Design Thinking Model on Sativa Toothpaste Product Innovation

Lusi Zafriana[1], Rahaju Saraswati[2], Ernie Maduratna Setiawatie[3], Nyoman Puspa Asri[4], Arman Hakim Nasution[5]

Ciputra University of Surabaya[1,2,4]

Airlangga University[3]

Sepuluh Nopember Institute of Technology[5]

DOI: https://dx.doi.org/10.47772/IJRISS.2023.7011005

Received: 15 July 2023; Accepted: 14 August 2023; Published: 27 November 2023

ABSTRACT

The purpose of this research is to develop a Design Thinking model for product innovation in the Sativa toothpaste, featuring a premium 3% *Nigella Sativa* extract. *Nigella Sativa* extract significantly assists in maintaining oral hygiene and health due to its antimicrobial, antioxidant, and anti-inflammatory properties. The Design Thinking model is a systematic approach aimed at understanding user needs, problem identification, and delivering innovative solutions. The Design Thinking in this study follows five stages: empathize, define, ideate, prototype, and test. In this study, data was collected from 80 users of Sativa toothpaste products through interviews and documentation techniques. Participants were selected based on their use of the product for more than 6 months. The interview questions were validated through preliminary testing and expert review. From the Design Thinking analysis, it is evident that the safety and halal status of toothpaste are primary concerns for users. This underscores the importance of transparency and education about product composition in today's market.

Keywords – Design Thinking, Sativa Toothpaste, Nigella Sativa.

INTRODUCTION

Background

Toothpaste is a crucial product in the maintenance of dental hygiene and health. The availability of various brands and types on the market provides numerous opportunities for innovation in creating more effective toothpaste that delivers health benefits. Continuous innovation is necessary for the development of toothpaste products to meet the increasingly complex needs of customers. One innovative solution that offers effectiveness and satisfaction to customers is the incorporation of *Nigella Sativa* as an antimicrobial agent in Sativa toothpaste. The inclusion of a 3% *Nigella Sativa* extract in Sativa toothpaste improves periodontal tissue based on inflammation and the periodontal extracellular matrix [1]. *Nigella Sativa* has anti-inflammatory, antioxidant, and antimicrobial effects [2]. It also offers various health benefits, including anti-inflammatory, antioxidant, antimicrobial, and anticancer properties [3]. In several health studies, the presence of *Nigella Sativa* in toothpaste has been shown to prevent oral health issues such as gingivitis, caries, and plaque. The Design Thinking model, as a creative framework, focuses on deeply understanding toothpaste users, identifying emerging problems, and finding innovative solutions through a human-centered process. This approach places the user at the heart of a systematic and creative innovation process. In this study, the Design Thinking framework model uses five stages [4]. The first stage, the empathize phase, involves collecting information about the needs and desires of users of the 3% *Nigella Sativa* extract toothpaste and understanding the impact of the 3% *Nigella Sativa* extract on dental and gum health and

hygiene. The second phase, the define phase, describes the challenges and obstacles experienced in the use of Sativa toothpaste made from a 3% *Nigella Sativa* extract. Next is the ideate phase, which involves seeking creative ideas to address the existing challenges and obstacles. The ideas are evaluated based on effectiveness, safety, ease of use and accessibility, and the needs and desires of Sativa toothpaste users. The subsequent phase, the prototyping phase, involves creating a prototype to test and further develop the design concept. This research uses a qualitative method through primary and secondary data analysis. Primary data are obtained through interviews with Sativa toothpaste users, while secondary data are derived from literature reviews and other information sources. Design Thinking promotes collaboration and creativity in problem-solving, challenges, and provides innovative and effective solutions [5]. Therefore, this study is expected to contribute to the design and development of Sativa toothpaste product innovations and contribute to a deeper understanding of user needs and desires. It also aims to deliver optimal dental and gum health benefits in line with the expectations of stakeholders and shareholders.

Problem Statement

How is the application of the design thinking model to the innovation of Sativa toothpaste products containing *Nigella Sativa* extract?

Research Objectives

1. To carry out project thinking on the development of Sativa toothpaste containing *Nigella Sativa* extract according to customer expectations .
2. To find out the extent to which acceptance and satisfaction of Sativa toothpaste users can be achieved.

Research Benefits

1. Academically, this research broadens the horizons on the application of design thinking models in product development.
2. For the industrial world, the results of this research help in the design and development of herbal toothpaste products that are more effective for healthy teeth and gums.
3. For the community, this study provides an alternative choice of herbal toothpaste labeled halal that is safer, healthier and more sustainable.

