

Oravé Lotion: Green cosmetic business development using orange and avocado peel waste

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Abstract

Oravé Lotion is a green cosmetic venture developed through the 2025 Student Entrepreneurship Creativity Program (PKM-K) at Batam State Polytechnic. It converts orange and avocado peel waste into a natural body lotion under circular economy principles. This descriptive study used a convenience-sample survey of 56 campus respondents, product trials, third-party heavy-metal testing, and financial records, analyzed with descriptive statistics and feasibility indicators (COGS, B/C, R/C, BEP, payback period). Initial interest was expressed by 93% of respondents (non-representative sample); trial feedback was positive on packaging, texture, and skin softness, with scent and color flagged for improvement. Heavy metals were below detection limits. At a projected volume of 760 units, COGS was IDR 12,500 and the selling price IDR 21,500, yielding a B/C ratio of 1.72, BEP at 194 units, a payback period of 18.7 months, and profit after tax of IDR 6,087,600. Representative demand validation is needed before scaling.

Keywords: Green Entrepreneurship; Circular Economy; Waste Valorization; Business Feasibility; Student Startup.

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INTRODUCTION

Dry and dull skin is a common problem experienced by the general public, particularly among people of working age. This condition is triggered by various factors such as extreme weather, exposure to pollution, an unhealthy lifestyle, and the use of chemical-based cosmetic products (Durri & Walid, 2024; Herawan et al., 2022). As consumer awareness of product safety and environmental impact has increased, demand for natural-ingredient cosmetics has shown a significant growth trend over the past decade (Mishra et al., 2023). This phenomenon creates attractive business opportunities for young entrepreneurs to introduce sustainable products made from local ingredients.

On the other hand, the utilization of fruit peels as cosmetic ingredients offers an opportunity to convert organic waste into value-added products. Orange and avocado peels contain bioactive compounds with potential cosmetic applications. In avocado peel, Lister et al. (2021) reported phenolic, flavonoid, and tannin contents of 59.55 GAE mg/g extract, 2.96 QE mg/g extract, and 22.63 TAE mg/g extract, respectively. Their study also found that topical application of avocado peel extract increased skin hydration, collagen, and elasticity in an experimental model, with the highest effects observed at a 10% extract concentration.

Meanwhile, Suryadi et al. (2021) reported sunscreen activity from lime peel extract, with SPF values ranging from 24 to 81.8 under different extract concentrations and solvents. These findings indicate that fruit peels, particularly avocado and citrus peels, contain bioactive compounds with potential for development into value-added cosmetic products, supporting their utilization as raw materials for natural body lotion. These components make orange peels and avocado peels suitable for processing into active ingredients for skin-safe moisturizing cosmetic products (Rani et al., 2021; Sasmita & Azzahra, 2023).

The concept of the circular economy offers a framework for transforming waste into value-added raw materials while reducing the environmental burden (Geissdoerfer et al., 2020; Kirchherr et al., 2017). Applying this concept to cosmetic products offers two benefits at once: addressing environmental issues caused by organic waste and creating economically valuable products that align with modern consumers' preferences for green products (White et al., 2019). Specifically in Indonesia, Setiawan et al. (2023) found that environmental concerns and health consciousness positively influence consumers' reasons for consuming natural personal care products and contribute to more positive attitudes toward these products, which subsequently increase purchase intention. These findings indicate that environmental and health concerns are important considerations for Indonesian consumers when choosing natural personal care products.

Maslikhah et al. (2024), using the Push-Pull-Mooring (PPM) framework and PLS-SEM on 219 Indonesian consumers, found that health and environmental benefits significantly encourage consumers' intention to switch to green skincare products, while barriers such as high prices, limited product availability, and lack of information hinder switching intention. Similarly, Uturestantix et al. (2026), in a study of 872 Indonesian consumers using PLS-SEM, found that environmental concern, health consciousness, and consumer innovativeness significantly and positively influence purchase intention, which in turn significantly influences willingness to pay a premium (WTP) for green cosmetics, with purchase intention acting as a partial mediator. Together, these findings indicate that consumers' adoption of green skincare and cosmetics is influenced by both positive perceptions of environmental and health-related benefits and practical or individual factors that shape purchase intention and willingness to pay. A preliminary survey conducted at Batam State Polytechnic among 56 respondents revealed that 93% of respondents expressed interest in using natural and eco-friendly lotion products. The respondents were predominantly female (83.9%) and aged 17–25 years, indicating initial market interest among young adult consumers in the campus environment. These findings provide an initial indication of potential demand for affordable natural lotion products made from fruit peel waste, although they should not be generalized to the broader consumer population in Batam. Environmental concern, health awareness, and perceived behavioral control have been reported

to positively influence purchase intention toward natural and eco-friendly cosmetics (Bahaiyan & Ridanasti, 2025). These factors provide a relevant basis for developing fruit-peel-waste-based lotion as a sustainable cosmetic product.

Based on this opportunity, a team of students from the Batam State Polytechnic developed Oravé Lotion, a body lotion made from orange and avocado peels, through the 2025 Student Entrepreneurship Creativity Program (PKM-K). The name Oravé combines “orange” and “avocado”, reflecting the product’s main ingredients. The program addresses two themes of the 2025 PKM-K, namely Public Health and Nutrition and Environmental Conservation and Disaster Mitigation, by applying a circular economy approach to the development of its business model.

