Innovation and Business Feasibility Analysis of Banana Flavored Spinach Chlorophyll Functional Drink "Dally"

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ABSTRACT

Indonesia is rich in food sources with bioactive components that have the potential to be developed. Both market research and academic research have shown an increase in consumer awareness and interest in health and nutrition. The prospect of functional drinks one of them can be said to be very promising and profitable. Dally, a functional drink containing spinach essence and banana peel fiber has valuable nutrients such as chlorophyll content (0.2094%), calcium (0.0159%), vitamin C (5,9705 mg/100g), total sugar (1.7334%), and antioxidant IC50 (4077,156 ppm). This drink has a pH of 4.19 and a water activity of 0.955. Based on organoleptic tests on 23 students, it was found that 100% of respondents (liked the taste of Dally, and 65.2% liked the colour and 39% liked the aroma. Market research shows a very high trend for the Yogyakarta and Central Java regions. A SWOT analysis shows Dally has a good chance of being marketed. Meanwhile, Dally's marketing and promotion are carried out through marketplaces such as Shopee, Tokopedia, Facebook and Instagram. Marketing is also carried out with personal selling techniques by visiting potential buyers who are engaged in selling functional drinks. The calculation shows that the cost of goods sold is 7,500 rupiah with a profit margin set of 125%. From the calculation, it is known that the cost of goods sold is 7,500 rupiah with a profit margin set of 125%.

1. Introduction

Functional drinks are the fastest growing segment in the functional food category. as an example of a functional drink containing chlorophyll under the K-link brand has attracted a lot of attention from consumers in Indonesia. chlorophyll itself actually is one of the pigments found in the plant body with the most distributed amounts for plant life processes by converting light energy into chemical energy. In the process of photosynthesis, pigments and other molecules take the energy of sunlight to form ATP and NADPH coenzymes which are then used in stroma to form carbohydrates from carbon dioxide and water. In chloroplasts, there is not only chlorophyll which is the substance that causes the green colour of the leaves. But in chloroplasts there are also other colour pigments. Chlorophyll in the leaves will be different from chlorophyll at the edges, middle, and edges of the leaves. Amaranthus tricolour plant L. Chlorophyll is known to act as an antioxidant for the body. Chlorophyll has structural similarities with hemoglobin and has been found to regenerate or act as a substitute for hemoglobin in conditions of hemoglobin deficiency [1].

Therefore, now chlorophyll is extracted and consumed as a dietary supplement. Based on our group's research on our beverage product which we named (DALLY). This research will formulate a functional drink (Dally) with the main ingredients of spinach and banana peels. Nutritional content and organoleptic tests are measured. More than that we also analyzed the market strategy and analysis SWOT of the product.

2. Research Methodology

2.1. Materials

The materials used in this study were spinach, banana peels, honey, and water. All of these ingredients, besides water, were obtained from the Godean market in Sleman, Yogyakarta.

2.2. Procedures

The first step to do was to weigh 100 grams of spinach, then washed and then drained it. After that, it was blended by adding 400 ml of water. After that, it was filtered until chlorophyll extract was obtained. The second step to do was to weigh the banana peel by 85 grams, wash it well, and then drain it. Then it was blended by adding water by 100 ml. After that, it was filtered using a regular sieve, then re-filtered using a tea filter which was then added to the spinach chlorophyll. 50 mL of honey was added while stirring until well mixed and then 5 mL of sweetened condensed milk was added.

2.3. Data analysis

The antioxidant activity (IC 50) test was carried out using the DPPH (1,1–diphenyl-2-picrylhydrazil) method. Determination of vitamin C levels was tested using iodometric titration. The chlorophyll content in the sample drink was determined with several modifications from Arnon (1949) [2], the determination of total sugar content followed the Luff Schoorl method [3]. Measurement of calcium level analysis follows the procedure of Mardiah (2017) [4]. Measurement of water activity or water activity follows the steps taken by Adnan (1980), pH is measured using a pH meter [5]. The testing process was carried out at the Pratama Chem-mix Laboratory, Bantul, Yogyakarta.

3. Results and Discussion

According to Table 1, Dally drink has a chlorophyll content of 0.2094%, calcium 0.0159 %, total sugar 1.73347%, vitamin C 5,9705 mg/100 g, antioxidant IC50 4077.156 ppm, pH 4.19, and water activity 0.955. Chlorophyll pigment can be obtained from a variety of green vegetables, including spinach. Vegetables are food ingredients that are important for maintaining human health because they contain a lot of natural nutrients [6]. Green vegetables are the best source of pigment and important for fighting free radicals [7]. Antioxidants are compounds that can delay or prevent the occurrence of free radical oxidation reactions in lipid oxidation, carbohydrates, or DNA. The reaction between free radicals and these molecules leads to the emergence of disease [8]. the IC 50 antioxidant value of Dally's drink of 4077.156 ppm is classified as a very weak antioxidant.