LITERATURE REVIEW

Nigella Sativa

Nigella sativa, a part of the Ranunculaceae family originating from Southwest Asia, is a flowering plant species [6]. *Nigella Sativa* has been used in various traditional medicinal systems around the world, including Arabian, Chinese, Ayurvedic medicine, and others [7]. The seeds of *Nigella Sativa* have anticancer, antileukemic, and antimicrobial effects [8]. In addition to being antimicrobial, anti-inflammatory, analgesic, antipyretic, and anticancer, modern research has validated that *Nigella Sativa* oil provides protection against viral infections in rats [9]. *Nigella Sativa* is rich in bioactive components, exhibits excellent bio functionality, and can be utilized for protection against fungi [10]. *Nigella Sativa* seeds contain amino acids, proteins, carbohydrates, essential oils, fatty oils, saponins, alkaloids, and minerals such as calcium, iron, sodium, and potassium. Inhibition tests and Thin Layer Chromatography-Bioautography have shown that *Nigella Sativa* seeds can inhibit the growth of *Streptococcus mutans* [11]. The results of antimicrobial activity tests on toothpaste with an ethanol extract of *Nigella Sativa* seeds showed that toothpaste formulas containing *Nigella Sativa* extract exhibit the best antibacterial activity against *Streptococcus mutans* [12]. *Nigella Sativa* extract is effective against Streptococcus mutans, which disrupts oral health [13].

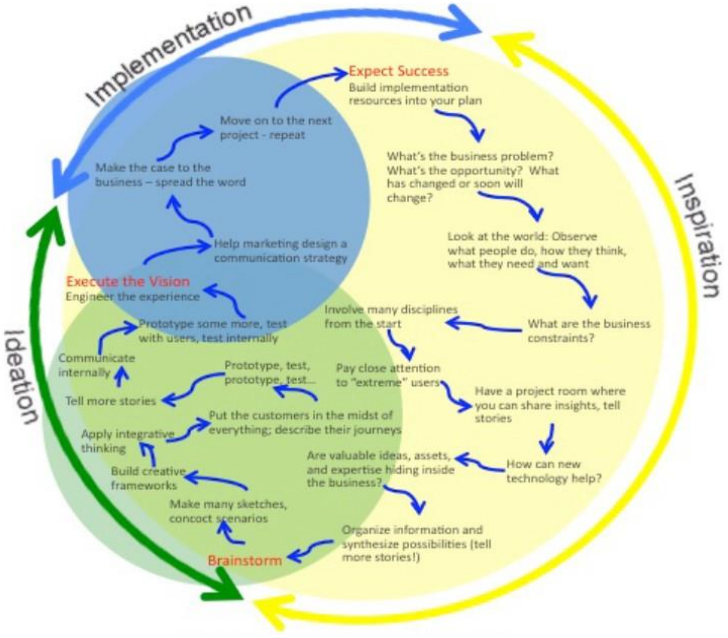
Toothpaste

Toothpaste is a material for cleaning the surface of teeth that can be reached using a toothbrush [14]. Teeth paste is a product in the form of a paste or gel designed to clean and maintain healthy teeth and gums. Toothpaste is able to work to clean teeth effectively by using a tool in the form of a toothbrush. The main components of toothpaste are cleaners and scrubbers, moisturizing agents, and sweetening agents [15]. Toothpaste serves to clean the surface of the teeth, gloss the surface of the teeth, reduce dental caries, improve gum health, provide oral health sensations and control bad breath. As a cleanser and scrubbing aims to remove plaque and food debris from teeth, it contains moisturizers to help maintain the consistency of the product, while sweeteners to provide a pleasant taste. Teeth contain chemical compounds, including calcium carbonate (CaCO3) which functions as a powder-shaped abrasive to remove stains and plaque and add viscosity to toothpaste The trend of using teeth [16]. has developed not only as a cosmetic tool, but is expected to have a treatment impact on diseases of the mouth, gums and teeth. Common anti-germ ingredients used for plaque control include phenol, hexetidine, fluorine and chlorhexidine [17].

Design Thinking

Design thinking is a collaborative and practical solution-seeking process. [18]. posited that design thinking is a human-centered and collaborative approach to problem-solving that is creative, iterative, and practical. Focusing more on the process, design thinking pertains more to the verb aspect, i.e., the process of designing [19]. Design, in essence, is about specificity [20]. From the specific possibilities in a concrete situation, a designer must formulate a design that leads to a specific product. Design thinking is used as an approach to create an experience related to emotional impact, aesthetics, and interactions oriented towards social value [21]. While there are several versions of stages in the design thinking process, the core principle remains the same – it provides an insight into how to create innovative designs based on specific human needs and solutions that can be generally applied [22]. The design thinking method consists of seven frameworks for systematic product design: exploration, identification, ideation, visualization, prototyping, evaluation, and persuasion [23]. The design thinking process is divided into four thinking framework phases: phase 1 understanding, phase 2 define, phase 3 ideate, phase 4 prototype, and test [24]. The design thinking approach involves human-oriented interaction, with processes of empathy, integrative thinking, and optimism intrinsic to it as values that come from the heart, and deep relationships are depicted as the three crucial pillars of inspiration, ideation, and implementation [25].

