

CASE STUDY

Topic: Development of an original diet chocolate with a bubbling sensation

Team № 1

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I. Executive Summary (150 words)

Provide a brief overview of the case study, including the objective and key findings.

This study has developed a new type of diet chocolate, formulated to offer a healthy and attractive alternative to the modern consumer. The product uses erythritol as a sugar replacer and ground flaxseed as a natural source of prebiotic fibre and omega-3 fatty acids, providing additional functional benefits. In addition, a bubbling sensation is incorporated when chewing, thanks to the addition of carbonic acid, creating an innovative sensory experience.

This chocolate is aimed primarily at health-conscious young adults interested in products with no added sugars and clean labels. To this end, a product aligned with these demands was designed, and its financial viability was assessed, considering the costs of raw materials, labour and positioning strategy.

Finally, potential associated risks were identified, such as market acceptance, differentiation from competitors, consumer perception and potential reputational challenges around the use of novel ingredients.

II. Introduction (300 words)

- Explain the background and context of the project.
- Identify the problem or opportunity that led to the development of the new food product.
- Describe the purpose and scope of the case study.

Recently, a growing concern for health and wellness has driven a significant change in consumption habits. This has not only increased the demand for functional and reduced sugar foods, but also for the adoption of plant-based products (GFI, 2022).

Chocolate has been traditionally associated with pleasure but also with high sugar and fat content. Therefore, it has begun to transform into a category susceptible to healthy innovation to make this product a pleasant and healthy option at the same time.

According to the World Health Organization (WHO, 2015), the main issue of sugar products is their relation to certain illnesses such as obesity and diabetes mellitus type 2. This problem has led to the

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development of alternatives for both reducing the negative impact of sugar and providing functional benefits.

In this context, within sweeteners, erythritol is a natural, calorie-free sweetener, with a low glycaemic index which has a sweetening power of 70% (Mazi et al., 2023). Moreover, related to functional products, ground flaxseed (*Linum usitatissimum*) is an oil seed which is rich in prebiotic fiber and omega-3 fatty acids, which makes a great ally to add to a product like chocolate (Kauser et al., 2024).

The aim of this study is to develop a diet chocolate containing erythritol and ground flaxseed. However, wanting to go further, it was decided to incorporate an element that would enhance the consumer's sensory experience, consisting of an effervescence and explosion effect.

The development of this product not only provides a food with added nutritional value (replacing sucrose with erythritol and adding dietary fiber and omega-3 fatty acids thanks to the presence of flaxseed) but also creates a product that attracts the sensory attention of the consumer, something that could capt the attention of consumers who are continuously looking for new sensations and sensory novelties.

III. Market Analysis: (300 words)

- Conduct a thorough analysis of the target market and its characteristics.
- Identify the target audience and their preferences, needs, and purchasing behavior.
- Analyze the competition and market trends related to similar food products

The proposed product is a diet-friendly, functional chocolate sweetened with **erythritol**, enriched with **ground flaxseed** (as a source of prebiotic fiber and omega-3), and designed to deliver a **bubbling or popping sensation** during consumption. This combination targets modern consumers seeking guilt-free indulgence with added health benefits and unique sensory experiences.

The target market includes adults aged **18–45**, especially health-conscious individuals who follow **low-sugar, low-carb, or keto** diets. These consumers are primarily **urban**, with **moderate to high income**, and actively avoid added sugars. They are also interested in foods that support **digestive health, heart health, and weight management**. Texture-driven food trends (e.g., popping candies, crunchy inclusions) also appeal to **younger consumers** seeking novelty and fun.

Consumers in this segment prefer products that are:

- Naturally sweetened and low in calories.
- Free from artificial additives.
- Rich in functional nutrients (e.g., fiber, omega-3).

They are often **label-conscious**, willing to pay more for premium health benefits, and frequently shop online or at specialty health food retailers.

The functional chocolate segment is growing rapidly, driven by demand for **sugar-free** and **gut-friendly** options. Erythritol is gaining popularity for its **low glycemic index** and **natural origin**, while flaxseed is recognized as a plant-based source of **omega-3** and **fiber**. Although some brands offer sugar-free chocolate, few combine **functional benefits with innovative textures** such as popping sensations.

