

CASE STUDY

Topic: Ready to eat healthy soup

Team №...13

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I. Executive Summary (150 words)

This case study presents the development of a ready-to-eat (RTE) halal healthy soup incorporating self-heating technology, designed to meet the growing consumer demand for convenient, nutritious, and inclusive meals. The product offers a balanced and protein-rich formulation with low salt content, integrating halal-certified lamb to address the needs of Muslim consumers—a currently underserved segment in the RTE market. Seasonal vegetables and food industry by-products are used to enhance sustainability, reduce waste, and support local agriculture.

The soup is packaged in self-heating cans that allow for consumption anytime, anywhere, making it suitable for outdoor activities, school lunches, or emergency situations. A sensory panel guided the formulation to optimize taste, texture, and aroma. The product stands out due to its eco-friendly technology, nutritional quality, and inclusiveness, offering a viable solution for health-conscious consumers seeking convenient meals. Financial projections indicate strong profitability and market potential, with scalability and positive environmental and social impact.

II. Introduction (300 words)

The development of a ready-to-eat (RTE) healthy soup incorporating self-heating technology responds to several emerging consumer and market demands. The current consumer is informed regarding health and increasingly demands products or preparations of higher nutritional quality that retain their sensory characteristics and, ideally, require a minimum processing or reconstitution time. Convenience foods such as ready-to-cook and ready-to-eat meals act as the optimal solution for these consumers; however, the major challenge is providing a completely balanced diet (Vargha et al., 2024). This product is designed to offer a balanced (low salt, high protein and nutritious) meal accessible anytime and anywhere, thanks to a self-heating mechanism based on a safe exothermic reaction.

A key distinguishing feature of this soup is the inclusion of halal-certified lamb, addressing the rising global demand for halal products. The halal food market is rapidly growing and was valued at over USD 1.5 trillion in 2023, with a projected annual growth rate of 15.4%. Despite strong demand, the market still

suffers from a lack of certified halal RTE products. Many consumers face limited options, especially when seeking convenient, trustworthy halal meals (Ellahi et al., 2025).

Furthermore, the soup promotes sustainability and circular economy principles by utilizing vegetable by-products from the food industry; ingredients that would otherwise be discarded. In addition, it incorporates seasonal vegetables, selected based on their availability throughout the year in local supply chains. This seasonal rotation not only supports regional agriculture but also aligns with sustainable sourcing practices.

III. Market Analysis: (300 words)

The primary target consumers for the healthy RTE soup are individuals in need of convenient, nutritious, and portable meals. These include students, schoolchildren, travelers, outdoor enthusiasts, and professionals working in remote or high-demand environments. The product is also ideal for emergency preparedness and military use due to its self-heating mechanism, which requires no external equipment or electricity.

This consumer segment values health, functionality, and sustainability. They seek quick yet wholesome food options that can be consumed on the go without compromising nutritional quality. In particular, Muslim consumers are increasingly demanding certified halal RTE meals, a market that remains significantly underserved. The inclusion of halal-certified lamb directly addresses this gap.

Purchasing behavior among these groups is influenced by nutritional content, packaging convenience, product trust (clean labeling and certifications), and environmental impact. The use of seasonal vegetables and vegetable by-products appeals to environmentally conscious buyers who support circular economy principles.

From a competitive perspective, the RTE market is saturated with processed soups and meals, yet very few offer the combination of high protein, low sodium, halal certification, and sustainable sourcing in a self-heating format. Products that do incorporate self-heating technology tend to be limited in nutritional value or rely on artificial ingredients.

Market trends show increased demand for functional, clean-label, and inclusive products. Consumers are moving toward personalized nutrition, seeking products tailored to dietary restrictions or cultural

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preferences. Healthier RTE meals with authentic taste and sustainable features are gaining popularity. This soup's positioning at the intersection of health, technology, sustainability, and inclusivity offers a significant competitive advantage. Its appeal to multiple niche markets—urban health-conscious buyers, halal consumers, and outdoor users—reinforces its market potential and versatility, enabling strong differentiation in a crowded convenience food sector.

IV. Research and Development: (500 words)

The final product will consist of a ready-to-eat healthy soup, made with natural ingredients, featuring higher protein content and reduced salt levels, compared to similar items on the market. It will be sold in individual sterilized cans equipped with self-heating technology, allowing consumers to heat it anywhere without the need for external equipment.

The soup will contain a plant-based broth made from vegetable by-products sourced from the food industry, promoting sustainability and waste reduction. The broth is going to include a base of ingredients, condiments and spices to ensure a pleasant and balanced flavor, as well as soy flour to enhance the protein content and texture. Starting from this base, four seasonal variations of the soup will be developed, each formulated with vegetables collected in each season of the year.