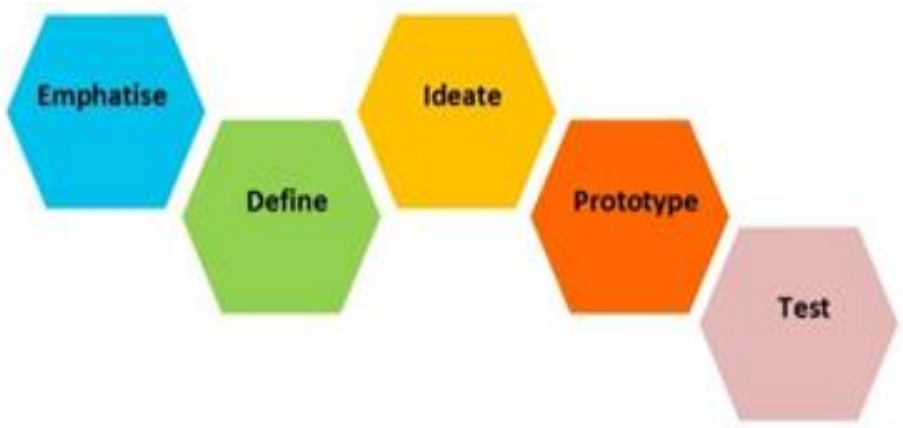
Figure 1. Three pillars are the basis of design thinking from Tim Brown.



Source : Change by Design [18]

The aforementioned three pillars are delineated into five interrelated stages that occur both linearly and laterally. The linear process unfolds systematically across all stages. A repetitive lateral process happens from the ideation to evaluation stages. Iteration is conducted to make improvements, identify shortcomings, and refine the subsequent stages. The outline of the five stages in the design thinking process is as follows:

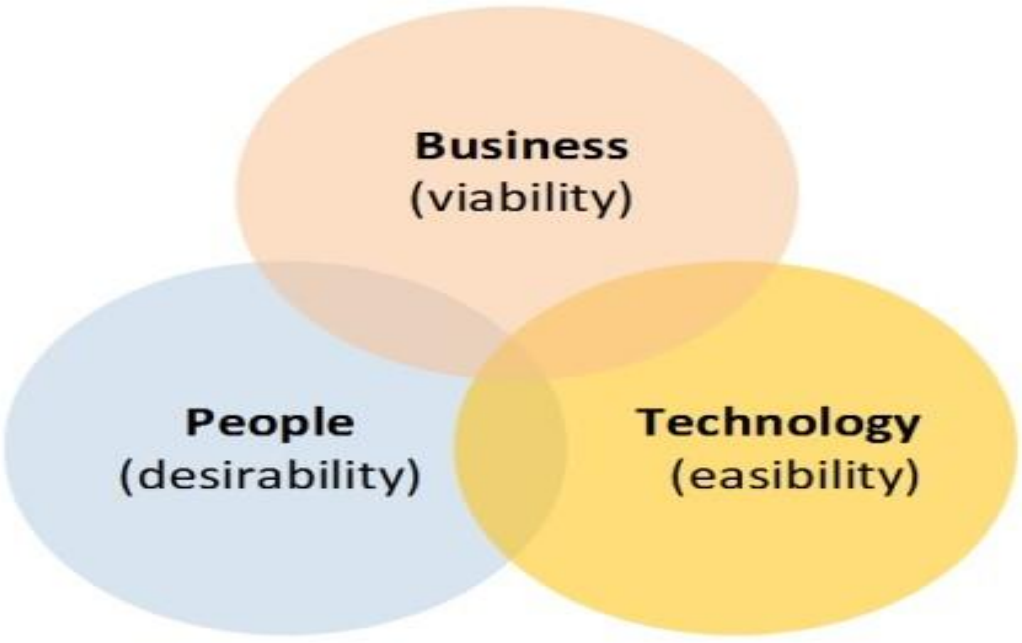
Figure 2. The process of elaborating the stages of design thinking



Source: Stanford University Design Thinking Process [26]

Design thinking is a tool for solving human-centered problems, emphasizing empathy, collaboration, and input from stakeholders to create creative and innovative solutions [26]. Design thinking encompasses three elements: business (business viability), people (public desire for something), and technology support.