This product concept offers a unique value proposition by combining **health, innovation, and sensory excitement**. It addresses unmet needs in the diet-friendly confectionery space and has strong potential to stand out in a competitive, health-driven market.

IV. Research and Development: (500 words)

- Explain the research and development process undertaken for the new food product.
- Describe any consumer surveys, focus groups, or taste tests conducted to gather feedback.
- Detail the formulation, recipe development, and production processes involved.

The idea for this product arises from the fact that chocolate and sugar products face the disadvantage of having a high glycemic index, which increases the risk of developing obesity and diabetes in the consumer. This has led society to increasingly reject these products and to consume them occasionally.

Thus, an alternative sweetener product was needed to substitute sucrose and avoid this inconvenience. Searching for an alternative, erythritol was chosen as the right choice. It is approximately 70% as sweet as sucrose and has a mild cooling effect in the mouth with no aftertaste (Grembecka, 2015). Moreover, it is a naturally occurring sugar alcohol found in a variety of fruits (Shindou et al., 1989). Since 2006, erythritol has been permitted as a sweetener for use in all food applications in the European Union (Directive 95/2/EC).

In addition, the consumption of dietary products is a trend in an increasingly health-conscious society. Thus, the addition of ground flaxseed can bring very interesting properties to this product. Flaxseed is an

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oil seed crop cultivated all over the world and with a lot of interesting properties due to its content of proteins, dietary fiber, fatty-acids (especially -linolenic acid) and vitamins among others. It is already being used in the food industry, especially in bakery products, beverages and everyday consumer products (Kauser et al., 2024).

To make the product more remarkable, the idea of a popular Spanish candy known as Peta Zetas® was taken. It has the particularity of producing a sparkling and explosive effect. The company developed this product thanks to the addition of carbon dioxide inside the caramel. When this carbon dioxide encounters saliva, it produces a fizzy sensation like that of carbonated soft drinks.

In relation to gathering feedback from consumers, it is proposed to perform a sensory analysis, which consists of three steps: focus group with a consumer panel, descriptive sensory analysis with a trained panel and a sensory analysis with a non-trained panel.

On the one hand, the idea of developing a focus group is to gather information about the tastes of a broad group of consumers to detect, before developing the product, whether it is an attractive idea and what level of success the product could have in the market. Several dynamic sessions will be held in which they will be asked about their opinion of the product launched on the market and possible improvements.

On the other hand, a sensory analysis with a trained panel should be performed as it provides objective and consistent assessments of the sensory characteristics of the product. Whereas the trained panel seeks to evaluate the acceptability and liking of the product in a less technical way.

The following formulation is proposed for the product (expressed per 100 g): cocoa mass (40.0 g), cocoa butter (10.0 g), erythritol (25.0 g), ground flaxseed (5.0 g), crystallized carbonic acid (8.0 g), soya lecithin (1.0 g), vanilla extract (0.5 g), sea salt (0.3 g) and antioxidant (tocopherol) (0.2 g).

V. Product Description: (500 words)

- Provide a detailed description of the new food product, including its key features, ingredients, and nutritional information.
- Explain the unique selling proposition (USP) and how it differentiates from existing products in the market.

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The proposed product is a functional, sugar-free chocolate developed to meet modern consumer demands for health, wellness, and sensory experience. It is designed for individuals seeking indulgence without compromising their dietary and nutritional goals. This diet chocolate combines natural sweetening, plant-based functional ingredients, and a popping sensory effect, resulting in a product that is both nutritious and exciting.

Key Features:

- Sugar-free, using erythritol as the primary sweetener
- Enriched with ground flaxseed, a rich source of prebiotic fiber and omega-3 fatty acids
- Contains popping crystals (similar to popping candy) to create an effervescent and exploding texture during consumption
- Plant-based, suitable for vegetarian and potentially vegan consumers
- Low glycaemic index and zero-calorie sweetening, ideal for diabetics and those on ketogenic or low-carb diets
- Designed to offer functional benefits (gut health, cardiovascular support) while delivering a novel sensory experience

Ingredients:

- Cocoa mass
- Cocoa butter
- Erythritol (natural sweetener)
- Ground flaxseed (*Linum usitatissimum*)
- Popping candy (carbon dioxide-activated erythritol crystals)
- Emulsifier (sunflower lecithin)

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- Natural vanilla extract

Optional: Depending on formulation, it may also include a small amount of plant-based milk powder or stabilizers to improve texture and mouthfeel.