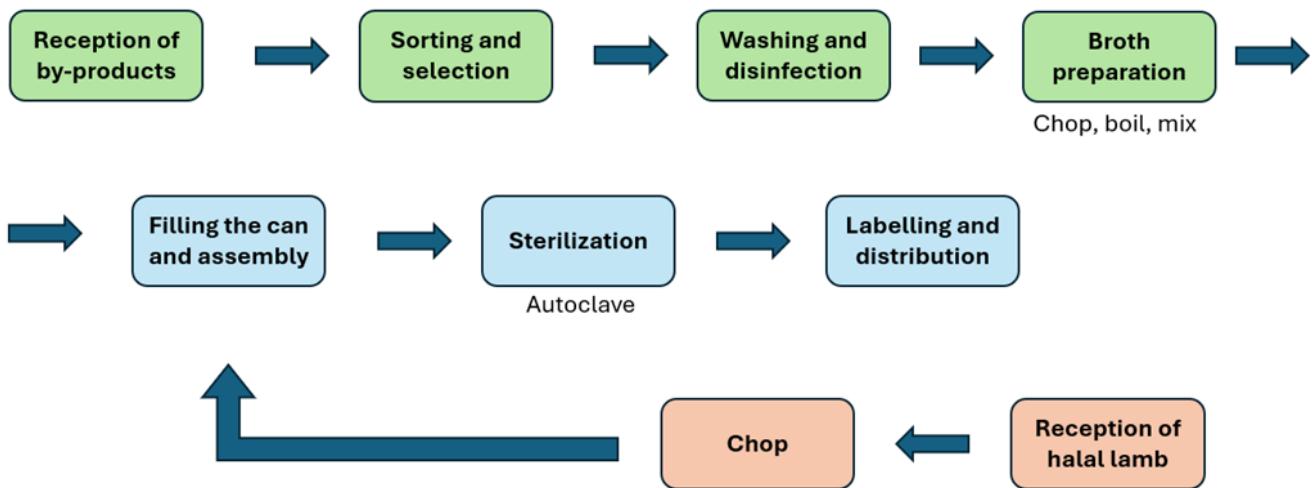
Additionally, each variety will include sliced halal lamb meat as a topping to provide extra protein and flavor. Moreover, this approach contributes to the expansion of ready-to-eat halal products offered in the market, where the availability of such options is currently insufficient. To evaluate the formulations of each soup, a sensory panel was conducted to assess the flavor, texture, and aroma in order to select the ones that best fit the desired criteria.

The final formulation and ingredients of each soup are detailed in **Table 1** below.

Table 1: Table detailing the formulation and ingredients of the product for each season of the year. The percentage refers to the weight relative to the total final product.

MAIN COMPONENT	INGREDIENTS	% (total product)
PLANT-BASED BROTH	BASE INGREDIENTS Onion, garlic, carrot (flavour and nutrients) Soy flour (high protein and improve texture) Water	40%
	SEASONAL INGREDIENTS	39%
	Winter soup Broccoli, spinach, leek	
	Spring soup Artichoke, green peas, asparagus	
	Summer soup Tomato, zucchini, pepper	
	Autumn soup Pumpkin, mushrooms, sweet potato	
	CONDIMENTS & SPICES Salt, black pepper, lovage root, turmeric, parsley, rosemary	1%
HALAL LAMB TOPPINGS	Sliced halal-certified lamb	20%

The production process will follow the stages shown in **Figure 1** below.



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Figure 1: Flowchart of the production process for the ready-to-eat healthy soup. The process followed by the vegetable by-products is highlighted in green, the halal lamb component is shown in orange, and the stages where both ingredients are combined are indicated in blue.

1. **Reception** of vegetable by-products and certified halal lamb meat, and store under appropriate conditions.
2. **Sorting and selection:** remove spoiled, damaged or by-products that do not meet quality standards.
3. **Washing and disinfection:** mild food-safe disinfectant (e.g., chlorinated water).
4. **Preparation of the broth:** chopping, boiling to extract all the flavors, and blending.
5. **Mixing** the broth inside the can along with small pieces of halal lamb. The cans will incorporate self-heating technology.
6. **Sterilization:** Once filled, the cans will be sterilized to ensure safety and fully cook the lamb pieces.
7. **Labeling and distribution.**

The self-heating technology works through an exothermic reaction between calcium oxide and water, which heats the contents up to approximately 42°C in 3 minutes. These two reactants are stored in separate compartments, completely isolated from the soup. When activated, the compartments are opened, allowing the reaction to take place and safely heat the meal.