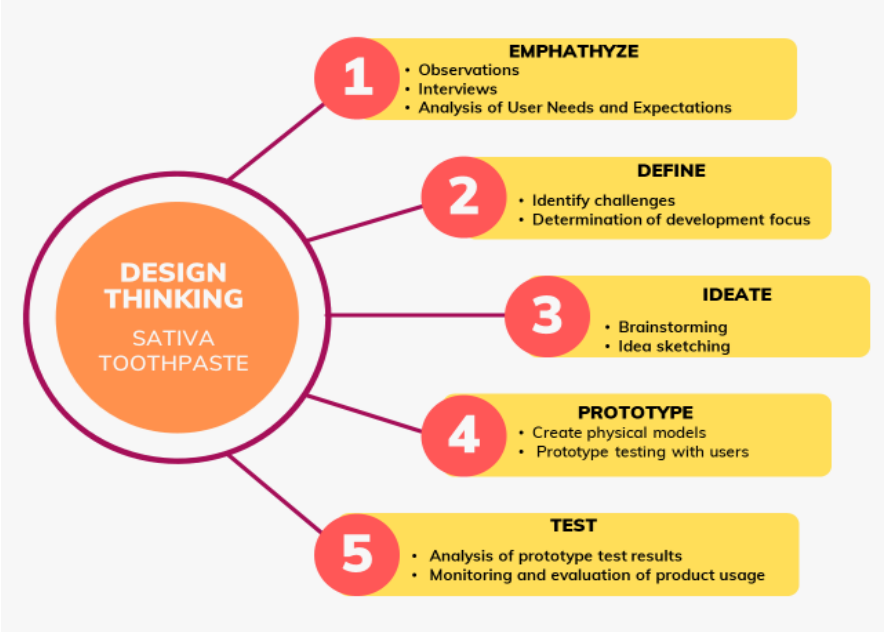
Figure 3. Elements in design thinking



Source: Journal of Art and Design Dimensions [25]

RESEARCH METHODS

Figure 4. Use of Design Thinking Sativa Toothpaste



Source: [27]

This study employs a descriptive analysis using a qualitative approach to explain the ongoing phenomenon. To conduct this analysis, data is gathered from relevant sources such as books, journals, websites, and others. Each source is meticulously analyzed to extract information pertinent to the phenomenon under investigation. Qualitative analysis techniques, including coding, categorization, and interpretation, are utilized to understand the context and essence of the collected data. The results of this analysis are then aligned with the design thinking framework, which consists of five stages: empathize, define, ideate, prototype, and test.

Empathize

- Data Collection: interviews are conducted with Sativa toothpaste users to understand their needs, desires, and experiences using the product. These interviews also aim to gain a deep understanding of the benefits of *Nigella Sativa* in toothpaste as a form of care for dental and gum hygiene and health..
- Observation: Direct observations are made of Sativa toothpaste users when using the product containing Nigella sativa, aiming to delve deeper into their experiences and feedback.

Define

- Data Analysis: Data from interviews and observations with Sativa toothpaste users were systematically analyzed using a thematic analysis approach. Initially, all interview transcripts and observation notes were thoroughly reviewed to gain a comprehensive understanding. Subsequently, the data were coded, and these codes were grouped into major themes highlighting the challenges and obstacles faced when using Sativa toothpaste enriched with Nigella Sativa. Utilizing the qualitative software NVivo, these themes were further refined and cross-verified with observation data. Insights derived from these challenges and obstacles were then articulated clearly and specifically, serving as a foundation for innovation in the development of Sativa toothpaste products.

Ideate

- Brainstorming: A brainstorming stage is conducted, involving a team of experts in their fields to generate creative ideas in overcoming the challenges and obstacles faced by Sativa toothpaste users that have been successfully identified. These creative and constructive ideas are developed using various innovative approaches.

Prototype

- Initial Prototype Creation: Based on the creative and innovative ideas from the expert team, an initial prototype of the Sativa toothpaste product is created. The prototype of the Sativa toothpaste product, comprising a physical model and its simulation, reflects the proposed innovative design concept. This prototype of the Sativa toothpaste product, which contains the natural ingredient Nigella Sativa, is used to test and collect feedback from Sativa toothpaste product users regarding effectiveness, comfort, and user desires for the innovation outcome.

Test

- User Testing: The Sativa toothpaste prototype is tested by users to obtain direct feedback about their experience, satisfaction, and potential shortcomings.
- Evaluation and Analysis: User feedback is evaluated and analyzed to identify the strengths and weaknesses of the proposed innovative solution. The evaluation results are subsequently used to develop and improve the existing prototype.

