Andika Putra Setiawan

Analysis of quality characteristics and business feasibility study of fruit peel extract dish soap.p

Universitas Muhammadiyah Jember

Document Details

Submission ID
trn:oid:::17800:84505145

Submission Date
Mar 5, 2025, 10:25 AM GMT+7

Download Date
Mar 5, 2025, 10:58 AM GMT+7

File Name
nalysis of quality characteristics and business feasibility study of fruit peel extract dish soap.pdf

File Size
236.7 KB

10 Pages

6,827 Words

33,623 Characters

17% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography
- Quoted Text
- Cited Text
- Small Matches (less than 15 words)

Match Groups

28 Not Cited or Quoted 17%
Matches with neither in-text citation nor quotation marks

0 Missing Quotations 0%
Matches that are still very similar to source material

0 Missing Citation 0%
Matches that have quotation marks, but no in-text citation

0 Cited and Quoted 0%
Matches with in-text citation present, but no quotation marks

Top Sources

14% Internet sources
4% Publications
4% Submitted works (Student Papers)

Integrity Flags

0 Integrity Flags for Review

No suspicious text manipulations found.

Our system's algorithms look deeply at a document for any inconsistencies that would set it apart from a normal submission. If we notice something strange, we flag it for you to review.

A Flag is not necessarily an indicator of a problem. However, we'd recommend you focus your attention there for further review.

Match Groups

- **28** Not Cited or Quoted 17%
  Matches with neither in-text citation nor quotation marks
- **0** Missing Quotations 0%
  Matches that are still very similar to source material
- **0** Missing Citation 0%
  Matches that have quotation marks, but no in-text citation
- **0** Cited and Quoted 0%
  Matches with in-text citation present, but no quotation marks

Top Sources

14% Internet sources
4% Publications
4% Submitted works (Student Papers)

Top Sources

The sources with the highest number of matches within the submission. Overlapping sources will not be displayed.

1	Internet	
jurnal.yudharta.ac.id		8%
2	Publication	
H Salatnaya, A M Fuah, C Sumantri, S Kahono, Widiatmaka. "Farmer Perception a...		2%
3	Submitted works	
Universiti Malaysia Sabah on 2024-07-01		1%
4	Publication	
R W Arief, Soraya, R D Tambunan, R Asnawi, N Abdullah. "Diversify the processin...		<1%
5	Internet	
aijans.lppm.unand.ac.id		<1%
6	Internet	
jurnal.teknologiindustriumi.ac.id		<1%
7	Submitted works	
President University on 2017-12-30		<1%
8	Internet	
ieomsociety.org		<1%
9	Internet	
www.floristdijakarta.com		<1%
10	Internet	
www.joaat.com		<1%

11 Publication

Saptariana, R Budiono. "Nutritional content and preference analysis of red drago... <1%

12 Internet

doaj.org <1%

13 Publication

Arya Kemuning, Abdul Nasir. "Application of Information Economics and New Inf... <1%

14 Publication

Susinggih Wijana, Tika Puspita, Nur Lailatul Rahmah. "Optimization of solubilizer... <1%

15 Internet

intraders.org <1%

16 Publication

Paulina Pannen, Ojat Darojat, Moch Abduh. "Education Technology in the New No... <1%

17 Submitted works

Universitas Brawijaya on 2019-03-07 <1%

18 Submitted works

Universitas Mataram on 2022-01-18 <1%

19 Internet

ejournal.iaisyarifuddin.ac.id <1%

20 Internet

journalng.uwks.ac.id <1%

21 Internet

jurnal.ugm.ac.id <1%

AGROMIX
pISSN (Print): 2085-241X; eISSN (Online): 2599-3003
Website: https://jurnal.yudharta.ac.id/v2/index.php/agromix

Analysis of quality characteristics and business feasibility study of fruit peel extract dish soap

Danu Indra Wardhana [1], Anisa Nurina Aulia [1*], Andika Putra Setiawan [1], Ara Nugrahayu Nalawati [1], Fina Syafia [1], Firlana Rosa
[1] Universitas Muhammadiyah Jember, East Java, Indonesia
*Email correspondence: anisa_nurina@unmuhjember.ac.id

Original article

Article history
Received : December 26, 2023
Accepted : September 15, 2024
Published : September 30, 2024

Keywords
Fruit peel extract;
Quality characteristics;
Business feasibility;
Dishwashing soap;

ABSTRACT

Introduction: Fruit peel is one of the natural ingredients that has not been optimally utilized and can be used as a raw material for making dish soap because it has antibiotic, antiseptic, and antibacterial content. This study aims to make dish soap using dragon fruit peel extract, papaya fruit, and banana fruit as natural ingredients and determine the quality characteristics of dish soap and business feasibility analysis. **Methods:** This research was conducted in two stages. The first stage selected the best fruit skin dish soap based on the quality characteristics and organoleptic tests on the product. The second stage then analyzed the business feasibility of the best fruit peel extract dish soap product. **Results:** The quality characteristics of dragon fruit peel, banana, and papaya skin extract dish soap with pH test parameters, FFA content, and free alkali content are in accordance with SNI standards, but the viscosity test shows that it is not suitable and has a value below SNI, and the results of the organoleptic test show that dragon fruit peel extract dish soap is preferred by panelists compared to banana and papaya skin extract soap with an average value of 4.3 color parameters; aroma 3.5; texture 3.6; and overall 4.1. **Conclusion:** Dragon fruit peel extract dish soap has the best organoleptic test value compared to banana and papaya peel dish soap. The results of the feasibility study analysis of the dragon fruit peel extract dish soap business have a BEP Unit value of 31, BEP Rupiah of IDR.462,185, ROI of 81.64%, and R / C of 1.82 where this business is considered feasible if developed.