Nutritional Information (per 25g serving - approximate):

Nutrient	Amount
Energy	~95kcal
Protein	2.5 g
Total Fat	7.5 g
Saturated Fat	2.5 g
Carbohydrates	8 g
- of which Sugars	0 g
- of which Erythritol	6 g
Dietary Fiber	3 g
Omega-3 (ALA)	1.2 g
Sodium	<5 mg

Note: Final values will depend on exact formulation.

Unique Selling Proposition (USP):

The main differentiator of this product is the fusion of health, flavor, and fun:

1. **Health-Focused Formulation:** While many sugar-free chocolates exist, few provide functional benefits like prebiotic fiber and omega-3, making this a more nutrient-dense alternative.
2. **Innovative Texture:** The incorporation of popping crystals creates a surprising effervescent sensation, elevating the sensory experience beyond traditional chocolate.
3. **Natural and Plant-Based:** The use of erythritol (a natural, calorie-free sweetener) and ground flaxseed offers a clean label and aligns with current consumer preferences for plant-based, sustainable, and clean-ingredient foods.
4. **Multi-Benefit Appeal:** Appeals to multiple consumer goals – weight management, diabetes control, digestive health, and sensory novelty – all in one product.

Given the rise of functional foods, low-sugar diets, and consumer interest in interactive eating experiences, this chocolate product is well-positioned to meet evolving preferences. It would be attractive to health-conscious adults, young consumers looking for exciting textures, and those managing specific dietary conditions.

VI. Marketing and Promotion: (300 words)

- Outline the marketing strategy for launching the new food product.
- Describe the branding, packaging, and labeling considerations.
- Discuss the pricing strategy, distribution channels, and promotional activities planned.

For the launch of the new food product, the marketing strategy will focus on creating an authentic, modern and responsible brand image. The new product is aimed at a food-conscious public interested in natural ingredients, sustainability and quality taste. Thus, the branding will reflect values such as transparency, health care and respect for the environment.

The logo will be modernized, and the visual identity will use natural colors (green, beige, white) and clear fonts, which convey simplicity and trust.

The packaging will play an essential role in transmitting the brand message. Recyclable, biodegradable or reusable packaging will be used, with a friendly and functional design.

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The label will contain clear information about the nutritional benefits, the origin of the ingredients, ecological certifications (if applicable), as well as a QR code for accessing recipes or the story behind the product.

The pricing strategy will be positioned in the mid-upper range, reflecting the quality and values of the product. To stimulate initial purchase, we will offer promotional packages, discounts on monthly subscriptions or free samples in the first few months. Distribution channels will include supermarkets, local grocers, organic stores and our own ecommerce platform. We will also collaborate with fast delivery apps and online retailers specializing in healthy food products.

Promotion will combine traditional and digital methods: social media campaigns (Instagram, TikTok), collaborations with lifestyle and nutrition influencers, in-store tastings, participation in local product fairs and online storytelling campaigns. This integrated strategy aims to generate awareness, trust and a solid base of loyal customers.

VII. Financial Analysis: (300 words)

- Conduct a cost analysis of developing and manufacturing the new food product.
- Estimate the potential sales and revenue based on market research.
- Evaluate the profitability and return on investment (ROI) for the project.

The financial analysis of the product can be found in Table 1. The analysis has taken into account the price of raw materials (see Table 2 for more detailed information), utilities (water and electricity consumption), packaging, employees and equipment and research. Packaging will be conducted in paper recycled material, free of microplastics, with an estimated cost of €0.15. Utilities such as gas, electricity, water have an estimated price of €0.15.

Other expenses, including equipment and research (formulation trials, sensory evaluations, stability testing, packaging design, small-scale test production) are projected at 0.35 €/ product unit.

The cost of production per unit is €1.38. The pilot batch size considered for financial modeling is 10,000 units and the industrial scale-up calculation is made for 100,000 units. The marketing and development costs have also been taken into account, which, together with the above, translates into a final pilot plant production cost of €13,750.

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Finally, it should be noted that the selling price per unit will be €2 and this will provide a profit percentage of 6.25% on a pilot scale and 18.75% on an industrial scale.

