is necessary to research on good business planning to develop this honey product's potential. This study was aimed to analyze the feasibility of establishing a functional food industry of honey fortified with *E. hirta* based on local resources with added value as an antioxidant.

## 2. Methods

This research was conducted at Banjarbaru, South Kalimantan. The research was conducted from June to September 2020. Data collection was carried out by observation and survey. The aspects studied were technology, production, marketing, legal aspects, management, and financial, including the analysis of break-even point (BEP), net present value (NPV), net benefit and cost ratio (Net B/C), internal rate of return (IRR), and payback period (PBP).

## 3. Results and Discussion

The honey to be produced was honey with a mixture of *E. hirta* extract. The honey was put into a bottle with a capacity of 100 ml. The price for a bottle of honey was Rp32,500.00. Production and packaging were carried out at CV. XY, which was located in Banjarbaru, South Kalimantan. Then an analysis was carried out several aspects to determine the feasibility of a honey business. These aspects were marketing aspects, technical aspects, legal aspects, management aspects, and financial aspects. The concept of product and its packaging appearance is presented in Figure 1.



Figure 1. Packaging and products concepts

### 3.1. Marketing aspect

#### 3.1.1 Segmentation, targeting, and positioning

Segmentation divides the market into sections or groups of buyers who require different products or marketing mixes. CV. XY's market segmentation includes local and regional markets (South Kalimantan, West Kalimantan, Central Kalimantan, East Kalimantan, and North Kalimantan) and the national market.

Targeting is the determination of targets. Each segment's activeness will be evaluated, and one or more market segments will be selected to serve. The target market of CV. XY is an older adult or adult over 35 years, both women and men who have an awareness of a healthy lifestyle.

Positioning is the last step after segmentation and targeting have been selected. Market positioning is determined after determining which segment to enter, and then the desired position will be selected in that segment. The market position of CV. XY is creating an image in the consumers' minds as a functional food innovation company.

The marketing concept focuses on the sales process from producers to consumers to gain a profit. Profits will be achieved using a market mix strategy (marketing mix). The market mix strategy is a controlled marketing step that includes a product strategy, a pricing strategy, a location strategy, and a promotional strategy combined to produce a good market response [6].

### 3.1.2 Product strategy

Honey products with bioflavonoid fortification are chosen because, in the processing, there is the addition of local herbal plant *E. hirta* which is considered to have antioxidant properties. So that the honey produced is believed to have a high antioxidant content. Also, the honey product strategy includes a label from BPOM RI and a halal label from MUI.

### 3.1.3 Pricing strategy

Price is crucial because it can affect product sales. Pricing must adjust to several aspects in order to obtain affordable prices and achieve profit margin targets. The price for a bottle of honey is Rp32,500, while the purchase of honey in large quantities will be given a discount. Prices are determined after calculating various aspects.

### 3.1.4 Location and distribution strategy

The company's location in the Sungai Besar area is seen as a strategic place because it is located in the middle of a city. Furthermore, the company is close to mosques, health centers, schools, and housing. This is certainly one of the advantages because more and more people are passing through the company. The layout of the company was arranged with the Blocplan software. Blocplan software will calculate the degree of proximity between workstations. Then it will find the minimum distance of material transfer between workstations so that the production process can be optimized.