Cite this article:
Wardhana, D. I., Aulia, A. N., Setiawan, A. P., Nalawati, A. N., Syafia, F., & Rosa, F. (2024). Analysis of quality characteristics and feasibility study of dish soap form the fruit peel extract. *Agromix, 15*(2), 215-224. https://doi.org/10.35891/agx.v15i2.4703

INTRODUCTION

Hygiene is an important factor in public health. Housewives, hospitals, public facilities, and lodging places make soap products the main cleaning tool in daily activities (WHO and UNICEF, 2019). Soap as one of the main needs to obtain hygiene standards is included in basic needs, but soap is not included in the primary needs group. Fulfillment of soap is often considered a secondary need because it must prioritize primary needs such as clothing, food, and shelter that must be met every day (Amalia *et al.*, 2018). Dish soap is one type of soap that is currently the most widely used to clean various kinds of tableware such as plates, glasses, spoons, forks, and other kitchen utensils from dirt and fat left over from food and cooking that has been made. In recent years, the use of dish soap in liquid form has increased because it is more practical, hygienic, economical, and has better cleaning power compared to dish soap in solid form (Handayani *et al.*, 2022; Mulyani *et al.*, 2022).

With the development of technology and the use of liquid dish soap, the ingredients used in the production process are also growing. The addition of natural ingredients that are safe for users of liquid dish soap needs to be developed which aims to have a positive impact on the liquid dish soap produced, including giving a smooth impression, a soft impression, moisturizing the skin, and having antibacterial activity when used (Endo *et al.*, 2019). One of the natural ingredients that have not been optimally utilized is fruit leather, where fruit leather is currently only thrown away and becomes accumulated waste that has the potential to pollute the environment (Rusman, 2019). The use of fruit peels in the form of soap is still little done, even though the use of fruit peels is practical, economical, and easy to find (Nurfita *et al.*, 2021). On the other hand, dragon fruit skin also has a chemical content that can be used as raw material for products that have more added value. Dragon fruit skin is also used as a natural colorant, aroma enhancer, antioxidant, and anti-bacterial in soap making (Ayun & Eka, 2019).

The use of fruit peel in the form of soap is still less done, despite its potential to be practical, economical, and easily available. because it requires coordination from all parties and a large amount of fruit peel if it is to be commercialized at an industrial capacity. In Indonesia there are many constraints on waste sorting activities, in Indonesian society waste sorting is still a big task, and not all people know the importance of sorting waste. Fruit peel waste is mostly obtained from farmers, fruit traders, juice traders, or fruit processing industries where fruit waste is just thrown away and mixed with household waste or other industries. So this is an obstacle if you want to make fruit peels into soap, besides that the problem of capital is also still a major obstacle, Setyadjit *et al.* (2018) explained that one young researcher's idea of extracting D-limonene from the citrus peel with very little investment and then adding it to polystyrene, which is in the form of a polymer that is very difficult to degrade. Once degraded, it becomes a monomer that microbes can use as a source of metabolism. This idea is great, but it is necessary to define who will pay for the activity to have a sustainable one.

Dragon fruit skin is one of the natural ingredients that can be used in making dish soap. Based on research conducted by Nurfita *et al.* (2021), dragon fruit skin has several contents such as flavonoids which can be used as antioxidants. Pujiastuti & El'Zeba (2021) used the spectrophotometric method to determine the total flavonoid content in red dragon fruit skin so that the total flavonoid content was 10.82% of the red dragon fruit skin (*Hylocereus polyrhizius*). Antibacterial activity tests using the diffusion method by Khotimah *et al.* (2017) resulted in ethanol and ethyl acetate in the skin of red dragon fruit (*Hylocereus polyrhizius*) which has antibacterial activity against E.*coli and* S. *Aureus*.

Other fruit peels that can also be used as raw materials for soap-making include banana peel extract (Mardiana & Yuniati, 2021) and papaya skin (Maranggi *et al.*, 2020). Banana peel and papaya peel also have potential as antibacterials. Based on research by Sirajudin *et al.* (2014) banana peel extract (*M. paradisiaca*) against human pathogenic bacteria and found that banana peel extract showed inhibition against *S. aureus, Escherichia coli*, and *Proteus mirabilis*, as the microorganisms tested showed antibacterial activity. Meanwhile, papaya fruit peels also contain antibacterial properties which were analyzed using the silver nanoparticle synthesis technique by Balavijayalakshmi & Ramalakshmi (2017) showed good antibacterial activity against human pathogens such as *E. Coli* and *Staphylococcus aureus.*

Making liquid dish soap from dragon fruit skin can be a business that can be utilized by the community. The method of making dragon fruit peel extract dish soap is relatively easy so it can be adopted by all circles of society, especially people who live in areas that have high potential for red dragon fruit production such as Banyuwangi Regency and Jember Regency. An enterprise or business must fulfill certain feasibility to be produced largely and sustainably. A feasibility analysis is conducted to ascertain whether a business activity is feasible at the start of the project to accurately assess its revenue and profitability. In addition, the results obtained need to be shared with related parties or people who will start a business making dish soap from dragon fruit peel, to improve decision-making in starting their business (Junho & Jun, 2023). In general, the aspects analyzed are technical feasibility, market feasibility, management feasibility, financial feasibility, legal feasibility, and social feasibility. This research only focuses on the financial feasibility aspect of the dragon fruit peel dish soap business.