The Design Thinking approach serves as a framework in this research to guide the research steps towards the development of an improved Sativa toothpaste innovation containing 3% *Nigella Sativa* extract. This method assists the researchers in comprehensively understanding the needs, desires, and expectations of the users, and it involves the users of the Sativa toothpaste product.

RESULT AND DISCUSSION

Sativa Toothpaste is a toothpaste containing 3% *Nigella Sativa* extract, without detergent, that is capable of preventing cavity-causing caries, exhibiting antimicrobial and anti-inflammatory properties, and containing antioxidants. It also reduces the incidence of mouth ulcers, bleeding gums, and provides a long-lasting freshness effect. It has also been certified as halal. Sativa Toothpaste can be used twice daily on a regular basis as a regular toothpaste.

Figure 5. Sativa Toothpaste Products

Source: [**28**]

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VII Issue XI November 2023

Empathize

In the initial stage, the researcher describes the method of interaction with the users of Sativa toothpaste to understand their needs.

- Through interviews with Sativa toothpaste users, it was found that users have a desire to use natural herbal dental care products.
- Sativa toothpaste users require a toothpaste that is effective in cleaning teeth, reducing stains, killing germs, providing a fresh sensation in the mouth, being antimicrobial, antioxidant, anti-inflammatory, supportive of overall health, and ensuring safety and halal compliance.
- Data from observations on the use of toothpaste made from *Nigella Sativa* shows that some users experience anxiety about the availability of products and variants according to their needs, desires, and expectations.

Define

In the second stage, the researcher describes how to determine problems with a focus on specific users based on user needs.

- The challenges identified in using *Nigella Sativa* toothpaste are the lack of adequate information about the benefits of *Nigella Sativa* for dental, gum, and overall body health..
- The challenge lies in the demand for variations in color, flavor, texture, design, packaging size, safety, and halal compliance according to the needs, desires, and expectations of the users.
- The challenge of high price perception and limited accessibility of Sativa toothpaste in the market.

Ideation

The third stage, namely ideation:

- In the brainstorming session, researchers generated various creative and innovative ideas to overcome the challenges that have been successfully identified.
- Several ideas generated include the development of educational marketing campaigns to enhance public understanding of the health benefits of *Nigella Sativa* extract, and the availability of product variants that are safe and halal in line with user preferences and expectations.

Prototype

The fourth stage is the prototype.

- The initial prototype development of Sativa toothpaste was created based on the ideas generated in the ideation stage.
- This prototype encompasses the innovation of a Sativa toothpaste formulation that is safe and halal, with variations in color, flavor, texture, design, and packaging size to provide optimal health benefits and practicality.