Calcium is a mineral needed by the human body which is useful for preventing osteoporosis, blood clots, and building stronger bones and teeth [9]. A small amount of calcium of 0,0159 % was detected in Dally's drink. When compared with research, the calcium content of kepok bananas reaches 41 mg/100 g. So that the process of taking calcium from banana peels needs to be studied again [10].

Total sugar content is the overall sugar content in a food ingredient consisting of reducing sugars and non-reducing sugars. Vitamin C is needed in the body's metabolic reactions, a lack of vitamin C in the food consumed can cause a decrease in body resistance. At least 10 mg of vitamin C is consumed per day to prevent deficiency disease scurry [11]. Vitamin C acts as an antioxidant capable of reducing superoxide radicals, hydroxyl, hypochloric acid and reactive oxygen derived from activated neutrophils and monocytes [12]. According to the Department of food security and animal husbandry in West Java province, 100 grams of spinach contains 52 grams of vitamin C. Vitamin C content of 5.9705 mg/100 g of spinach in Dally's drink is considered good enough as shown in Figure 1.

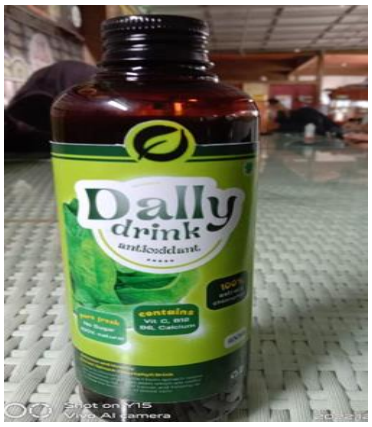

Figure 1. Dally's functional drink contains chlorophyll from spinach and calcium from banana peels

The chemical activity of water or often called water activity (water activity) and abbreviated as Aw is a measure used to determine the ability of water to assist microbiological, enzymatic, chemical damage processes or a combination of these three processes. The higher the value of water activity, the food will be more vulnerable to attack by microorganisms [5]. The pH value is related to the quality of food products. Products with low pH values generally tend to be more durable because it will be difficult for microbes to grow in media with high acidity [12]. The pH value of 4.19 is classified as acidic which can help this drink last longer.

Table 1. Test results for the average sample Dally

Variable	Test 1	Test 2	Mean
Chlorophyll (%)	0.2101	0.2087	0.2094
Calcium (%)	0.0169	0.0148	0.0159
Total sugar (%)	1.7247	1.7423	1.7334
Vitamin C (mg/100 g)	6.8235	5.1176	5.9705
Antioxidant IC 50 (ppm)	4055.6957	4098.6170	4077.156
Water activity	0.95	0.96	0,955
pH	4.18	4.20	4.19

Sensory quality (organoleptic) tests were carried out to determine the level of panelists' preference and acceptance of Dally's functional drink formulations. There are several aspects must be tested to find out consumer preferences such as color, taste, and scent through a organoleptic test questionnaire as shown in Table 2. This organoleptic test conducted by 23 students of Ahmad Dahlan University with an age range of 17-20 years.

Table 2. Organoleptic test results on 23 Universitas Ahmad Dahlan students randomly

Parameter	Results
flavor	like very much (82,6 %), like (17,4%)
color	like very much (13 %) like (65,2 %) not so much like (17,4 %) dislike (4,4 %)
Scent	like very much (8,7%) like (39,1 %) Not so much like (52,2 %)

The type of organoleptic test used in this study is the hedonic test panelists stated whether they liked or disliked the sample. The range of values used in this study is 1-100. Where values 1-25 do not like, 26-50 do not like, 51-75 likes and 76-100 likes very much. From the results of the questionnaire it was found that the taste aspect was 82.6% like and 17.4% really like, color aspect 65.2% like and 13% really like. Meanwhile, 39.1% liked the aroma aspect and 8.7% really liked it. This shows that the taste and color aspects were acceptable to the panelists while the scent aspects were still acceptable need to be repaired.

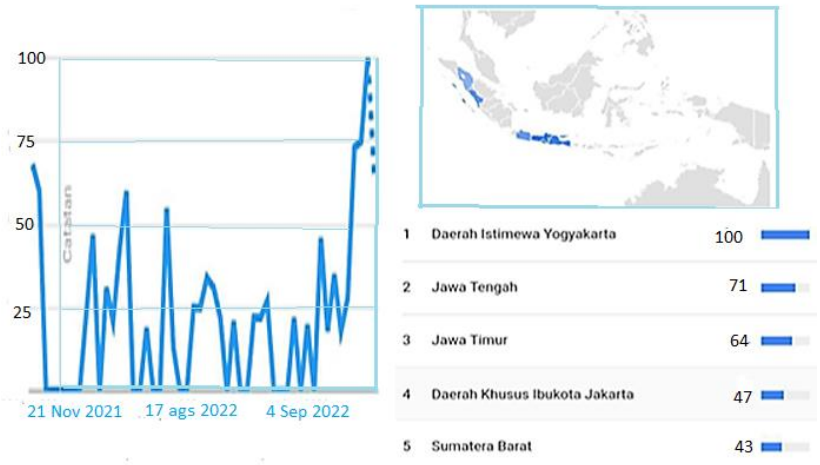

Figure 2. Google trend analysis result. Movement of the google trend index with the keyword antioxidant(left) and google trend results regarding interest by province in Indonesia (right)