Based on some of the above studies, this study aims to make liquid dish soap using red dragon fruit peel extract and then compare it with papaya fruit and banana fruit as natural ingredients and determine the quality characteristics of liquid dish soap based on pH parameters, viscosity, FFA content, free alkali content, organoleptic test and business feasibility analysis of red dragon fruit peel dish soap (*Hylocereus polyrhizus*).

METHODS

This study analyses the quality characteristics and business feasibility study of fruit skin extract dish soap using red dragon fruit skin (*Hylocereus polyrhizus*) which is compared with banana fruit skin (*Musca paradisiaca* L.) and papaya fruit skin (*Carica papaya)*. The fruit peels used are freshly cut fruit peels from fruits that are old enough to get a bright soap color. The first stage selected the best fruit leather dish soap based on the quality characteristics and organoleptic test on the product. The second stage then analyses the business feasibility of the best fruit peel extract dish soap product. To compare the quality characteristics and organoleptic test results of fruit peel dish soap in this study, dragon fruit peel extract, papaya fruit peel extract, and banana fruit peel extract were used.

Tools and materials

Tools used in the production of dragon fruit peel extract dish soap include a blender, stirrer, basin, digital scale, knife, cutting board, measuring cup, 100 ml volume pipette, sieve, filter cloth, funnel, and 250 ml Erlenmeyer, pH meter, goblet, stirrer, electrode, weighing bottle, 1 litre volumetric flask, water bath, upright cooler, burette, separatory funnel, fat flask, distiller, electric bath, drying cabinet, desiccator, and viscometer.

The basic ingredients used for the production of fruit peel extract dish soap in this study are dragon fruit peel, papaya fruit peel, banana fruit peel, lime, distilled water, salt, texapon, fragrance, alcohol 96%, HCL 0.1 N, phenolphthalein, methyl orange, petroleum ether/diethyl ether/hexane and sodium sulfate.

Place of implementation

This research was conducted at the Agroindustrial Processing Technology Laboratory and Agribusiness Laboratory of the Faculty of Agriculture, Muhammadiyah University of Jember, and the Food Analysis Laboratory of Jember State Polytechnic. The research was conducted from December 2022 to April 2023.

Methods used

Testing the quality characteristics of dish soap extracts of dragon fruit peel, papaya fruit, and banana fruit based on SNI SNI 2588: 2017.

pH test

A total of 250 mL of liquid dish soap was measured using a calibrated pH meter. This aims to determine the acid-base level in liquid soap formulations that are in accordance with SNI standards, namely in the range of 4-10.

Viscosity test

A total of 250 mL of liquid dish soap was tested using a viscometer at 12, 30, and 60 rpm at room temperature. The measurement results were recorded on the viscometer screen.

Free alkali content test

Testing for free alkali in liquid dish soap using the acid-base titration method. A total of 5 mL of dish soap sample was dissolved with 100 mL of 96% ethanol. Then, the mixture was heated for 30 minutes at 50°C. The mixture was added 2 drops of pp indicator and then titrated with HCl (0.1 N) in alcohol until the red color disappeared.

Free fatty acid (FFA) content test

The FFA test was carried out by adding 10 ml of dragon fruit peel extract dish soap and then adding 50 ml of distilled water, a few drops of methyl orange solution, and 10% HCl until all fats were liberated as indicated by the appearance of a red color. Next, the solution was put in a separating funnel. Then the settled solution was poured with petroleum ether/diethyl ether or hexane solvent, repeated until the solvent amounted to approximately 100 ml. Then the solvent is shaken and washed with distilled water until it does not react with acid. Then the solvent is dried with dry sodium sulfate, filtered, and put into a fat flask that has known weight (W_1). Then the solvent is distilled and the fat flask is dried at 105^0 C until the weight remains (W_2).

$$Total\ Free\ Fatty\ Acids = \frac{W_2 - W_1 X 100\%}{W}$$

Organoleptic test

Organoleptic testing was carried out by 30 untrained panelists to assess the level of liking for color, aroma, texture, and overall characteristics of liquid dish soap products formulated using dragon fruit peel extract, papaya fruit, and banana fruit (Ayustaningwarno, 2014).

Business feasibility analysis

The feasibility of a business activity is calculated based on the amount of expected financial profit. A business feasibility study is an activity that studies in depth an activity or business to be carried out to determine whether or not a business is run (Sobana, 2018). Business activities are said to be feasible if they provide benefits.