Test

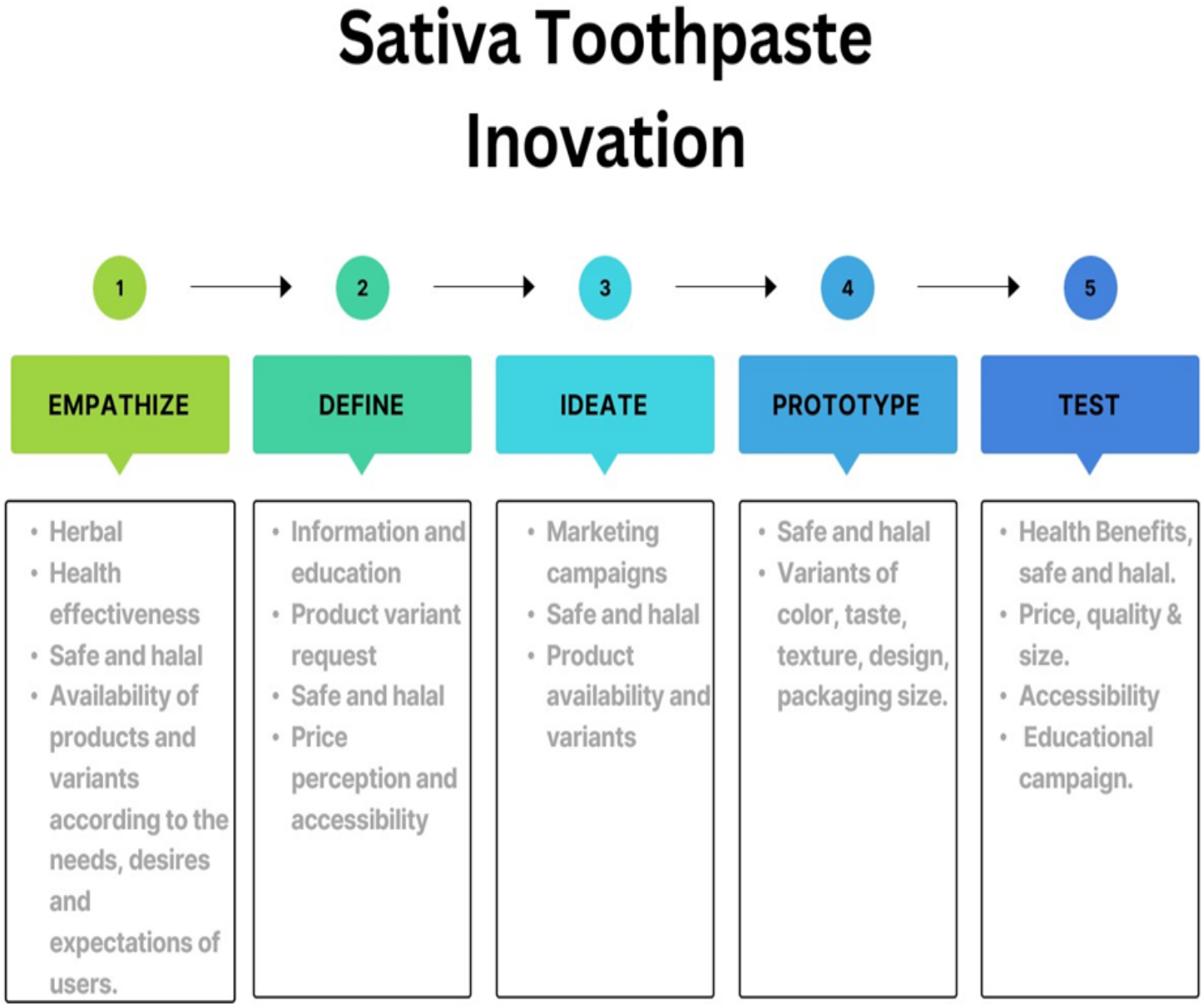
The final stage is the test, as an evaluation of opportunities to improve the existing solution and make it even better.

- The prototype testing was conducted involving Sativa toothpaste product users.

- Feedback received from users indicated that Sativa toothpaste with an innovative formulation gave satisfying results in cleaning and maintaining dental and gum health for all ages..
- Sativa toothpaste with an innovative formulation provides practicality and comfort when brought for traveling..
- Users of Sativa toothpaste feel safer with the availability of Sativa toothpaste on the market..
- Sativa toothpaste users feel safer, more comfortable, halal, and confident after gaining a better understanding of health benefits through educational marketing campaigns.

Below is a diagram of the conclusion from the discussion of the five stages of design thinking on Sativa toothpaste.

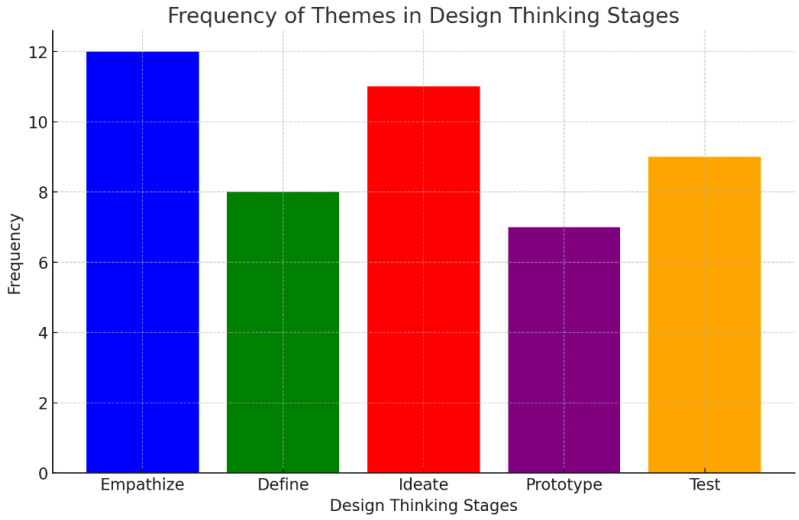
Figure 6. Results of Design Thinking Analysis Sativa Toothpaste Innovation



Source: [27]

The frequency of themes arising from interviews with Sativa toothpaste users in the context of the Design Thinking stages.

Table 1. The frequency of themes arising from interviews with Sativa toothpaste users in the context of the Design Thinking stages.