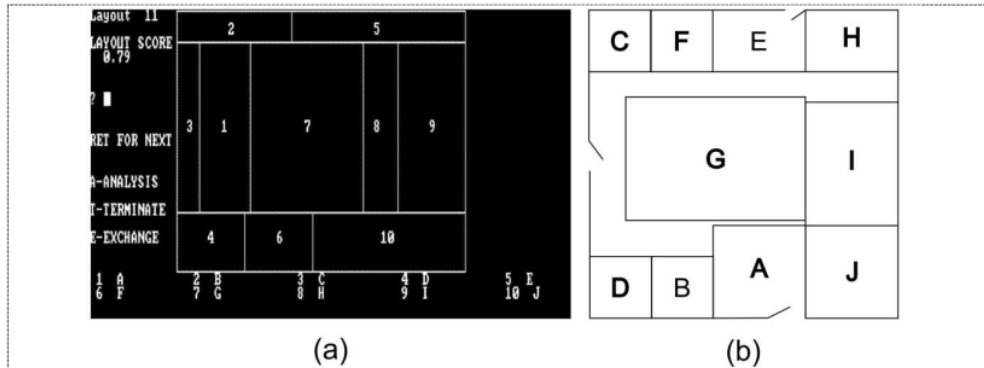
### 3.1.5 Promotion strategy

Promotion strategy aims to provide product information and discover new potential customers. There are four kinds of promotional tools used, namely advertising, publicity, and personal selling. Promotion takes advantage of social media such as Facebook, Instagram, Twitter, Blogspot, and websites. Advertising is carried out by placing banners in strategic locations, which are considered widely passed by the public and distributing brochures. Publicity is conducted by sponsoring certain events. Meanwhile, personal selling activities are carried out directly by the marketing team.

### 3.2. Technical aspect

Technical aspects include raw materials, production processes, labour, technology and equipment, and business location [7]. The raw materials for honey processing are honey and *E. hirta* extract. The production process was carried out by mixing the two raw materials until blended, filling into bottles, labelling brands, and production codes, and packaging them into boxes.

Blocplan software was utilized to produce effective and efficient factory layouts. Blocplan software generated 20 alternative production process layouts (Table 1). The alternative layout for the production process was chosen by looking at the highest R-score, namely layout number 11, with an R-score of 0.77. The R-score is the normalized relationship distance score. R-score that is close to the value 1 indicates that the layout is optimal, but on the contrary, if it is close to the value 0, it is not optimal. The layout of the proposed results from the selected Blocplan software with an R-score of 0.77 is presented in Figure 2a. From the proposed alternative layout, each work station's coordinate points can be determined in Table 2.



Legend: A: Administration room; B: Pantry; C: Prayer Room; D: Toilet; E: Raw material room; F: Tool storage space; G: Production room; H: Storage space for packaging materials; I: Packing room; J: Product storage space

**Figure 2.** Layout generated by the Blocplan (a) and the adjusted layout (b) for production process

**Table 1.** Alternative production process layouts generated by Blocplan software

Layout	ADJ-Score	REL-DIST Score	
1	0,86 -1	0,72 -2	-73 -2
2	0,84 -4	0,66 -10	-9 -6
3	0,71 -18	0,60 -20	70 -20
4	0,73 -16	0,66 -13	9 -14
5	0,81 -6	0,66 -6	-3 -8
6	0,80 -9	0,66 -11	3 -11
7	0,67 -20	0,69 -5	-44 -4
8	0,86 -1	0,64 -14	8 -13
9	0,75 -13	0,66 -9	5 -12
10	0,73 -16	0,69 -4	-43 -5
<b>11</b>	<b>0,79 -10</b>	<b>0,77 -1</b>	<b>-120 -1</b>
12	0,74 -15	0,63 -18	41 -19
13	0,79 -10	0,66 -12	-3 -10
14	0,85 -3	0,66 -8	-5 -7
15	0,71 -18	0,62 -19	34 -18
16	0,75 -13	0,64 -15	17 -16
17	0,81 -6	0,63 -17	17 -15
18	0,82 -5	0,71 -3	-58 -3
19	0,81 -6	0,66 -7	-3 -9
20	0,77 -12	0,64 -16	19 -17

**Table 2.** Coordinates of the selected layout

Work Station	Centroids		Length (m)	Width (m)	L/W
	X	Y			
A	1,47	4,81	1,6	5,8	0,3
B	1,77	8,27	3,5	1,1	3,1
C	0,35	4,81	0,7	5,8	0,1
D	1,04	0,96	2,1	1,9	1,1
E	6,18	8,27	5,3	1,1	4,7
F	3,12	0,96	2,1	1,9	1,1
G	3,98	4,81	3,5	5,8	0,6
H	6,23	4,81	1,0	5,8	0,2

I	7,79	4,81	2,1	5,8	0,4
J	6,49	0,96	4,7	1,9	2,4

The output layout of the Blocplan software was then transformed using Coreldraw software to implement the results and readjustments to the station width and centroid points (Figure 2b). The results of the Blocplan have taken into account the degree of closeness between work stations using the Activity Relationship Chart (ARC) input data. Moreover, the output of the Blocplan software has been adjusted so that it can be applied directly. From Figure 2b, a new coordinate point is obtained, which is presented in Table 3.