To assess a fruit peel extract dish soap business to obtain a basic benchmark in investment feasibility, an analysis method has been developed, namely with investment criteria, several conclusions can be drawn about whether it benefits an opportunity to invest. The components of business feasibility are as follows:

a. Production costs

Production costs are all economic expenses that must be incurred to produce an item. Here is the formula for calculating production costs.

$$TC = TFC + TVC$$

Description:
TC = Total business costs of the dragon fruit peel extract dish soap home industry (IDR)
TFC = Total fixed costs of the dragon fruit peel extract dish soap home industry (IDR)
TVC = Total variable costs of the dragon fruit peel extract dish soap home industry (IDR)

b. Depreciation

Depreciation is the systematic and rational allocation of acquisition costs and expenses over the useful life of the fixed assets concerned, systematically written as follows:

$$Depreciation = \frac{PurchasePrice - ResidualValueofProducts}{economiclifeofproducts(years)}$$

c. Revenue

Income is the amount of money received by sellers of dragon fruit peel extract dish soap. The formula used to calculate income is as follows.

$$TR = P \times Q$$

Description:
TR = Total income from the dragon fruit peel extract dish soap home industry (IDR)
P = Product price of the dragon fruit peel extract dish soap home industry business (IDR)
Q = Total sales from the dragon fruit peel extract dish soap home industry (IDR)

Business profit is the reduction of total revenue by the total cost of the dragon fruit peel extract dish soap home industry. Mathematically it can be written as follows:

$$\pi = TR - TC$$

Description:
π = Profit from the dragon fruit peel extract dish soap home industry (IDR)
TR = Total income from the dragon fruit peel extract dish soap home industry (IDR)
TC = Total cost of the dragon fruit peel extract dish soap home industry business (IDR)
The business feasibility criteria that can be used as a reference for sellers in conducting a business are as follows:

a. Break event point (BEP)

In general, BEP is a situation where production in a company has no profit and no loss, breaking even between the costs incurred by the company and the revenue received. BEP is a point of the amount of production or sales that must be made so that the costs incurred can be covered again or the value at which the profit received is zero.

$$BEPunit = \frac{FC}{P - VC}$$

$$BEPprice(IDR) = \frac{FC}{1 - VC/P}$$

Notes: FC = Fixed Cost
P = Selling Price Per Unit
VC = Variable Cost per unit

Production BEP criteria are as follows:
1) If production BEP < production quantity, then the business is in a profitable position
2) If production BEP = production amount, then the business is in a break-even position or no profit/no loss.
3) If production BEP > production quantity then the business is in an unprofitable position

Meanwhile, the price BEP criteria are as follows:
1) If BEP price < selling price, then the business is in a profitable position.
2) If BEP price = selling price, then the business is in a break-even position or no profit/no loss.
3) If BEP price > selling price, the business is in an unprofitable position.

b. Return on investment (ROI) analysis

Return On Investment (ROI) analysis in financial analysis has a very important meaning as one of the comprehensive financial analysis techniques. *Return On Investment* (ROI) is a ratio that measures the company's overall ability to generate profits with the total assets available in the company.

$$ROI = \frac{BusinessProfit(IDR)}{BusinessCapital(IDR)} x100\%$$

c. Revenue cost ratio (R/C)

Revenue Cost Ratio (R/C) is the ratio between total revenue and total cost with the following formula.

$$R/C = \frac{TR}{TC}$$

If the R/C Ratio > 1, then the business is profitable or worth developing. If the R/C Ratio is < 1, then the business suffers a loss or is not worth developing. Furthermore, if the R/C Ratio = 1, then the business is at the break-even point.

Experimental design

Preparation of dragon fruit peel, banana fruit and papaya fruit extracts

Each 100 grams of dragon fruit skin, papaya fruit, and banana fruit were cut into small pieces. Small pieces of dragon fruit skin were mashed using a blender until smooth. After that, 250 ml of distilled water was added and stirred for 30 minutes at room temperature.

Formulation of dragon fruit peel extract dish soap

A total of 25 g texapon, 10 g Na_2 SO_4, 5 ml fragrance solution, and 50 ml lime extract were added to 100 ml and 150 ml dragon fruit peel extract (water fraction) and stirred for 30 minutes. The liquid dish soap suspension was allowed to stand (*aging* process) for 24 hours until the liquid soap mixture became homogeneous and transparent.

Data analysis

Data analysis of the quality characteristics of fruit peel extract dish soap is processed using the ANOVA test with an error rate of 5% and if the resulting value is significantly different, it is continued using *Duncan's multiple range test* (DMRT) 5%.

RESULTS AND DISCUSSION

Quality characteristics analysis of fruit peel extract dish soap

Analysis of the quality characteristics of dragon fruit peel extract dish soap, papaya fruit, and banana fruit refers to SNI 2588: 2017 with parameters of pH, viscosity, FFA content, and free alkali content which in detail can be seen in Table 1.

Table 1. Characteristic analysis results of fruit peel extract dish soap

Parameters	Dragon Fruit	Papaya Fruit	Banana Fruit
pH	4,29±0	4,5±0	4,37±0,01
Viscosity (cp)	138,662±3,470	128,82±0,19	144,445±0,14
FFA content (%)	0,01±0	0,020±0	0,015±0
Free Alkali Content (%)	0,0055±0,0003	0,0077±0	0,0062±0

Source: Primary Data (2023)

pH test

Testing the pH value aims to determine the level of acids and bases in the formulated fruit skin dish soap product. Based on Table 1. it can be seen that the pH value of dragon skin extract dish soap is in accordance with SNI standards, namely in the range of pH values 4-10 A total of 250 mL of liquid dish soap was measured using a calibrated pH meter. Based on SNI, the results of the three extracts show that the pH is in accordance with the National Standard for Kitchen Washing Soap.