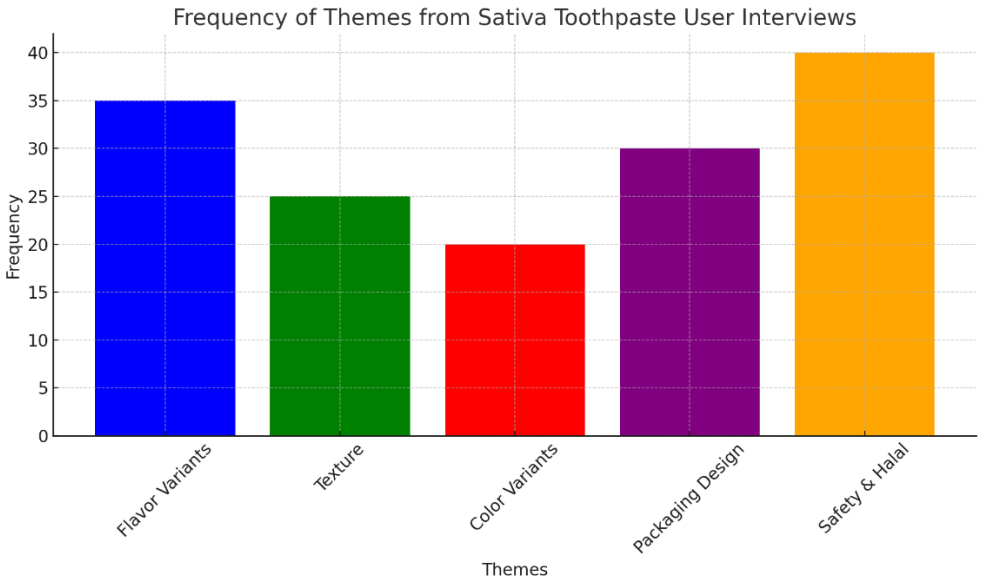


Source: [27]

From the chart above, you can observe the frequency of themes emerging from interviews with Sativa toothpaste users, grouped according to the Design Thinking stages. For instance, the "Empathize" stage has the highest frequency of themes, indicating numerous insights gathered from users during this phase.

The frequency of themes that emerged from interviews with Sativa toothpaste users.

Table 2. The frequency of themes that emerged from interviews with Sativa toothpaste users.



Source: [27]

The graph shows the frequency of themes emerging from interviews with Sativa toothpaste users. As illustrated, the theme "Safety & Halal" was mentioned most often, indicating the importance of the theme among the participants

CONCLUSION

Using the design thinking framework model through five stages, namely empathize, define, ideate, prototype, and test, the process of designing and developing Sativa toothpaste products is able to explore potential and innovation more deeply, structured, and clearly detailed. This research provides insights into how the design thinking approach can be used to create Sativa toothpaste products to be more effective and beneficial for optimal dental and gum health. In the empathize phase, researchers collect as much information as possible about the needs, desires, and expectations of Sativa toothpaste users, as well as a deep understanding of the health impacts of using Nigella Sativa. This forms a strong foundation for problem identification and the need for solutions by developing innovative Sativa toothpaste that contains 3% *Nigella Sativa* extract. The definition phase helps researchers depict the challenges and obstacles to using Sativa toothpaste. By identifying existing problems, researchers can formulate the objectives of the design and development of *Nigella Sativa* extract-based toothpaste products. The ideation phase is a milestone in generating creative ideas to overcome perceived challenges. Researchers evaluate creative ideas by considering the criteria for effectiveness, safety, comfort, and affordability, and ensuring the fulfillment of the needs and desires of Sativa toothpaste users. In the prototyping phase, researchers create an initial prototype to be tested by users. Finally, in the testing phase, the collection of user feedback plays a very important role in further development, improvement, and refinement of the prototype before the Sativa toothpaste product innovation is made. This research provides a significant contribution to the development of innovative toothpaste for dental and gum health problems using a design thinking approach. Through a deep understanding of users' needs and desires, researchers successfully developed a Sativa toothpaste product that is more effective, comfortable, safe, halal, and meets user expectations. This research is expected to provide valuable insights for people who care about the condition of clean and healthy teeth and gums will have an impact on the health of other body organs, as well as opportunities for the development of innovative and responsive Sativa toothpaste.