**Table 3.** The centroid point of the layout

Workstations	X	Y	Length (m)	Width (m)
Administration room	5,40	1,50	3,00	3,00
Pantry	3,00	1,00	2,00	2,00
Prayer Room	0,90	8,90	2,00	2,00
Toilet	1,00	1,00	2,00	2,00
Raw material room	5,40	8,90	3,00	2,00
Tool storage space	3,00	9,00	2,00	2,00
Production room	4,00	5,10	5,80	4,00
Packaging materials storage	8,50	9,00	3,00	2,00
Packing room	8,40	5,00	3,00	4,00
Product storage space	8,40	1,50	3,00	3,00

### 3.3. Legal aspect

Legal aspects are used to determine whether the business plan can be declared legally feasible or not [8]. In terms of business legality, CV. XY has several legal entity documents to conduct business. The type of honey business legal entity that will be run is Commanditaire Vennootschap, commonly known as a CV. CV was chosen because this honey business is a joint venture with joint capital, and profits are shared based on the proportion of each paid-up capital, where all management activities are the responsibility of CV. XY.

CV. XY has a business registration number (NIB) from the Investment Coordinating Board (BPKM), Electronically Integrated Business Licensing Service, and is registered as a business actor selling herbal products. Per Government Regulation Number 24 of 2018 Article 25 paragraph 1 concerning Electronically Integrated Business Licensing Services or OSS (Online Single Submission) states that NIB is a business identity used by business actors to obtain business permits and operational or commercial permits.

### 3.4. Management aspect

Management is needed to achieve company goals. CV. XY aims to meet consumer needs for herbal and innovative products that are expected to compete excellently in functional food and supplements. Company goals can be achieved and implemented because of the organization. Organizations within the company CV. XY is a formal organization, where all activities carried out are coordinated and structured firmly. The company's organizational structure describes the duties, authorities, and responsibilities of each part.

CV. XY employs five workers consisting of a manager who is also a sales force, responsible for all business activities, namely the company's production, starting from the availability of raw materials, production, and managing supplies efficiently and effectively. The manager is also responsible for marketing activities so that the business unit's products can be recognized by the wider community and encourage them to consume honey products. One production staff responsible for assisting and receiving orders from the manager in carrying out its production activities. Two workers in charge of packaging, labeling, and production code. One additional marketer in charge of product promotion.

### 3.5. Financial aspect

The financial aspect is carried out to find out whether a business is feasible or not. Several assumptions are used in the analysis of the company. CV. XY operates 288 days in a year (8 hours per day). Income tax is calculated based on PP No. 46 of 2013 concerning income tax on the business income received or earned by taxpayers who have a certain gross turnover. Workers' salaries follow the minimum salary standard in Banjarbaru City. The discount factor is assumed to be 14%. Production capacity in the first year and thereafter is 100%.

### 3.5.1 Fixed investment capital

Fixed investment capital is the initial capital required for the initial investment in the honey business. The funds issued are a constant need for the factory so that the business can continue. The building area required to build a honey business is 100 m<sup>2</sup> and a land area of 150 m<sup>2</sup>. Moreover, permits, vehicles, production and packaging equipment, and other equipment are also required. The calculation of fixed investment capital cost of building and facilities is presented in Table 4.

**Table 4.** Calculation of building and facility costs

Fixed Investment Capital	Total Price (Rp)
Licensing	3,000,000
Building	200,000,000
Land	37,500,000
Motorcycle	8,000,000
Weight scales	800,000
Mixer	6,000,000
Mixing Pot	200,000
Funnel	120,000
Bucket	80,000
Filter	800,000
Laptop	5,000,000
Bottle packaging	3,500,000
Board name	500,000
Packing tools	1,000,000
Storage cabinet	3,200,000
Refrigerator	3,000,000
	<b>272,700,000</b>

### 3.5.2 Work capital

Working capital is a cost used to finance production and operational needs, including raw materials, supporting and supporting materials, utilities, cash, and start-up in the business's first year. In one day, CV. XY can produce 200 bottles of honey or 57,600 bottles a year. Honey processing is conducted once a day.