Figure 2: Schematic representation of the final product concept. Allows to understand how the self-heating technology and the soup are placed in separate compartments. Figure adapted and reproduced from <https://www.the42degreescompany.com/pages/our-technology>

For each seasonal soup variety, several sensory evaluations were conducted at both the trained panel level and with regular consumers. These tests aimed to assess flavor, texture, aroma and overall consumer acceptance. The trained panels provided detailed feedback on sensory attributes such as aroma, mouthfeel, and balance of ingredients, while consumer panels focused on preference, satisfaction, and purchase intent.

V. Product Description: (500 words)

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The proposed product is a healthy, ready-to-eat soup that integrates self-heating technology and aligns with modern consumer expectations for nutrition, convenience, and sustainability. Designed to be consumed anywhere—without the need for external heating—it comes in individual sterilized cans equipped with a self-contained heating element. The heating system functions through an exothermic reaction between calcium oxide and water, which safely warms the soup to approximately 42°C in under three minutes, making it ideal for use in schools, travel, or outdoor environments.

The soup features a plant-based broth made from vegetable by-products—ingredients recovered from the food industry that would otherwise go to waste—making the product environmentally responsible and economically efficient. The broth is flavored with a carefully balanced mix of spices and herbs to ensure palatability and enhanced nutritional value. To increase protein content and improve texture, soy flour is added to the formulation.

A standout feature of the soup is the inclusion of halal-certified lamb meat, sliced and added to each variety to ensure sufficient protein content and meet the dietary requirements of Muslim consumers. This also positions the product in the halal RTE market, which is growing globally yet remains underdeveloped in terms of convenience foods.

To reflect seasonal availability and promote sustainable agriculture, the soup will be released in four seasonal varieties, each using vegetables harvested during the corresponding season in local supply chains. This ensures freshness, supports regional farmers, and reduces the product's carbon footprint.

Nutritional information includes:

- High protein content from lamb and soy flour.
- Reduced salt compared to conventional RTE soups.
- Low saturated fat, with no artificial preservatives or additives.
- Source of fiber, vitamins, and minerals from fresh vegetables.

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The unique selling proposition (USP) of the product lies in its combination of self-heating convenience, nutritional quality, halal certification, and environmental responsibility. While many soups on the market prioritize either convenience or nutrition, very few successfully integrate both—especially with added cultural and dietary inclusivity.

Existing self-heating meals are often targeted toward emergency or military use, with little attention to taste, health, or dietary restrictions. This soup addresses those limitations by offering a gourmet, nutritionally balanced, and culturally sensitive alternative that also supports circular economy principles.

The product's versatility makes it suitable for multiple consumer scenarios—from quick office lunches to outdoor expeditions—while also fitting into growing health, wellness, and sustainable food trends. Sensory tests conducted with trained panels and consumers confirm strong acceptance in flavor, aroma, and texture, reinforcing its appeal and readiness for market launch.

In summary, this healthy RTE soup is a forward-thinking, inclusive, and sustainable food product that responds directly to evolving consumer demands and stands out in a crowded convenience foods market.

VI. Marketing and Promotion: (300 words)

The healthy ready-to-eat soup is a modern food solution designed for people with active lifestyles who care about convenience, nutrition, and sustainability. One of the key sustainability benefits of this product is its long shelf life, which helps reduce food waste. Additionally, it uses innovative eco-friendly self-heating technology that requires no electricity or open flame, making it ideal for outdoor or emergency use. The soup is made with seasonal vegetables, which helps lower the product's overall carbon footprint, and the packaging is recyclable—further appealing to environmentally conscious consumers.

The target market includes outdoor enthusiasts who enjoy camping, hiking, and traveling, as well as students and workers who need quick and healthy meals during busy days. Another important use case is emergency preparedness, where this product can serve as a reliable food source during disasters. Military personnel and people working in remote areas can also benefit from this ready-to-eat meal, especially since it can be prepared without any cooking appliances.

From a competitive standpoint, this soup stands out through its advanced self-heating technology and its commitment to quality and inclusivity. For example, the availability of halal-certified meat options

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ensures that it can meet diverse dietary requirements. The product also uses fresh, natural ingredients that provide high nutritional value and are rich in protein—key components of a balanced and healthy diet.

In summary, the healthy ready-to-eat soup combines sustainability, convenience, and high nutritional standards in a single, innovative product. By targeting both everyday users and niche markets such as emergency responders and outdoor adventurers, it has strong potential to succeed in the growing health and wellness food sector.