Genoveva & Tanardi (2022) demonstrate that millennials, as a productive generation, possess strong environmental awareness and significant potential to develop as green entrepreneurs. However, the number of young entrepreneurs in Indonesia remains relatively low compared with global figures. This situation highlights the importance of supporting sustainability-oriented youth entrepreneurship, which can be facilitated through programs such as the Student Entrepreneurship Creativity Program (PKM-K).

This article documents the development of Oravé Lotion as an empirical instance of student-led green entrepreneurship applying a circular business model in the Indonesian cosmetic sector. The intended contributions are threefold. First, to the circular business model literature (Bocken et al., 2016; Geissdoerfer et al., 2020), the study offers a micro-scale, input-side illustration of how zero-cost secondary resources sourced through hyper-local supplier partnerships can materially alter unit economics, while making explicit the boundary at which circularity remains partial. Second, to the green entrepreneurship literature (Genoveva & Tanardi, 2022; Nabi et al., 2017), the study documents how a program-based incubator such as PKM-K can bring a student venture to demonstrable financial feasibility within a single cycle, and identifies certification, working capital, and scale-up mentoring as boundary conditions for post-program sustainability. Third, to business feasibility practice in student and micro-enterprise contexts, the study provides a transparent worked example of standard feasibility indicators applied to a waste-valorization venture, together with sensitivity and market-response evidence usable as a template for similar PKM-K submissions.

RESEARCH METHODS

This study used a descriptive approach to document and evaluate the development of Oravé Lotion as a green entrepreneurship venture utilizing orange and avocado peel waste. The data were obtained from the implementation of the Oravé Lotion PKM-K program conducted in Batam City from July to October 2025, a consumer survey involving 56 respondents for initial market validation, and quantitative financial records from the production and business activities. Respondents were recruited through convenience sampling from the Politeknik Negeri Batam community. The survey was exploratory and was not designed to represent the broader consumer population in Batam.

The program activities were carried out at the Batam State Polytechnic campus for the main activities, the home of one of the members for waste collection and cleaning, and LABKESMAS Batam as a partner providing laboratory facilities. The program consisted of four phases: planning, production, marketing, and evaluation and sustainability. Each phase was conducted to achieve the PKM-K output targets while supporting the assessment of business viability (Maulana et al., 2022).

The market validation data consisted of respondent characteristics and their stated interest in the Oravé Lotion concept. The respondents were predominantly female (83.9%) and aged 17–25 years. The survey results were analyzed descriptively to identify initial consumer interest in natural and environmentally friendly lotion products. The results showed that 93% of respondents expressed interest in the product concept, while 7% indicated otherwise. These

findings were interpreted as an initial indication of market interest rather than a general representation of consumer preferences in Batam.

Business feasibility was assessed using quantitative financial indicators, including cost of goods sold (COGS), gross profit, profit after tax (PAT), benefit-cost ratio (B/C), revenue-cost ratio (R/C), break-even point (BEP), and payback period (PP). The analysis used production costs, selling price, projected production volume, revenue, and other business-related costs to evaluate the financial feasibility of the venture. The feasibility analysis was complemented by observations of product development, marketing activities, and sustainability practices implemented during the program.

Planning Phase

The planning phase included identifying market opportunities through a survey of 56 respondents at the Batam State Polytechnic, determining the product formulation based on scientific references (Royyatun et al., 2024), designing the logo and product packaging, and developing a partnership strategy for sourcing raw materials. Partnerships were established with local fruit juice vendors Jus Kita and Jooz Aja as suppliers of orange peel and avocado peel waste, thereby securing a supply of raw materials while supporting the principle of waste valorization.

Production Stage

1. The production process adapted the oil-in-water (O/W) emulsion-type lotion formulation developed by Royyatun et al. (2024), with adjustments to extract concentration and production capacity. The production stages include:
2. Extract preparation. Avocado peel and orange peel powders were extracted via maceration using 96% ethanol (1:10 w/v ratio) for 3×24 hours, then concentrated using a rotary evaporator at 60–70°C;
3. Lotion preparation. The ingredients were separated into an oil phase (stearic acid, cetyl alcohol, liquid paraffin, propyl paraben) and an aqueous phase (glycerin, TEA, methyl paraben, distilled water); both phases were heated to 75°C, then emulsified until homogeneous;
4. Addition of active extracts. Avocado peel extract (5%) and orange peel extract (3%) were added at a temperature below 40°C to preserve the stability of heat-sensitive vitamin C;
5. Packaging. The formulation was cooled to room temperature, packaged in 100-ml plastic tubes labeled with the tagline “Be Moist, Be Fresh,” and placed in a natural-toned cardboard box. The production capacity achieved during the PKM-K project was 100 bottles.

Marketing Phase

The marketing strategy was implemented through an integrated offline and online approach. Offline marketing involved distributing trial products to students who completed an initial questionnaire to gather feedback. Online marketing was conducted through the official Instagram account (@pkmk_orave) and WhatsApp messages, featuring product introductions, videos of the lotion-making process, and user testimonials. In addition, a word-of-mouth strategy is utilized to expand the promotional reach on campus without incurring additional advertising costs (Mardiyana & Huwae, 2025).