Cash costs consist of manager salaries, marketing labor, production labor, labor for labeling. The salaries given to managers and marketing staff are Rp3,000,000, while the production staff and brand and code-binding workers are Rp2,500,000. The total salary of workers for 1 year is Rp126,000,000. Start-up costs include the cost of raw materials, utilities, and labor salaries.

### 3.5.3 Estimated project cash flow

Variable costs are costs that fluctuate according to the needs of a production quantity. Variable costs at CV. XY includes the costs of raw materials, packaging materials, operations, and direct labor. The production capacity for fixed costs and variable costs are presented in Table 5.

**Table 5.** Fixed Cost and Variable Cost

Type of Cost	Production Capacity
--------------	---------------------



	200 bottles/day	4,800 bottles/day	57,600 bottles/day
Fixed Cost	24,216	581,200	6,974,400
Variable Cost	11,032,166	132,386,000	1,588,632,000
Total (Rp)	11,056,382	132,967,200	1,595,606,400

Profit and loss projection are a financial report that must be prepared by a company so that its financial condition can be identified. Profit and loss projections include a detailed summary of the company's revenues and expenses. This is intended to provide accountable data during the evaluation. Therefore, the net income at CV. XY is the profit value from the honey company's activities, which has been reduced by the income tax burden, with the project period used is 3 years. Projected net income in the first, second, and third years is presented in Table 6.

**Table 6.** Net Income

Item	Year		
	1	2	3
	100%	100%	100%
Net Income (Rp)	103,710,336	114,527,436	125,344,536

#### 3.5.4 Feasibility analysis

Feasibility analysis is carried out to determine the prospect of an investment project that underlies the decision to accept or reject the investment. The main objective of investing is to obtain a high profit or return. Investment feasibility cannot be assessed based solely on assumptions or beliefs but must be comprehensive from various aspects. Five methods can be used to assess the investment feasibility, namely Break-Even Point (BEP), Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit/Cost (Net B/C), and Payback Period (PBP).

#### 3.5.5 Break even point

Break even point (BEP) is the point where income is equal to the issued capital, so there is no profit or loss [9]. If sales are only enough to cover variable costs and part of the fixed costs, the company will incur a loss. Conversely, profits will be obtained if sales exceed variable costs and fixed costs. The BEP calculation shows that the honey business does not experience any profit or loss if at least 18,509 bottles of honey are sold in the first year, 14,492 bottles in the second year, and 10,475 bottles in the third year.

#### 3.5.6 present value

Net present value (NPV) is the difference between the present value of cash inflows and cash outflows for a certain period of time [10]. If the NPV is positive, the business is feasible to run, but if it is negative then it is not feasible [11]. From the NPV calculation, the NPV was Rp197,535,270. Based on these results, the NPV was stated to be positive. This means that the honey business is feasible to be implemented.

#### 3.5.7 Internal rate return

Internal rate return (IRR) is used to calculate the discount rate of all estimated cash inflows and cash outflows [12], 2009). The business is feasible if the IRR is greater than or equal to the discount rate and unfeasible if the IRR is less than the discount rate. The honey business's IRR was 48.27%, so based on the IRR method, the honey business is declared feasible to be implemented.

#### 3.5.8 Net benefit cost ratio

Net benefit cost ratio (Net B/C) is the ratio between the positive net PV benefit and the negative PV net benefit. The positive present values as the numerator, and the negative present values as the denominator. The business is declared feasible if the Net B/C is more than one and not feasible if the

Net B/C is less than one [13]. Result of Net B/C of CV. XY was 1.72. Based on these results, the honey business is declared feasible to be implemented.

#### 3.5.9 Payback period

Payback period (PBP) is the time needed to recover capital [14]. If the profit is known, it will be easier to predict when the profit will break even with the investment that has been issued. PBP results of CV. XY was 2.1 years.

#### 4. Conclusions

Based on the measurement of financial aspects, we obtained that net present value of the business was Rp197,535,270.00, net benefit and cost ratio was 1.72, internal rate of return value was 48.27% with payback period for 2.1 years. The business will reach break-even point by selling 18,509 bottles of products. Considering the values of the analyzed financial parameters and the analysis results of marketing, legal, technical, and management aspects, the business is declared feasible to be implemented.

#### Acknowledgments

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