Viscosity test

A total of 250 mL of liquid dish soap was tested using a viscometer at 12, 30, and 60 rpm at room temperature. Recorded measurement results on the viscometer screen. Measurement of the viscosity of dish soap aims to determine the amount of resistance produced by the soap. Dish soap has a viscosity range of 500-20000 cp. Based on the results of lab tests. obtained a viscosity value with a range of 120-140 cp, which means that the viscosity value is still below the SNI value. This shows that the viscosity of the research soap is still below the commercial soap due to the lack of thickeners added or the water content being too high. This happens because dragon fruit skin contains pectin with a low *water-holding capacity* (Muhammad *et al.*, 2020).

Free alkali content test

A free alkali is an alkali that does not finish reacting with fatty acids in the soap-making process. The results showed a color change, which is one indicator of the absence of free alkali in the sample, from the results obtained a free alkali content of 0.0055% in dragon fruit extract, 0.0062% banana fruit extract and 0.0077% for papaya fruit extract. Good soap quality requirements based on SNI 3588-2017 are <0.05% so liquid dish soap from the three fruit extracts meets the free alkali standards required by SNI.

FFA content test

The FFA content test is carried out to find out the total amount of fat in soap that has or has not reacted with alkali. Based on SNI, the maximum fat content of dish soap is 15% or 0.015. The resulting dragon fruit extract liquid soap has FFA levels between 0.0055%, 0.0062 Banana Fruit, and 0.0077 Papaya Fruit (Table 1). Total fatty acid content tends to decrease with increasing stirring time and water/soap ratio. In soap products, fat indicates the amount of fatty acids from unsaponified and saponified triglycerides, these values depend on the type of oil/fat raw material used for soap production. The decrease in the total amount of fatty acids is due to the proportion of soap ingredients decreasing as the amount of water used increases. So because the main ingredient is fruit skin, which has little fat value, the total fat origin content is far below the SNI.

Organoleptic test

After testing the characteristics of dish soap from dragon fruit peel, papaya, and banana extracts, the organoleptic test was then carried out. The level of consumer liking for dish soap products from dragon fruit, papaya, and banana peel extracts was carried out through organoleptic tests. The organoleptic test carried out is hedonic in the form of color, texture, aroma, and overall using a 1-5 test scale. The hedonic scale can be stretched or collapsed according to the desired scale range. The hedonic scale can also be converted into a numerical scale with quality numbers according to the level of preference (Husain *et al.*, 2021). The test scale was used with a value of 1 = very dislike, 2 = dislike, 3 = neutral, 4 = like, and 5 = very like. Panelists conducted organoleptic tests on dish soap samples that had been prepared to taste in small containers. Panelists totalling 30 people were randomly selected both male and female in the age range of 15-30 years. Organoleptic test assessment is carried out on the questionnaire paper that has been provided by giving a number scale in the column that has been given. The hedonic test was conducted on the aspects of color, texture, aroma, and overall. The data collected was processed using simple statistics, namely the calculation of the average value. Table 2 presents the average results of the organoleptic test of dish soap products from dragon fruit peel extract, banana, and papaya as a comparison**.** The results of the organoleptic test of dish soap from dragon fruit peel, papaya, and banana can be seen in Table 2.

Table 2. Table of organoleptic test results of dish soap from dragon fruit, papaya, and banana peels

Parameters	The mean value of the organoleptic test		
	Dragon Fruit	Papaya	Bananas
Color	4,3 ± (0,844)	2,7 ± (1,020)	3,8 ± (0,799)
Fragrance	3,5 ± (1,171)	3,9 ± (0,891)	3,5± (1,105)
Texture	3,6 ± (1,066)	3,5 ± (0,999)	3,5 ± (0,923)
Overall	4,1 ± (0,994)	3,9 ± (0,832)	3,9 ± (0,848)

Source: Primary data (2023)

Based on the results of the organoleptic test above, it can be seen that the highest average value on the color parameter is dragon fruit peel extract dish soap with an average value of 4.3. Dragon fruit skin contains anthocyanin pigments so that it can produce attractive colors and has the potential to be used as a natural dye (Widyasanti *et al.*, 2021; Hariadi *et al.*, 2023). In the aroma parameter of dish soap, papaya fruit peel extract has the highest value, namely 3.9. According to Zhou *et al.*, (2021), papaya peel has a distinctive aroma resulting from the volatile components it contains, namely linalool and benzyl isothiocyanate, thus producing a distinctive papaya aroma in the resulting dish soap product. In the texture parameter, dragon fruit peel extract dish soap has a high average value of 3.6. According to Nolandi & Kusumastuti, (2019) dragon fruit skin has a soft and juicy texture so it is suitable if used as a raw material for making dish soap, and the texture of the soap produced is also preferred compared to other dish soap. Overall, dragon fruit peel extract dish soap has the highest average value of 4.1 compared to dish soap from papaya and banana peel extracts which have an average value below this is because dragon fruit peel extract dish soap has the characteristics of dish soap in general and on the color and texture parameters it also has a higher value than papaya and banana peel extract dish soap. Based on these results, the next stage of research is to calculate the business feasibility of dragon fruit peel extract dish soap so that it can be information for people who want to develop a dragon fruit extract dish soap business.