Business Feasibility Analysis

The financial viability of a business is assessed using five key indicators commonly used in business feasibility studies (Dr. Kasmir, S.E. & Jakfar, S.E., 2003; Sudana, 2009). The calculation of the Cost of Goods Sold (COGS) follows Equation (1).

$$\text{COGS} = \text{Beginning Inventory} + \text{Net Purchases} - \text{Ending Inventory} \quad (1)$$

Gross Profit and Profit After Tax (PAT) are calculated as follows:

$$\text{Gross Profit} = \text{Revenue} - \text{COGS} \quad (2)$$

$$\text{PAT} = \text{Gross Profit} - (\text{Gross Profit} \times \text{Tax Rate}) \quad (3)$$

The economic efficiency of a business is assessed using the Benefit-Cost Ratio (B/C) and the Revenue-Cost Ratio (R/C), with a B/C ratio > 1 and an R/C ratio > 1 indicating business feasibility:

$$\text{B/C Ratio} = \text{Total Benefits} / \text{Total Costs} \quad (4)$$

$$\text{R/C Ratio} = \text{Total Revenue} / \text{Total Costs} \quad (5)$$

The Break-Even Point (BEP) and Payback Period (PP) are calculated using the following formulas:

$$\text{BEP (units)} = \text{Fixed Costs} / (\text{Selling Price per Unit} - \text{Variable Costs per Unit}) \quad (6)$$

$$\text{PP} = \text{Initial Investment} / \text{Monthly Net Profit} \quad (7)$$

A lower PP indicates a faster recovery of the initial investment (Sudana, 2009). The business is considered feasible when it meets all of the specified feasibility criteria: B/C > 1 , R/C > 1 , the BEP is reached below the planned production capacity, and the Payback Period is shorter than the economic life of the business.

RESULTS AND DISCUSSION

Product Profile and Positioning

Oravé Lotion is formulated as a natural moisturizing body lotion with a light texture, a distinctive orange-avocado scent, and a soft brown color that reflects the authenticity of the fruit extracts. The product is packaged in a 100-ml plastic tube accompanied by a cardboard box featuring a nature-inspired design, along with the tagline “Be Moist, Be Fresh.” During the PKM-K project, a total of 100 bottles were successfully produced at a unit cost of IDR 12,500 and a selling price of IDR 21,500 per bottle.

Oravé Lotion's product differentiation lies in three main aspects. First, the active ingredients are derived from fruit peel waste, supporting a circular economy. Second, the natural antioxidant content (flavonoids, tannins, vitamin C) provides both moisturizing and anti-aging benefits (Ferreira et al., 2022; Rani et al., 2021). Third, Oravé Lotion is positioned at a mid-price band that is more accessible than premium imported natural lotions (e.g., Nature Republic) but at a higher per-milliliter price than mass-market avocado lotions from established brands. This combination of strengths positions Oravé Lotion as a mid-range green cosmetic product with a strong sustainability value proposition.

Competitor Benchmarking and Positioning Analysis

To sharpen Oravé Lotion's competitive positioning, this section compares the product against seven reference brands available in the Indonesian body lotion market that also feature avocado as an active ingredient. The benchmarks are grouped into three tiers: (a) mass-market local brands (Marina, Citra, Viva, Emeron, Kaila); (b) mid-market international/imported brands (St. Ives); and (c) premium imported brands (Nature Republic). The comparison in Table 1 evaluates five value-proposition dimensions beyond price: active-ingredient source, sustainability narrative, target segment, product differentiation, and distribution channel.

The observations follow from Table 1, Oravé Lotion occupies a blue-ocean position on the ingredient dimension: within the market scan performed, no established commercial brand in Indonesia currently uses fruit-peel waste as the primary active ingredient for body lotion, although comparable formulations exist at the academic level (Royyatun et al., 2024). Oravé Lotion is not positioned as a price leader; its per-milliliter price is above mass-market local brands but below St. Ives and Nature Republic, with its premium based on ingredient novelty and circular-economy value rather than cost efficiency (Bahaiyan & Ridanasti, 2025; White et

al., 2019). Accordingly, Oravé is positioned as a specialty green cosmetic targeting consumers willing to pay a modest premium for a circular-economy value proposition.

Table 1. Competitor Benchmarking of Avocado-Based Body Lotions in Indonesia

Dimension	Oravé Lotion	Mass-market local (Marina, Citra, Viva, Emeron, Kaila)	Mid-market imported (St. Ives)	Premium imported (Nature Republic)
Active-ingredient source	Avocado & orange peel waste extracts (circular)	Avocado flesh/oil extract (linear supply)	Avocado flesh extract + Vitamin E (linear supply)	Avocado flesh extract (linear supply)
Sustainability narrative	Explicit waste valorization + local supply partnership	Generic "natural ingredient" claim	Generic "natural ingredient" claim	Generic "natural ingredient" claim
Target segment	Young productive-age consumers (17–25) with sustainability awareness	Mass consumers seeking affordable moisturizer	Mid-market consumers seeking well-known international natural brand	Premium urban consumers, brand-conscious
Product differentiation	Circular economy narrative + peel-based bioactive (novel)	Formulation & fragrance variation, whitening claims	Trusted international brand, large-format value pack	Premium Korean beauty positioning, glass packaging
Distribution channel	Direct-to-consumer (Instagram, WhatsApp, campus, word-of-mouth)	Mass retail, minimarket, e-commerce	Modern retail, e-commerce	Official stores, department stores, e-commerce
Reference price per 100 ml	IDR 21,500	~IDR 4,000-15,000	~IDR 25,000	~IDR 45,000

Source: authors' compilation from brand official information, Shopee/Amazon listings, and product review portals (accessed 2025).