2.4. Markets analysis and marketing

Dally's products will be marketed among teenagers to adults because they are very good for consumption to keep the body healthy at productive age. Marketing is done in strategic places. Google Trends is a useful software for designing content and Search Engine Optimization strategies. Because you can learn what consumers are looking for in the target market so you can make the right decision. According to google trend analysis as shown in Figure 2, there is an increase in searches with antioxidant keywords as of September 4, 2022. While the province that has the opportunity to become a potential marketing area based on google trends is the island of Java, especially Yogyakarta.

According the total score of each component (S-W and O-T), the total score of internal factors analysis Summary (S-W) is 9 as shown in Table 3 and total score of external factors Analysis Summary (O-T) is 4 as shown in Table 4. This shows that internal factor is more dominant that external factor and an effective strategy for Dally products is in the S-O area where this means maximizing the potential strengths and advantages of Dally products through available opportunities.

Table 3. Internal Strategic Factors Analysis Summary (IFAS)

Strength (S)	Contribution	mark	score
The product is attractive in terms of taste, color and scent	20 %	85	17
Not many products yet antioxidant drink on the market	15 %	80	12
Contains antioxidants and vitamin C which are good for the body	30 %	90	27
Have a delivery unit service for orders outside the city or island, for example an online shop	15 %	80	12
Cheap raw material prices	10 %	80	8

The selling price of the product is relatively affordable	10 %	80	8
Total score			84

Weakness (W)	contribution	mark	Score
Product shelf life is relatively not durable	80 %	75	15
Not yet able to produce in large quantities	10 %	70	7
Distribution channels are not maximized	15 %	60	9
no license yet	15 %	80	12
if not stored properly it will be easily damaged and not durable	20 %	85	17
remote shipping or purchasing has the potential to damage the product	20 %	75	15
Total score			75

Table 4. Internal Strategic Factors Analysis Summary (EFAS)

Opportunity (O)	contribution	mark	Score
Utilization of banana peel waste in beverage diversification	20 %	95	19
Extensive marketing reach	10 %	80	8
The nature of consumers wants to try new products	15 %	80	12
Target market for all levels of society	10 %	75	7,5
Antioxidant beverage products are relatively accepted by society	15 %	80	12
Much sought after, especially by consumers who like herbal drinks	10 %	75	7,5
With a good marketplace, this drink can be more easily recognized by consumers	20 %	85	17
Total Score			83

Threats (T)	contribution	mark	Score
Changes in people's tastes or human nature that get bored quickly	20 %	75	15
There are competitors of antioxidant drinks that have broad relations	10 %	70	7
the emergence of new competitors with a superior variety of beverage products	20 %	75	15
Market tastes are always changing	15 %	80	12
Imitation of products with lower quality sets a lower price	15 %	80	12

Don't have a brand yet		20 %	90	18
	Total score			79

2.5. Production cost, selling cost, and BEP

Based on the cost of making 5 Dally products, the total production cost is Rp. 30,000. which consists of the main raw material costs of Rp. 26,000, direct labor costs of Rp. 2500, and overhead costs of Rp. 1500. The cost of production per unit of Rp. 6000 can be calculated by dividing the total production cost by the number of products produced. While the sales price of Rp. 7500 per unit is determined by multiplying the cost of production by the profit margin set at 125%. The break even point (BEP) value can be calculated by dividing the total production cost by the sales price per unit so that the break even value is obtained at the sale of 4 units of Dally product. As for the larger scale, the calculation still follows this basic calculation and opens the opportunity for the BEP price to be lower per unit on a larger scale. Marketing of Dally is done digitally through marketplaces or online shops such as Tokopedia, Shopee, Facebook and Instagram. In addition, marketing is also carried out with personal selling techniques by visiting potential places, buyers, and shop that are engaged in selling functional drinks.

4. Conclusion

Functional drink product "Dally" made from spinach and banana peels has been shown to contain chlorophyll, antioxidants, vitamin C and calcium. from the results of the overall organoleptic test, the panelists can accept a choice of taste, color and aroma. the marketing process is preceded by market analysis, SWOT analysis, and the use of google trends. Cost of production, cost of goods sold and Dally's production break even point in this article are obtained from the calculation results. Marketing is done conventionally and digitally. Further process development is needed to improve the nutritional quality of Dally.

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