VII. Financial Analysis: (300 words)

The development and manufacturing of the new healthy soup require both initial capital investment and ongoing operational costs. The initial development phase includes R&D for recipe formulation, nutritional testing, and consumer taste panels, with estimated costs of €15,000. Regulatory approvals and certifications (e.g., organic, clean label) may add another €10,000. Branding, packaging design, and marketing strategy development are expected to cost around €7,000.

The capital expenditure for small-scale production equipment, packaging machinery, and quality control tools is estimated at €50,000. These are one-time investments needed to ensure consistent quality and compliance with food safety regulations.

Recurring monthly production costs for raw ingredients (vegetables, legumes, spices), biodegradable packaging, utilities, and labor are projected at €1.80 per unit. For an expected monthly volume of 10,000 units, this translates to €18,000 in direct production costs.

Market research indicates a strong and growing demand for nutritious, ready-to-eat products among urban, health-conscious consumers. Based on an estimated sales volume of 8,000 units per month in the first year, and a retail price of €4.50 per unit, projected monthly revenue is €36,000, or €432,000 annually.

Subtracting the annual production costs ($€1.80 \times 96,000 \text{ units} = €172,800$) and fixed costs (€90,000, including salaries, rent, logistics, and marketing), the first-year net profit is projected at €169,200.

The Return on Investment (ROI), calculated as net profit relative to total investment (€90,000 initial + fixed costs), is approximately 188%, which demonstrates excellent financial viability. As brand recognition

grows and economies of scale are achieved, profit margins are expected to improve further, making the healthy soup line a scalable and sustainable business opportunity.

VIII. Challenges and Risks: (200 words)

While healthy ready-to-eat soup offers numerous benefits, launching and maintaining such a product in the market comes with its own set of challenges and risks. One of the most critical factors is gaining consumer trust. In a highly competitive market where many brands claim to offer “natural” or “healthy” foods, promises alone are no longer enough. Consumers demand transparency and verified quality. Without this, even the most well-designed product may fail.

Clear labeling, third-party certifications, and expert endorsements are essential tools to make consumers feel confident in choosing the product. These elements reinforce the brand's credibility and help it stand out in a crowded marketplace.

Another significant challenge lies in the supply chain. The consistent availability of high-quality ingredients—especially fresh or seasonal vegetables—is crucial. Disruptions in the supply chain can lead to production delays or increased costs, making the product less competitive. For a ready-to-eat soup marketed as healthy and natural, this is especially risky, as the freshness and nutritional quality are among its key selling points.

Moreover, even if the product meets all health standards, poor supply chain management or lack of transparency can damage brand reputation and consumer confidence. In today's digital era, negative feedback spreads quickly, and recovering consumer trust can be very difficult.

In summary, for a healthy ready-to-eat soup to succeed long-term, the brand must go beyond product quality. It needs to ensure robust supply chain systems, maintain transparency in all communication, and invest in building consumer trust through verifiable quality standards. Without these pillars, even the healthiest products are at risk of failure in a demanding and skeptical market.

IX. Conclusion (300 words)

The development of the healthy ready-to-eat soup with self-heating technology represents an innovative response to current consumer trends focused on nutrition, sustainability, and convenience. This

product combines natural ingredients, high protein content, and reduced salt levels to offer a nutritionally balanced meal that is easily accessible anywhere—whether at school, during travel, or in emergency situations.

A key differentiator is the inclusion of halal-certified lamb, directly addressing the growing global demand for halal ready-to-eat options—a rapidly expanding market that remains underserved. Additionally, by using vegetable by-products from the food industry and seasonal, locally sourced vegetables, the product demonstrates a strong commitment to sustainability and circular economy principles. These choices not only reduce food waste but also support local agriculture and lower the carbon footprint.

Market analysis identifies a diverse and promising target audience, including health-conscious urban consumers, students, outdoor enthusiasts, and professionals working in remote or demanding environments. This diversity increases the product's market penetration potential and supports consistent demand throughout the year.

From a financial standpoint, the soup shows strong viability, with an initial investment offset by promising revenue projections. Estimated annual revenue exceeds €430,000, with a projected return on investment (ROI) of 188% in the first year alone. These figures reflect both the solid market demand and the efficient cost structure, suggesting the product has the potential for scalability and long-term profitability.

In conclusion, the healthy self-heating soup is a high-value, forward-thinking food product aligned with modern consumer expectations. Through its combination of technological innovation, sustainability, and inclusivity, it is well-positioned for success in an increasingly competitive and health-oriented market. Its adaptability to different consumer needs and scenarios further reinforces its potential as a scalable and sustainable business opportunity.