Business feasibility analysis of dragon fruit peel extract dish soap

This business feasibility analysis is carried out to provide information to the public that the business of making dragon fruit extract dish soap can be developed because it has a feasible business feasibility analysis value if it can sell according to the value generated in this study. Business feasibility analysis is reviewed from fixed capital, working capital, investment, fixed costs, total costs, and income. The results of this calculation and analysis will be seen through the fixed-cost business feasibility parameters calculated through the depreciation cost of fixed capital. Production is assumed to be carried out twice a month in the amount of 500 pcs, so that in one-year production is 24 times production. Table 3, Table 4, and Table 5 show the calculation data in the business feasibility analysis of dragon fruit peel extract dish soap.

Table 3. Fixed cost of dragon fruit peel extract dish soap business

No.	Fixed Costs	Quantity (Unit)	Price (IDR)	Economic Life (Years)	Depreciation (IDR)
1	Knife Set	1	IDR 115,000	10	IDR 3,500
2	Pots	3	IDR 60,000	10	IDR 1,500
3	Scales	1	IDR 30,000	10	IDR 1,000
4	Trays	1	IDR 15,000	10	IDR 300
5	Spatula	1	IDR 15,000	10	IDR 500
6	Filter cloth	1	IDR 7,000	10	IDR 300
7	Mini funnel	3	IDR 15,000	10	IDR 300
8	Blender	1	IDR 200,000	10	IDR 10,000
	Total		IDR 457,000		IDR 17,400

Depreciation cost per year IDR 208,800

Source: Primary data (2023)

Table 4. Variable cost of dragon fruit peel extract dish soap business

No.	Variable Costs	Total	Unit Cost	Total Cost	Total Annual cost
1	Dragon Fruit Peel	50 kg	IDR 10,000	IDR 500,000	IDR 6,000,000
2	Lime	20 kg	IDR 31,900	IDR 638,000	IDR 7,656,000
3	Texapon	50 kg	IDR 16,500	IDR 825,000	IDR 9,900,000
4	Water	280 L	IDR 15,875	IDR 168,750	IDR 2,025,000
5	Salt	1 pack	IDR 1,250	IDR 40,000	IDR 480,000
6	Aroma	1 pack	IDR 139,430	IDR 140,000	IDR 1,680,000
7	Stickers	600	IDR. 1000	IDR 600,000	IDR 7,200,000
8	Travel pack	600	IDR 2,000	IDR 600,000	IDR 7,200,000
9	Pouch	600	IDR 3,500	IDR 600,000	IDR 7,200,000
	Total			IDR 4,111,750	IDR 49,341,000

Source: Primary data (2023)

Production cost

Production costs include fixed costs and variable costs. Fixed costs are tool depreciation costs and variable costs include raw material costs, labor costs, and supporting material costs. Fixed costs are the type of costs incurred in one production process that is a fixed amount and does not change. When carrying out the production process of dragon fruit peel extract dish soap, which includes fixed costs, is the depreciation of the equipment used, which is calculated based on the economic life of each piece of equipment. Variable costs are costs incurred in the production process depending on the size of the production produced. Variable costs include costs used for the purchase of raw materials and labor.

$$TC = 208{,}800 + 49{,}341{,}000 = 49{,}549{,}800$$

Based on Table 3 and Table 4 above, it can be seen that the use of total costs in the dragon fruit peel extract dish soap business is IDR. 49,549,800 per year from the sum of total fixed costs and total variable costs, which can be seen in Table 5.

Revenue

Revenue is the total value of products sold within a certain time multiplied by the selling price measured in rupiah (IDR). The amount of revenue as a sales/year on Table 5, The red dragon fruit dish soap home industry per month produces 500 bottles and per year 6,000 bottles with a weight per bottle of 250ml and a price of IDR. 15,000. For the price of IDR. 15,000 compared to competitors the dish soap industry is very competitive because the average price of packaged dish soap is IDR. 18,000-IDR. 25,000.

$$TR = 15{,}000 \times 500 \times 12 = \text{IDR. } 90{,}000{,}000$$

Profit analysis

Profit is the reduction of total revenue by the total costs incurred in the red dragon fruit dish soap business. A business is said to be profitable if the total revenue received is greater than the total costs incurred. Details of the profits obtained can be seen in the calculations below:

$$\pi = TR - TIDR$$

$$= \text{IDR. } 90{,}000{,}000 - \text{IDR. } 49{,}549{,}800$$

$$= \text{IDR. } 40{,}450{,}200$$

Based on the above results, the annual profit obtained is IDR 40,450,200. It can be seen in Table 5 number 8.

Feasibility analysis

The result of the Feasibility Analysis can be seen in detail in table 5. It includes BEP products or units. pouch, BEP of Revenue, Return on Investment (ROI), and Business efficiency (R/C > 1).

Table 5. Feasibility analysis of dragon fruit peel extract dish soap business

No.	Calculation Details	Value
1	Investment	IDR 49,549,800
2	Total Cost	IDR 49,549,800
3	Selling Price	IDR 15,000
4	Monthly Sales Target/unit	500
5	Sales/Month	IDR 7,500,000
6	Sales/year	IDR 90,000,000
7	Profit/month	IDR 3,370,850
8	Profit/year	IDR 40,450,200
9	BEP (product unit/pouch)	67
10	BEP (revenue)	IDR 1,011,058
11	Return of Investment (ROI)	81,64%
12	Business efficiency (R/C > 1)	1,82

Source: Primary Data (2023)

a. Break event point (BEP)

BEP on a table 5 above is a condition where the company does not make a profit and does not experience a loss.