Note: Prices are indicative retail-price ranges and may vary by channel and promotion.

Product Safety Test Results

The results of third-party laboratory testing for heavy metal content in samples of Oravé Lotion are presented in Table 2.

Table 2. Results of Heavy Metal Content Testing of Oravé Lotion

Parameter	Unit	Test Result	Method
Cadmium (Cd)	mg/L	< 0,05	IEC 62321-5:2013
Lead (Pb)	mg/L	< 0,005	IEC 62321-5:2013
Arsenic (As)	mg/L	< 0,001	IEC 62321-5:2013
Mercury (Hg)	mg/L	< 0,0001	IEC 62321-4:2013
Tin (Sn)	mg/L	< 0,02	IEC 62321-5:2013

Source: PT Sucofindo, Analysis Report No. M00581/CLAPAS (October 28, 2025).

Note: The symbol “<” indicates a concentration below the test method’s limit of detection.

All parameters show concentrations below the test method’s limit of detection, indicating that the heavy metal content in Oravé Lotion is well below the contamination threshold. These results meet the heavy metal contamination requirements for cosmetics established by the Indonesian Food and Drug Supervisory Agency (BPOM, 2023). Product safety validation by an accredited laboratory reinforces Oravé Lotion’s value proposition as a safe natural cosmetic product, while also supporting plans to obtain BPOM certification during the business sustainability phase (Nabi et al., 2017). For student startups, laboratory test result documents also help build consumer trust, which is an important intangible asset in cosmetic product marketing (White et al., 2019).

Market Analysis

An initial survey of 56 respondents of working age showed that 93% of respondents were interested in using natural and eco-friendly lotions, while only 7% expressed no interest. The respondent pool was dominated by women (83.9%) aged 17–25. These demographic characteristics align with the primary target segment for moisturizing cosmetic products, as this group exhibits high skincare usage intensity and moderate price sensitivity (Mishra et al., 2023). The combination of high market interest and the appropriate demographic segment supports the commercial viability of Oravé Lotion during the initial launch phase.

Production Cost Structure

Details of the production cost structure for Oravé Lotion during the PKM-K project are presented in Table 3. Total costs amounted to IDR 9,500,000, with consumables accounting for the largest share (60%).

Table 3. Cost Structure for the Oravé Lotion Program

No.	Cost Category	Amount (IDR)	Percentage (%)
1.	Raw materials and consumables	5,699,171	60.0
2.	Rent and services (production and laboratory testing)	1,140,000	12.0
3.	Local transportation	1,235,000	13.0
4.	Miscellaneous (promotion, administration, digital advertising)	1,425,283	15.0
Total		9,500,000	100.0

Source: Oravé Lotion PKM-K Final Report (2025), data processed.

Note: Percentages are calculated based on the total program implementation costs.

The cost structure shows that consumables account for the majority of total expenses, although the cost of the main raw materials, orange peels and avocado peels is zero because they are obtained through a waste valorization partnership with local fruit juice vendors. This cost configuration reflects one of the advantages of a circular economy-based business model: input efficiency resulting from the use of secondary resources (Bocken et al., 2016). The majority of consumables costs are actually allocated to packaging (tubes and cardboard boxes), totaling IDR 1,200,000, as well as formulation support ingredients (ethanol, glycerin, stearic acid, and so on).

Financial Feasibility Analysis

The financial feasibility analysis distinguishes between fixed costs incurred during PKM-K program setup, comprising equipment configuration, laboratory testing, brand and packaging development, and initial promotional materials, totaling IDR 2,336,400, and variable costs incurred per unit produced, comprising formulation ingredients, packaging tube, box, and label,

at IDR 9,426 per unit. These two categories reconcile with the total PKM-K expenditure of IDR 9,500,000 reported in Table 3 and form the basis for post-program unit economics.

The selling price of IDR 21,500 per unit was set based on the competitive positioning analysis in Table 1, above the mass market local segment (approximately IDR 4,000 to IDR 15,000 per 100 mL) but meaningfully below the mid-market imported segment (St. Ives at approximately IDR 25,000). To sustain a gross margin of approximately 41.9%, necessary to fund future BPOM and MUI Halal certification, working capital, and gradual scale up, the target unit COGS was set at IDR 12,500. Given the fixed and variable cost structure, achieving this target COGS requires a sustainable annual production volume of 760 units, computed as:

$$\begin{aligned}\text{COGS per unit} &= (\text{Fixed Cost} / \text{Volume}) + \text{Variable Cost per unit} \\ \text{IDR 12,500} &= (\text{IDR 2,336,400} / 760) + \text{IDR 9,426}\end{aligned}$$

This annual volume of 760 units also corresponds to approximately $3.9 \times$ the Break-Even Point (194 units), providing an adequate margin of safety, and is consistent with the estimated production capacity attainable using existing LABKESMAS laboratory access and the projected supply of orange and avocado peel waste from partners Jus Kita and Jooz Aja under the current partnership arrangement.

At this scale, total revenue is projected at IDR 16,340,000 (760 units $\times$ IDR 21,500), generating a gross profit of IDR 6,840,000 after deducting total COGS. After applying an effective tax rate of 11%, which encompasses the Micro, Small, and Medium Enterprises (MSME) Final Income Tax together with other operational components, the Profit After Tax (PAT) amounts to IDR 6,087,600.