XI. Internationalization Strategy

The ready-to-eat (RTE) halal healthy soup can be effectively scaled for international markets by leveraging global trends toward convenience, health, and inclusivity. The product's self-heating feature and halal certification position it strongly in regions with significant Muslim populations, such as Southeast Asia, the Middle East, and parts of Africa, while its nutritional balance and eco-friendly packaging appeal to Western markets focused on sustainability and wellness.

Adaptation to international markets will require alignment with local regulations on food safety, labeling, and import requirements. Specific certification schemes—such as JAKIM in Malaysia, MUIS in Singapore, or the Halal Food Authority in the UK—will be pursued to ensure compliance and consumer trust. Packaging and labeling will include multilingual information, clear halal and nutritional claims, and sustainability icons recognizable across markets.

Cultural and religious sensitivity will be maintained through responsible ingredient sourcing and transparent communication. Marketing strategies will be adapted to regional preferences, emphasizing health and convenience in Western countries and halal integrity and quality assurance in Muslim-majority regions. This dual strategy ensures both cultural relevance and global scalability, establishing the product as an inclusive, innovative, and trustworthy RTE meal option worldwide.

XII. Sustainability Impact

Sustainability is embedded throughout the product's lifecycle—from ingredient sourcing to packaging and distribution. The soup uses seasonal vegetables and upcycled by-products from the food industry, reducing agricultural waste and supporting circular economy principles. By relying on local suppliers and seasonal sourcing, transportation distances and associated carbon emissions are minimized.

The packaging is designed to be recyclable and incorporates an eco-friendly self-heating system based on calcium oxide and water, which eliminates the need for external heating devices and electricity, further lowering energy consumption. Lifecycle analysis estimates that the product's carbon footprint is significantly lower than that of conventional RTE soups that rely on external heating or cold chain logistics.

To further mitigate environmental impact, the production process prioritizes water efficiency through controlled washing and reuse systems, while waste from vegetable processing is redirected toward animal feed or composting. Future sustainability strategies include transitioning to fully biodegradable or compostable packaging and exploring carbon-offset programs within local supply chains.

The use of plant-based broth and locally sourced halal lamb ensures resource efficiency while maintaining high nutritional value. Together, these choices demonstrate a comprehensive approach to sustainability, balancing environmental protection, social responsibility, and economic viability. The result is a nutritious, low-impact product that aligns with global sustainability goals and consumer expectations for responsible food innovation.

XIII. Digital and Technological Integration

Digital technologies play a crucial role in both the development and commercialization of the RTE healthy soup. Artificial intelligence (AI) and data analytics can be employed to predict consumer preferences, optimize formulations, and forecast ingredient demand based on seasonality. These tools support efficient resource planning and reduce waste during production.

On the consumer side, the product will incorporate smart labeling through QR codes, providing instant access to information about nutritional composition, ingredient origin, halal certification, and sustainability efforts. This transparency strengthens consumer trust and engagement, especially among digitally active, health-conscious buyers.

Digital marketing channels such as social media, influencer partnerships, and targeted ads will be key to communicating the product's benefits. E-commerce platforms and delivery apps will expand accessibility, particularly in markets with high online food purchasing trends.

The integration of digital traceability systems will also enhance supply chain transparency, allowing stakeholders to verify the halal integrity and environmental impact of each batch. In summary, digital tools not only improve operational efficiency but also create a transparent, interactive consumer experience that reinforces the brand's innovative and ethical positioning.

XIV. Consumer Communication Plan

The communication strategy focuses on clarity, transparency, and engagement. Visual materials—such as eco-inspired packaging, natural color palettes, and clean graphic design—will reflect the product's health and sustainability values. The halal logo and nutritional claims (high protein, low salt, rich in fiber) will be prominently displayed to enhance trust and visibility.

Messaging will highlight three key benefits:

1. Health and nutrition – emphasizing balanced composition and natural ingredients.
2. Sustainability – showcasing the use of upcycled and seasonal ingredients, recyclable packaging, and reduced waste.
3. Inclusivity and convenience – underlining halal certification and the self-heating system that makes it accessible anywhere.

Storytelling will play a central role, using digital media to share behind-the-scenes insights about local

sourcing, responsible production, and community impact. Social media campaigns and collaborations with nutritionists, sustainability advocates, and halal food influencers will help reach both mainstream and niche audiences.

Consumer engagement tools such as QR codes will link to short videos, recipes, and interactive sustainability dashboards, promoting transparency and education. This communication approach ensures consistency across digital and physical touchpoints, building emotional connection and loyalty while reinforcing the product's image as a healthy, ethical, and forward-thinking meal solution.

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