$$BEPunit = \frac{FC}{P - VC}$$

= 208,800 : (15,000 - 49,341,000/6,000)
= 208,800 : (15,000 - 8,224)
= 208,800 : / 6,776
= 30,81 (31)

$$BEPprice = \frac{FC}{1 - VC/P}$$

= 208,800 : (1-8,224/15,000)
= 208,800 : (1 - 0.548)
= 208,800 : 0.452
= IDR 462.185

Based on the results of the above calculations, it can be seen that the BEP unit is 31 bottles and the BEP price is IDR. 462,185. While the production amount of dragon fruit extract dish soap is 5,000 bottles/year with a selling price of IDR. 15,000 / bottle so that the revenue is IDR. 90,000,000, it can be concluded that this amount is greater than product BEP and price BEP, so this business is said to be profitable.

b. Return on investment (ROI) analysis

ROI is an analysis to see how much profit can be obtained from the total capital invested in a business.

$$ROI = \frac{BusinessProfit(Rp)}{BusinessCapital(Rp)} x100\%$$

$$ROI = \frac{Rp.40{,}450{,}200}{Rp.49{,}549{,}800} x100\%$$

$$= 81.64\%$$

From the ROI calculation in Table 5 above, it can be seen that the ROI value obtained is 81.64%. This percentage shows that the dragon fruit peel extract dish soap business obtained 81.64% profit from the amount of capital spent for 1 year. This figure shows that this business gets a profit of IDR. 81.64 in every IDR. 100 of invested costs.

c. Revenue cost ratio

Revenue Cost Ratio is a feasibility analysis test with a comparison between total revenue and total costs incurred. The criteria used in this analysis is if the value of R / C> 1 then the business is said to be profitable and feasible to be cultivated, because the amount of income is greater than the amount of costs incurred, and vice versa. The calculation of the results of the analysis of income with costs (R / C) can be seen as follows:

$$(R/C) = \frac{TR}{TC}$$

$$= 90{,}000{,}000 : 49{,}549{,}800$$

$$= 1.82$$

In a Table 5, R / C is the comparison value between total income and total costs. The total revenue received by sellers of dragon fruit peel extract dish soap is IDR. 90,000,000 and the total costs incurred are IDR. 49,549,800. Based on the description above, it can be concluded that the dragon fruit peel extract dish soap business is declared profitable and feasible to operate. This can be seen from the comparison of total revenue with total costs greater than one, which has a number 1.82> 1. In other words, the R / C value of 1.82 means, that for every IDR 100 cost incurred, the seller of red dragon fruit peel extract dish soap gets an income of IDR. 182.

CONCLUSION

Fruit peel extract dish soap products are a breakthrough in the utilization of fruit peels to increase value. Based on testing the quality characteristics of dragon fruit peel, banana, and papaya skin extract dish soap with pH test parameters, FFA content, and free alkali content are in accordance with SNI standards, but the viscosity test shows that it is not suitable or the value is still below SNI, and the results of the organoleptic test show that dragon fruit peel extract dish soap is preferred by panelists compared to banana and papaya skin extract soap with an average value of 4.3 color parameters; aroma 3.5; texture 3.6; and overall 4.1 which shows panelists like to use red dragon fruit peel dish soap. The results of the feasibility study analysis of the dragon fruit peel extract dish soap business have a BEP Unit value of 31, BEP Rupiah of IDR.462,185, ROI of 81.64% and R/C of 1.82 where this business is considered feasible if developed.

ACKNOWLEDGEMENT

We would like to thank the Institute for Research and Community Service of Muhammadiyah Jember University for funding this research with contract number: 55/II.3.AU/LPPM/Riset/2022 and all parties who have been involved in research activities.

REFERENCES

Amalia, R., Paramita, V., Kusumayanti, H., Wahyuningsih, W., Sembiring, M., & Rani, D. E. (2018). Produksi sabun cuci piring sebagai upaya peningkatkan efektivitas dan peluang wirausaha. *Metana, 14*(1), 15. https://doi.org/10.14710/metana.v14i1.18657

Ayun, Q., & Eka, R. (2019). Formulasi sabun mandi padat dari ekstrak limbah kulit buah naga merah (*Hylocereus costaricensis*). *Jurnal Biosense, 2*(1), 18–27. https://doi.org/10.36526/biosense.v2i01.357

Ayustaningwarno, F. (2014). *Teknologi pangan: Teori praktis dan aplikasi*. Graha Ilmu.

Balavijayalakshmi, J., & Ramalakshmi, V. (2017). Carica papaya peel mediated synthesis of silver nanoparticles and its antibacterial activity against human pathogens. *Journal of Applied Research and Technology, 15*(5), 413–422. https://doi.org/10.1016/j.jart.2017.03.010

Endo, S., Sahadi, & Diana. (2019). Pengaruh penggunaan gel lidah buaya (*Aloe vera*) pada pembuatan sabun cair dengan minyak nilam (*Patchouli oil*). *Teknologi Pertanian Andalas, 23*(1), 10–18.