The B/C and R/C ratios both equal 1.72, calculated from the ratio of total revenue (IDR 16,340,000) to total costs (IDR 9,500,000). The identity between the two ratios follows from the operational definition of total benefits adopted here. Total benefits are defined as the monetary revenue accruing to the venture from unit sales, excluding non-monetary externalities such as the environmental value of organic waste diverted from disposal, avoided greenhouse gas emissions, and the social value of student entrepreneurship capacity building. Under this revenue-based definition, the numerator of the B/C ratio (total benefits) is algebraically identical to the numerator of the R/C ratio (total revenue), and the two ratios therefore reduce to the same value of 1.72. A broader definition incorporating avoided waste disposal costs or a monetized carbon avoidance credit would yield a B/C ratio strictly greater than the R/C ratio and is identified as a direction for follow up research.

The Break Even Point was calculated from the ratio of fixed costs of IDR 2,336,400 to the contribution margin per unit of IDR 12,074, obtained by subtracting the variable cost per unit (IDR 9,426) from the selling price (IDR 21,500), yielding a Break Even Point at 194 units. The Payback Period was obtained from the ratio of the initial investment of IDR 9,500,000 to the monthly net profit of IDR 507,300, itself derived by dividing the annual PAT by twelve months, producing a recovery period of 18.7 months, or approximately one year and seven months. Complete results are presented in Table 4.

Table 4. Results of the Financial Feasibility Analysis for the Oravé Lotion Business

No	Indicator	Value	Interpretation
1.	Cost of Goods Sold per unit	IDR 12,500	Basis for determining the selling price
2.	Selling price per unit	IDR 21,500	72% Markup; competitive compared to competitors
3.	Total revenue	IDR 16,340,000	Scale of 760 units
4.	Gross profit	IDR 6,840,000	41.9% of revenue
5.	Net profit after tax (11%)	IDR 6,087,600	After final MSME tax
6.	B/C Ratio	1.72	> 1: viable business

No	Indicator	Value	Interpretation
7.	R/C Ratio	1.72	> 1: revenue > costs
8.	Break Even Point (BEP)	194 unit	25.5% of planned capacity
9.	Payback Period (PP)	18.7 months	< 24 months: quick return on investment

Source: Oravé Lotion PKM-K Final Report (2025), data processed.

Note: The analysis is based on the assumption of a sustainable production scale of 760 units and an effective tax rate of 11% (including the final income tax for MSMEs and other operational components).

All indicators meet the business feasibility criteria. B/C and R/C ratios above 1 indicate that the economic benefits of the business outweigh the costs incurred (Dr. Kasmir, S.E. & Jakfar, S.E., 2003). The BEP is reached at 194 units, well below the planned production capacity of 760 units, resulting in a sufficiently wide margin of safety. A payback period of 18.7 months indicates a return on the initial investment in less than two years, a figure considered attractive for an innovation-based startup (Sudana, 2009). Therefore, Oravé Lotion is financially feasible to continue after the PKM-K period ends.

Business Risk and Sensitivity Analysis

The main business risks identified for Oravé Lotion include fluctuations in fruit peel waste availability, limited production capacity, incomplete product certification, and changes in consumer preferences. These risks can be mitigated through cooperation with multiple local waste suppliers, gradual production scaling, preparation for BPOM and halal certification, and product improvement based on consumer feedback.

Two additional commercial risks warrant attention as the venture transitions from the PKM-K program to independent operation. Working capital risk arises from the timing mismatch between upfront outflows for ingredients, packaging, and laboratory testing, and inflows from unit sales dispersed across subsequent weeks of direct to consumer distribution. At the projected 760 unit annual scale, a revolving working capital pool of approximately IDR 1,500,000 to IDR 2,000,000, equivalent to roughly two months of variable cost outflow, would be required to sustain continuous production. Mitigation options include pre-order collection via Instagram to convert intent into deposits, partial payment terms with packaging suppliers, and eligibility screening for MSME micro-financing such as Kredit Usaha Rakyat (KUR).

Competition risk operates on two fronts. The peel waste to lotion concept is technically replicable from publicly available literature (Ferreira et al., 2022; Royyatun et al., 2024), and Oravé currently holds no formal intellectual property protection over the formulation or brand. In addition, established mass market brands may adopt a circular narrative extension line at commercial scale, compressing the price premium and eroding the blue ocean position identified in Table 1. Mitigation options include early trademark registration, cultivation of first mover storytelling tied specifically to the Jus Kita and Jooz Aja partnership as a locally traceable supply story, and continuous SKU differentiation through scent variants and adjacent categories that leverage the established supplier relationships.

Sensitivity analysis was conducted by considering changes in projected sales volume and variable costs. A 10% decrease in sales from 760 to 684 units would reduce revenue from IDR 16,340,000 to IDR 14,706,000, while a 20% decrease to 608 units would reduce revenue to IDR 13,072,000. Based on the existing fixed and variable cost structure, the corresponding R/C ratios would remain above 1, at approximately 1.67 and 1.62, respectively. A 10% increase in variable costs would reduce the R/C ratio to approximately 1.60. These scenarios indicate that the business remains financially viable under the tested changes in sales volume and variable costs. A supplementary scenario considers disruption to the raw material supply. If one of the two waste supplier partners exits the arrangement, the venture would substitute peel with market purchased fruit peel at an estimated additional cost of IDR 1,000 per unit produced. Holding the

selling price constant, this reduces the R/C ratio to approximately 1.55 and extends the payback period to roughly 22 months, still within the feasibility threshold but with a materially narrower margin of safety.