Table 1. Financial analysis of the product.

	Price (€/production) at pilot scale	Price (€/production) at industrial scale
Raw materials	0.53	
Utilities	0.15	
Packaging	0.15	
Employees	0.2	
Equipment and research	0.35	
Price/unit	1.38	1.38
Nº units	10,000	100,000
Total price pilot production	13,750	137,500
Marketing and development	5,000	25,000
Final costs	18,750	162,500
Selling price/unit	2	2
Selling benefit/ pilot production	20,000	200,000
Benefit	1,250	37,500
Percentage benefit	6.25	18.75

Table 2. Cost of each raw material

Raw materials	Price (€/kg)
Dark chocolate	0.75
Erythritol	1.2
Flaxseed	0.1
Carbon dioxide	0.05
Price/kg final product	2.10

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Price raw materials/product unit	0.53
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VIII. Challenges and Risks: (200 words)

- Identify potential challenges, risks, and obstacles that could affect the success of the new food product.
- Propose mitigation strategies or contingency plans for addressing these challenges.

Below are the main categories of risks relevant to the product:

1. Market acceptance risk:

- Unusual flavor: The combination of chocolate and flaxseeds may seem inappropriate to some consumers.
- Cultural differences: In some countries flax seeds are strictly associated with salads, which limits their consumption in sweet products.

Preventive measure: Product testing (focus groups), limited market launch. Promoting the product as having nutritional qualities.

2. Risk related to the wrong market positioning:

- It may be perceived as a premium product, but the packaging or distribution must reflect this positioning.
- Or vice versa: the product is cheap in price, but with too sophisticated branding, which creates confusion.

Preventive measure: Clarity in positioning (premium, mainstream, impulse-buy, etc.), coherent branding.

3. Risk of intense competition:

- The chocolate market is extremely competitive, dominated by large brands.
- Products with filling already have established variants (e.g. Milka, Lindt, Kinder, etc.).

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Preventive measure: Clear differentiation – perhaps through storytelling (e.g. "artisanal recipe with flax seeds and explosive effect"), distinctive packaging or ethical values (microplastic free, palm oil-free, fair trade, etc.).

4. Financial risks:

- Higher costs for specific ingredients (as erythritol).
- Investment in consumer education campaigns (to understand the new product concept).

Preventive measure: Budget simulations, partnerships with distribution chains that can support the launch.

5. Labeling and regulatory risk:

- Allergenic ingredients (flaxseed) can create problems if not properly labeled.
- The need to mention the content of erythritol in accordance with EU regulations.

Preventive measure: Checking the label's compliance in accordance with the legislation.

6. Reputational risk (brand values vs. consumer perception):

- If the product is promoted as sugar free, but contains sugar, an image conflict may arise.
- The public is becoming increasingly attentive to ingredients and provenance.

Preventive measure: Transparency, clear list of ingredients, possibly certifications (ecological agriculture, fair trade, etc.).

IX. Conclusion: (150 words)

- Summarize the key findings and outcomes of the case study.
- Provide recommendations for the successful launch and growth of the new food product.

1. The development of a diet chocolate with erythritol, ground flaxseed and a bubbling effect has demonstrated to be an innovative proposal and viable from the technical and economic point of view.

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2. This product is intended to be targeted to a young adult consumer who is looking for a product free of added sugars and who is looking for a product with some innovative element.
3. Each unit of product is expected to be launched on the market at a price of €2, which would provide a profit of 18.75% at an industrial scale.
4. However, the product presents some marketing challenges, as it is at risk from allergens, such as ground flaxseed, and some ingredients such as erythritol raise the price of the product.
5. It is advisable to launch the product in specialised health or gourmet shops, accompanied by marketing campaigns focused on the sensory experience and functional benefits.

X. References and Appendices (up to 20 references)

- - Include a list of references used for the case study.
- - Attach any supporting documents or additional information related to the project.

Good Food Institute (GFI) (2022). *Consumer research: public report*. São Paulo: The Good Food Institute. Available in: <https://gfi.org.br/wp-content/uploads/2022/12/O-Consumidor-Brasileiro-e-o-Mercado-Plant-based-2022-GFI-Brasil.pdf> (Access on April 27, 2024).

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