Handayani, K. Y., Rezki, A. S., Fahmi, A. G., & Saputra, I. S. (2022). Formulasi sabun cair cuci piring menggunakan ekstrak air tanaman lidah buaya (*Aloe vera* L.). *Medical Sains: Scientific Journal of Pharmacy, 7*(2), 109–118. https://doi.org/10.37874/ms.v7i2.314

Hariadi, H., Nissa, R. C., Anggara, C. E. W., Hidayat, F., Ferdiansyah, A. E., & Rifqi, M. (2023). Utilization of dragon fruit (*Hylocereus polyrhizus*) peels waste as a natural dye. *IOP Conference Series: Earth and Environmental Science, 1241*(1). https://doi.org/10.1088/1755-1315/1241/1/012075

Husain, M., Naiu, A. S., & Yusuf, N. (2021). Formulasi dan analisis tingkat kesukaan serta nilai viskositas sabun gel alami yang menggunakan gelatin tulang ikan tuna (*Thunnus albacores*). *Nike: Jurnal Ilmiah Perikanan Dan Kelautan, 9*(4), 84–92.

Ikram, M., Sugihartini, N., & Guntarti, A. (2020). Daya antioksidan ekstrak kulit buah naga dan sabun ekstrak kulit buah naga (*Hylocereus polyrhizus*). *Jurnal Surya Medika, 6*(1), 22–25. https://doi.org/10.33084/jsm.v6i1.1616

Junho, C., & Jun, K. (2023). Techno-economic feasibility study for deep renovation of old apartment. *Journal of Cleaner Production, 382*. https://doi.org/10.1016/j.jclepro.2022.135396

Khotimah, T. K., Krisridwany, A., Orbayinah, S., & Harimurti, S. (2011). Antibacterial activity of fractions from ethanolic extract of *Hylocereus polyrhizus* peel against *E. coli* and *S. aureus*. *Journal of Fundamental and Applied Pharmaceutical Science*. https://doi.org/10.18196/jfaps.v1i2.11001

Mardiana, R., & Yuniati, Y. (2021). Formulasi sediaan sabun padat dari ekstrak kulit pisang awak (*Musa balbisiana*) secara maserasi. *Journal of Pharmaceutical and Health Research, 2*(1), 4–7. https://doi.org/10.47065/jharma.v2i1.779

Muhammad, N. W. F., Nurrulhidayah, A. F., Hamzah, M. S., Rashidi, O., & Rohman, A. (2020). Physicochemical properties of dragon fruit peel pectin and citrus peel pectin: A comparison. *Food Research, 4*, 266–273. https://doi.org/10.26656/fr.2017.4(S1).S14

Mulyani, N., Murhadi, Susilawati, & Sartika, D. (2022). Formulasi sabun cuci piring racikan dengan penambahan gel lidah buaya dan jeruk nipis. *Jurnal Agroindustri Berkelanjutan, 1*(2), 209–218.

Nolandi, S. H., & Kusumastuti, A. (2019). Kelayakan kulit buah naga super merah (*Hylocereus costaricensis*) sebagai bahan dasar dalam pembuatan tinta body art. *Beauty and Beauty Health Education Journal, 8*(1), 13–18.

Nurfita, E., Mayefis, D., & Umar, S. (2021). Uji stabilitas formulasi hand and body cream ekstrak etanol kulit buah naga merah (*Hylocereus lemairei*). *Jurnal Farmasi dan Ilmu Kefarmasian Indonesia, 8*(2), 125–131. https://doi.org/10.20473/jfiki.v8i22021.125-131

Pujiastuti, E., & El'Zeba, D. (2021). Perbandingan kadar flavonoid total ekstrak etanol 70% dan 96% kulit buah naga merah (*Hylocereus polyrhizus*) dengan spektrofotometri. *Cendekia Journal of Pharmacy, 5*(2), 117–127. https://doi.org/10.31596/cjp.v5i2.148

Rusman, N. H. (2019). Potensi limbah kulit buah sebagai bahan baku dalam pembuatan edible film. *Universitas Hasanuddin, 1*(69), 92–98.

Setyadjit, S., Sukasih, E., & Risfaheri, R. (2018). Fruit waste potential, a weakness or a potency, doing locally effect globally. *Journal of Advanced Agricultural Technologies, 5*(2), 153–158. https://doi.org/10.18178/joaat.5.2.153-158

Sirajudin, M. Z. N. Z., Ahmed, Q. U., Chowdhury, A. J. K., Kamarudin, E. Z., Khan, A. V., Uddin, A. H., & Musa, N. (2014). Antimicrobial activity of banana (*Musa paradisiaca* L.) peels against food borne pathogenic microbes. *Journal of Pure and Applied Microbiology, 8*(5), 3627–3639.

Sobana, D. H. (2018). *Studi kelayakan bisnis*. CV Pustaka Setia.

Tivani, I., & Perwitasari, M. (2021). Efektivitas antibakteri ekstrak beberapa kulit buah terhadap bakteri *Escherichia coli*. *Current Pharmaceutical Sciences, 4*(2), 339–346.

WHO & UNICEF. (2019). *Wash in health care facilities: Global baseline report 2019*. WHO & UNICEF. https://apps.who.int/iris/bitstream/handle/10665/154588/9789241508476_eng.pdf?sequence=1

Widyasanti, A., Arsyad, M. Z., & Wulandari, D. E. (2021). Ekstraksi antosianin kulit buah naga merah (*Hylocereus polyrhizus*) menggunakan metode maserasi. *Jurnal Agroindustri, 11*(2), 72–81. https://ejournal.unib.ac.id/index.php/agroindustri

Zhou, Z., Ford, R., Bar, I., & Kanchana-Udomkan, C. (2021). Papaya (*Carica papaya* L.) flavour profiling. *Genes, 12*(9). https://doi.org/10.3390/genes12091416