Marketing Strategy and Market Response

Oravé Lotion's marketing strategy combined digital promotion via Instagram (@pkmk_orave) and WhatsApp with offline product trials distributed to the 56 initial-survey respondents. By the end of the program period, the account had reached 415 followers across 30 posts, with an average of 126 likes per static post (median 140; range 18–174) a ratio suggesting reach into non-follower audiences via Explore and hashtag distribution. Three promoted video posts amplified the campaign, jointly generating 85,600 views, reaching 66,623 accounts, producing 17,054 engagements, and driving 1,389 outbound link clicks. Detailed performance metrics for the three video posts are summarized in Table 5.

Table 5. Performance metrics of Oravé Lotion promoted video posts on Instagram

Metric	Video 1	Video 2	Video 3	Total
Views	19,100	30,500	36,000	85,600
Accounts reached	14,352	23,540	28,731	66,623
Total engagements	2,971	6,489	7,594	17,054
3-second plays	2,562	5,892	6,654	15,108
Outbound link clicks	324	430	635	1,389
Likes and reactions	285	248	344	877
Comments	13	11	3	27
Shares	8	17	20	45
Reposts	-	5	7	12
Saves	-	-	3	3
Profile visits	319	429	628	1,376
New follows generated	13	8	4	25

Source: Instagram Insights of @pkmk_orave, program period 2025.

The combined engagement rate across the three video posts, calculated as total engagements divided by accounts reached, was approximately 25.6%, with an outbound click-through rate of 2.08%. These figures exceed typical benchmarks for the beauty industry, where median engagement rates for organic Instagram content generally fall between 1% and 3% (Iconosquare, 2025; Kolsquare, 2026). Direct comparison is limited because the Oravé videos were promoted rather than purely organic posts; nevertheless, the consistently high engagement across all three videos indicates that the circular-economy narrative and waste-valorization storyline resonated with the targeted audience, providing an early signal of message-market fit. Offline product trials with the 56 respondents yielded mixed qualitative feedback that complements the digital metrics. Positive responses centered on packaging, texture, skin softness, and a perceived sun-protection effect reported by a subset of respondents, consistent with the antioxidant properties of the peel extracts (Ferreira et al., 2022). Improvement inputs included preferences for a more pronounced fragrance and gender-neutral scent variants, along with a mismatch between the product's natural brown color, which is derived from the fruit-peel extracts, and consumer expectations of a tone-up finish common to mass-market lotions. This aesthetic gap reveals a tension between the visual conventions of the mainstream Indonesian lotion market and the natural-color positioning inherent to a waste-valorization product. Both categories of feedback were recorded as inputs for post-PKM-K product development, particularly for scent variants and for consumer-education content around natural-ingredient aesthetics.

These findings are consistent with the broader concept of conscious consumerism discussed by White et al. (2019), which highlights that consumer response to sustainable

products is shaped by both product functionality and by the alignment between the sustainability narrative and existing sensory and aesthetic expectations. The strong Instagram engagement with the fruit-peel-waste story indicates receptivity to the sustainability narrative, while the mixed sensory feedback (scent, color) reveals where mass-market cosmetic conventions still shape consumer acceptance. Overall, the combination of digital promotion metrics, product trials, and structured feedback capture provided both quantitative reach indicators and qualitative product-improvement insights, functioning as an early proof-of-interest signal rather than inferential market acceptance evidence. Scaling these results into representative market acceptance evidence would require a follow-up study employing randomized sampling, controlled purchase-intention measurement, and repeat-purchase tracking.

Business Model Canvas

To systematically describe the Oravé Lotion business model, the Business Model Canvas (BMC) was used to identify its key customers, value proposition, channels, resources, activities, partnerships, and financial components.

Table 6. Business Model Canvas of Oravé Lotion

Component	Oravé Business Model
Customer Segments	University students and young workers
Value Propositions	Affordable natural lotion made from orange and avocado peel waste, combining personal care and circular economy value
Channels	Instagram, WhatsApp, product trials, and word-of-mouth
Customer Relationships	Direct communication and consumer feedback through WhatsApp
Revenue Streams	Direct sales of 100 ml lotion at IDR 21,500 per bottle
Key Resources	Fruit peel waste, formulation materials, production equipment, student team, laboratory facilities, and capital
Key Activities	Waste collection, extraction, formulation, packaging, testing, marketing, and sales
Key Partnerships	Jus Kita and Jooz Aja as waste suppliers, LABKESMAS Batam for laboratory testing, and Politeknik Negeri Batam
Cost Structure	Materials, packaging, laboratory services, transportation, promotion, administration, and digital advertising

Source: Authors' analysis based on Oravé business activities and data (2025)

Circular Economy and Student Entrepreneurship

The implementation of the Oravé Lotion program offers three key lessons for the development of student entrepreneurship based on the circular economy. First, the waste valorization strategy through local partnerships with fruit juice vendors has proven to reduce the cost of the main raw material while securing a sustainable supply. This approach aligns with the concept of a circular supply chain as described by Farooque et al. (2019) and supports cost efficiency as outlined by Bocken et al. (2016).