REFERENCES

1. Setiawatie, E. M., Gani, M. A., Rahayu, R. P., Ulfah, N., Kurnia, S., Augustina, E. F., & Sari, D. S. (2022). Nigella sativa toothpaste promotes anti-inflammatory and anti-destructive effects in a rat model of periodontitis. Archives of Oral Biolog
2. Salem, M. L. (2005). Immunomodulatory and therapeutic properties of the Nigella sativa L. seed. International immunopharmacology.
3. Amin, B., & Hosseinzadeh, H. (2015). Black cumin (Nigella sativa) and its active constituent, thymoquinone: an overview on the analgesic and anti-inflammatory effects. Planta medica.
4. Brenner, W., Uebernickel, F., & Abrell, T. (2016). Design thinking as mindset, process, and toolbox: Experiences from research and teaching at the University of St. Gallen. Design thinking for innovation: Research and practice.
5. Kolko, J. (2015). Design thinking comes of age.
6. Irawati, D. (2016). Pengaruh Ekstrak Ethanol Jinten Hitam (Nigella Sativa) Terhadap Kadar Vegf Serum Dan Ekspresi Enos Ginjal Pada Mencit Model Preeklampsia (Doctoral dissertation, Universitas Brawijaya).
7. Ahmad, A., Husain, A., Mujeeb, M., Khan, S. A., Najmi, A. K., Siddique, N. A., … & Anwar, F. (2013). A review on therapeutic potential of Nigella sativa: A miracle herb. Asian Pacific journal of tropical biomedicine.
8. Abel-Salam, B. K. (2012). Immunomodulatory effects of black seeds and garlic on alloxan-induced diabetes in albino rat. Allergologia et immuno pathologia.
9. Salem, M. L., & Hossain, M. S. (2000). Protective effect of black seed oil from Nigella sativa against murine cytomegalovirus infection. International journal of immunopharmacology.

10. Neel, S., Mandal, A., Dutta, A., Saha, S., Das, A., Chawla, G., & Kundu, A. (2023). Response surface methodology guided process optimizations, modeling and bio functional analysis of phytochemicals from Nigella sativa seeds as a potential antifungal agent. Industrial Crops and Products.
11. Triani, A. O. (2013). Pengembangan Formulasi Pasta Gigi Ekstrak Etanol Biji Jintan Hitam (Nigella sativa L.) dengan Penambahan Bubuk Siwak (Salvador persica L.). Jurnal Bionature.
12. Farlina Ina. (2006). Uji Aktifitas Antibakteri Beberapa Formula Pasta Gigi Ekstrak Etanol Jinatan Hitam (Nigella Sativa L.) Terhadap Streptococcus mutans. Makassar.
13. A. A. Laskar, M. A. Khan, A. H. Rahmani, S. Fatima, dan H. Younus. (2016). Thymoquinone, an active constituent of Nigella Sativa seeds, binds with bilirubin and protects mice from hyperbilirubinemia and cyclophosphamide-induced hepatotoxicity. Biochimie.
14. M. S. , & S. E. (Eds.). Balsam, 'Balsam, M. S., & Sagarin, E. (Eds.). (1972). Cosmetics science and technology (Vol. 1). John Wiley & Sons.
15. Nuraisya, O. (2023). BAB 3 PELAYANAN ASUHAN KESEHATAN GIGI DAN MULUT TAHAP EVALUASI DAN DOKUMENTASI. Pelayanan Asuhan Kesehatan Gigi Dan Mulut Individu.
16. Syurgana, M. U., Febrina, L., & Ramadhan, A. M. (2017). Formulasi pasta gigi dari limbah cangkang telur bebek. In Proceeding of Mulawarman Pharmaceuticals Conferences.
17. Pratiwi, R. (2005). The difference of inhibition zones toward Streptococcus mutans among several herbal toothpaste. Dental Journal.
18. Brown, T. (2008). Design thinking. Harvard business review.
19. J., & M. H. Liedtka. (2008). Time for design.
20. R., & P. P. S. Hartson. (2012).The UX Book: Process and guidelines for ensuring a quality user experience. Elsevier.
21. Fauzi et.all. (2019). Organum: Jurnal Saintifik Manajemen dan Akuntansi.
22. G., & H. P. Ambrose. (2010). Design Thinking: Fragestellung, Recherche, Ideenfindung, Prototyping, Auswahl, Ausführung. Feedback. Publisher: Stiebner.
23. B. R. Ingle. (2013). Design thinking for entrepreneurs and small businesses: Putting the power of design to work. Berkeley.
24. T. , & W. J. Brown. (2010). "Design thinking for social innovation. Development Outreach.
25. Ardian, N. F., & Werdhaningsih, H. (2018). Penggunaan design thinking dalam pengembangan produk kerajinan ikm (Studi kasus: Sentra kerajinan patung kayu, Subang). Jurnal Dimensi Seni Rupa Dan Desain.
26. Plattner, Hasso. (2019) An Introduction to Design Thinking Process Guide. Published: Institute of Design at Stanford.
27. Author (2023).
28. UNAIR.(2023). https://isef.co.id/product-fashion-detail-en/?toko=produk-inovasi-unair.