Second, the high level of consumer interest (93%) in products made from natural ingredients confirms that sustainability has become a significant factor in purchasing decisions among consumers of working age. This opens up opportunities for student entrepreneurs to develop product differentiation based on environmental narratives without having to compete directly on price with mass-market cosmetics made from synthetic ingredients.

Third, from an entrepreneurial development perspective, the success of Oravé Lotion demonstrates that the PKM-K program can serve as an effective incubator for green entrepreneurship. Other studies confirm that entrepreneurship education has a positive impact

on entrepreneurial intentions and actions; however, business sustainability requires post-program mentoring in the areas of legal compliance, certification, and scalability (Nabi et al., 2017). In the context of Oravé Lotion, ongoing challenges include obtaining BPOM and MUI Halal certifications, developing small- to medium-scale production facilities, and expanding distribution to national e-commerce platforms such as Shopee and TikTok Shop.

CONCLUSIONS

The Oravé Lotion program, developed through the 2025 PKM-K at Batam State Polytechnic, shows that orange and avocado peel waste can be converted into a marketable body lotion, with the cost advantage arising from zero cost secondary inputs secured through local supplier partnerships. At a projected volume of 760 units, the venture meets all feasibility criteria (B/C and R/C of 1.72, BEP at 194 units, payback of 18.7 months), and its R/C remains above 1 under a 20% sales decline or a 10% rise in variable costs. Heavy metals were below detection limits, and 93% of surveyed respondents expressed interest, with engagement above industry benchmarks on promoted Instagram content.

For circular business model research, the case illustrates a micro scale local circular supply chain in which secondary resources improve input efficiency (Bocken et al., 2016; Farooque et al., 2019); circularity is nonetheless partial because packaging and synthetic ingredients remain linear, suggesting incremental input side circularity as a realistic path for small ventures. For green entrepreneurship, the case supports the view that young people hold potential as green entrepreneurs (Genoveva & Tanardi, 2022) and shows that a program based incubator such as PKM-K can bring a venture to projected financial feasibility, though post program support in certification and scaling remains necessary for sustainability (Nabi et al., 2017).

These implications rest on a single case with campus based market data and projected rather than realized volumes; the product has not yet obtained BPOM or MUI Halal certification. Future work should validate demand with a representative sample, product refinement, life cycle assessment of the product, and certified scale-up through e-commerce and derivative product lines.

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REFERENCES

- Badan Pengawas Obat dan Makanan. (2023). *Temuan Hasil Penindakan Produk Obat dan Makanan Ilegal Melalui Perdagangan Online yang Berisiko Terhadap Kesehatan*. <https://www.pom.go.id/siaran-pers/Temuan-Hasil-Penindakan-Produk-Obat-dan-Makanan-Ilegal-Melalui-Perdagangan-Online-yang-Berisiko-Terhadap-Kesehatan>
- Bahaiyan, S. Z., & Ridanasti, E. (2025). Analysis of Factors Influencing Intention to Purchase Natural And Environmentally Friendly Cosmetic Products. *Dinasti International Journal of Economics, Finance & Accounting*, 5(6), 5767–5775. <https://doi.org/10.38035/dijefa.v5i6.3726>
- Bocken, N. M. P., de Pauw, I., Bakker, C., & van der Grinten, B. (2016). Product design and business model strategies for a circular economy. *Journal of Industrial and Production Engineering*, 33(5), 308–320. <https://doi.org/10.1080/21681015.2016.1172124>
- Dr. Kasmir, S.E., M. M., & Jakfar, S.E., M. M. (2003). *Studi Kelayakan Bisnis* (Revisi). Kencana.
- Durri, S. A., & Walid, M. (2024). Identifikasi Senyawa Tanin Dan Evaluasi Ekstrak Kulit

- Alpukat Persea Americana Mill Sebagai Lotion Silfi Arini Durri “ Identifikasi senyawa tanin , fenol dan evaluasi ekstrak kulit alpukat sebagai lotion ” untuk. *Journal of Clinical Pharmacy and Pharmaceutical Science*, 3(1), 01–09. <https://doi.org/https://doi.org/10.61740/jcp2s.v3i1.49>
- Farooque, M., Zhang, A., Thüerer, M., Qu, T., & Huisinigh, D. (2019). Circular supply chain management: A definition and structured literature review. *Journal of Cleaner Production*, 228, 882–900. <https://doi.org/10.1016/j.jclepro.2019.04.303>
- Ferreira, S. M., Falé, Z., & Santos, L. (2022). Sustainability in Skin Care: Incorporation of Avocado Peel Extracts in Topical Formulations. *Molecules*, 27(6), 1–16. <https://doi.org/10.3390/molecules27061782>
- Geissdoerfer, M., Pieroni, M. P. P., Pigosso, D. C. A., & Soufani, K. (2020). Circular business models: A review. *Journal of Cleaner Production*, 277, 1–17. <https://doi.org/10.1016/j.jclepro.2020.123741>
- Genoveva, G., & Tanardi, J. (2022). Green Entrepreneurship: A New Paradigm for Millennials in Indonesia. *International Journal of Sustainable Development and Planning*, 17(4), 1133–1140. <https://doi.org/10.18280/ijstdp.170410>
- Herawan, D. ., Kurnia, G. ., Sukmawati, I., & Yurniasih, N. (2022). Efektivitas Ketersediaan Pelembab Bahan Alam Dalam Mengatasi Kulit Kering. *Health Sains*, 3(7), 1–10. <https://doi.org/https://doi.org/10.46799/jhs.v3i7.529>
- Iconosquare. (2025). *What are Industry Benchmarks?* Iconosquare. <https://support.iconosquare.com/industry-benchmarks>
- Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127(April), 221–232. <https://doi.org/10.1016/j.resconrec.2017.09.005>
- Kolsquare. (2026). *Instagram engagement rate: definition, calculation and tips to boost it*. Kolsquare. <https://www.kolsquare.com/en/blog/instagram-engagement-rate-definition-calculation-and-tips-to-boost-it>
- Lister, I. N. E., Amiruddin, H. L., Fachrial, E., & Girsang, E. (2021). Anti-Aging Effectiveness of Avocado Peel Extract Ointment (Persea americana Mill.) against Hydration, Collagen, and Elasticity Levels in Wistar Rat. *Journal of Complementary Medicine*, 10(2), 173–184. <https://doi.org/10.9734/jpri/2021/v33i32b31760>
- Mardiyana, D. A., & Huwae, G. N. (2025). Strategi Word of Mouth UMKM Tumpang Mbak Painem untuk Brand Awareness. *Petanda: Jurnal Ilmu Komunikasi Dan Humaniora*, 7(3), 542–558. <https://doi.org/10.32509/petanda.v7i3.6164>
- Maslikhah, Andika, Tampubolon, N. K. T., Harahap, J. B., & Luthfiana, D. N. (2024). Stay or Switch: How Usage Barriers Influence Consumer Transition to Green Skincare Products in Indonesia Using Push-Pull-Mooring Framework. *International Journal of Environmental Impacts*, 7(4), 603–614. <https://doi.org/10.18280/ije.070401>
- Maulana, R., Purnama, D. R., Utari, C. E., Sari, J., & Trimerani, R. (2022). Strategi Pemasaran Produk Bakso Kulit Pisang (Bakusang). *Jurnal Industri Kreatif Dan Kewirausahaan*, 5(2), 113–121. <https://doi.org/10.36441/kewirausahaan.v5i2.1310>
- Mishra, M., Patel, N., Pandya, I., Patil, R., & Patel, M. (2023). Evaluating the dermal safety and skin compatibility of personal care cosmetic products formulated with natural ingredients: An in-vivo primary irritation patch test study. *Dermatology Research and Skin Care*, 7(6), 1–8. <https://doi.org/https://doi.org/10.35841/aadrsc-7.6.176>
- Nabi, G., LiñáN, F., Fayolle, A., Krueger, N., & Walmsley, A. (2017). The impact of entrepreneurship education in higher education: A systematic review and research agenda. *Academy of Management Learning and Education*, 16(2), 277–299. <https://doi.org/10.5465/amle.2015.0026>
- Rani, Y. darmi, Delima, C., & Pranata, C. (2021). Formulasi Hand and Body Lotion Ekstrak Kulit Buah Alpukat(Persea Gratissima Gaertn) Sebagai Pelembab. *Jurnal Pengmas Kestra (Jpk)*, 1(2), 323–327. <https://doi.org/10.35451/jpk.v1i2.892>

- Royyatun, Alrosyidi, A. F., & Syaifiyatul H. (2024). Formulasi Dan Uji Fisik Sediaan Body Lotion Ekstrak Kombinasi Daun Alpukat (*Persea americana* Mill) Dan Kulit Jeruk Nipis (*Citrus aurantifolia* (Christm.) Swingle) Sebagai Pelembab. *FASKES: Jurnal Farmasi, Kesehatan, Dan Sains*, 2(1), 168–178. <https://doi.org/10.32665/faskes.v2i1.3268>
- Sasmita, A. P., & Azzahra, F. (2023). FORMULASI DAN UJI SIFAT FISIK SEDIAAN LOTION EKSTRAK DAUN ALPUKAT (*Persea americana* Mill.) DENGAN VARIASI KONSENTRASI GLISERIL MONOSTEARAT. *Jurnal Analis Farmasi*, 8(1), 32–41. <https://doi.org/10.33024/jaf.v8i1.8676>
- Setiawan, M., Widjojo, R., & Purnama Alamsyah, D. (2023). Consumers' reasonings for intention to purchase natural personal care products in Indonesian market. *Cogent Business & Management*, 11(1). <https://doi.org/10.1080/23311975.2023.2289205>
- Sudana, I. M. (2009). *Manajemen Keuangan Teori dan Praktik* (Cet. 1). Airlangga University Press.
- Suryadi, A. A., Pakaya, M. S., Djuwarno, E. N., & Akuba, J. (2021). DETERMINATION OF SUN PROTECTION FACTOR (SPF) VALUE IN LIME (*CITRUS AURANTIFOLIA*) PEEL EXTRACT USING UV-VIS SPECTROPHOTOMETRY METHOD. *Jambura Journal of Health Sciences and Research*, 3(2), 169–180. <https://doi.org/10.35971/jjhsr.v3i2.10319>
- Uturestantix, U., Warokka, A., & Aqmar, A. Z. (2026). Bridging the Green Purchasing Gap: Drivers of Willingness to Pay for Green Cosmetics Across Consumer Groups. *Administrative Sciences*, 16(5), 213. <https://doi.org/10.3390/admsci16050213>
- White, K., Habib, R., & Hardisty, D. J. (2019). How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework. *Journal of Marketing*, 83(3), 22–49. <https://doi.org/10.1177/0022242919825649>