

# The Prototype Product of the Community Enterprise in the Category of Cosmetics Made from Herbal Plants: Facial Color Decoration

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## Abstract

This study presents the development of prototype facial cosmetics derived from herbal plants through a research methodology that aligns with the potential and capabilities of herbal-based cosmetic production. The research utilized Thai herbs, such as turmeric, butterfly pea, and roselle, which are known for their natural pigmentation and abundant availability. A cold extraction and freeze-drying process was employed to preserve the natural properties and stability of these pigments. The prototypes, including liquid lipsticks, cheek tints, and eyeshadows, meet safety and quality standards, demonstrating the feasibility of producing chemical-free cosmetics. The research findings emphasize the economic and environmental benefits of using herbal resources, addressing consumer demand for natural and sustainable products. Training sessions and knowledge transfer activities were conducted to empower community enterprises and start-ups, enabling them to replicate these methods and comply with industry standards. This approach not only supports local economic development but also aligns with global trends in eco-friendly cosmetic products. Future studies should explore advanced techniques for pigment stabilization and market expansion to maximize the impact of herbal-based cosmetics.

**Keywords:** Herbs; Wet process; Herbal cosmetics; Supply chain

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## 1. Introduction

The cosmetics industry in Thailand has shown consistent growth, particularly in facial cosmetics, despite relying heavily on chemical ingredients that may cause irritation and are costly. This research introduces the use of Thai herbs such as turmeric, butterfly pea, and roselle to develop chemical-free cosmetics using cold extraction and freeze-drying techniques. The resulting prototypes are safe, high-quality, and environmentally friendly, meeting global demand for sustainable products. The study also empowers community enterprises to create high-value herbal cosmetics, leveraging local resources to align with eco-friendly and sustainable trends.

Herbal plants such as turmeric, butterfly pea, and dragon fruit are not only abundant but also contain natural coloring properties that are well-suited for cosmetic production. When combined with modern extraction technologies such as freeze drying and cold extraction, these resources offer promising potential for creating

innovative cosmetic products that meet safety and quality standards. Furthermore, the growing consumer awareness of environmental sustainability and preference for chemical-free products aligns with the Thai government's policy of promoting creative economic projects. These initiatives support startups and community enterprises in utilizing local resources to develop high-value products.

This study aims to develop prototype herbal cosmetics for facial applications, focusing on safety, economic feasibility, and sustainability (Senangkanikorn et al., 2020). By integrating modern technologies with indigenous knowledge, this research seeks to bridge the gap between consumer demand and local production capabilities, contributing to economic development and environmental conservation.

## 2. Research Objectives

- 1) To develop a prototype of herbal-based facial color cosmetics that are free from chemical substances.
- 2) To transfer research-based innovations and technologies to empower start-up entrepreneurs and community enterprises in producing products that comply with cosmetic manufacturing standards.

## 3. Literature Review

This research explores the sustainable development of herbal product logistics and supply chain management for Thai community enterprises, with the aim of enhancing their economic value. To establish a comprehensive framework, the study draws on various concepts, theories, and related research (Senangkanikorn et al., 2024). The literature highlights the significant potential of natural pigments derived from herbs such as roselle, butterfly pea, turmeric, and malabar spinach for use in facial cosmetics. These plants not only offer vibrant, natural colors but also align with consumer preferences for chemical-free and skin-safe products. Previous studies have demonstrated the effectiveness of methods like cold extraction in preserving the quality of natural pigments, ensuring their stability and suitability for cosmetic applications (Singh et al., 2021).

In addition to natural pigment studies, the research reviews innovations in supply chain management, emphasizing the integration of modern logistics technologies such as IoT and real-time tracking systems. These technologies are essential for optimizing operations and enhancing the competitiveness of community enterprises in a globalized market. Government policies are identified as pivotal in supporting the adoption of such technologies by providing funding and training for local enterprises. The literature also underscores the importance of knowledge transfer and the dissemination of technological advancements to empower community enterprises, enabling them to meet international cosmetic manufacturing standards.

The theoretical framework integrates concepts from logistics, technology management, and sustainable economic development, creating a robust foundation for this study. The review concludes that herbal-based cosmetics offer a promising avenue for increasing the economic value of Thai community enterprises while promoting sustainability. Building on these insights, this research aims to explore practical applications and scalability in community-based cosmetic production.

## 4. Research Methodology

This study employs a structured methodology to develop a prototype of herbal-based facial color cosmetics free from chemical substances and to explore the feasibility of transferring these innovations to community enterprises and start-ups. A mixed-methods approach, combining both qualitative and quantitative research methods, was utilized to ensure comprehensive data collection and analysis.

#### *4.1 Selection of Herbal Plants*

Herbs were selected based on their natural pigmentation and proven safety for cosmetic applications (Koley et al., 2018). This selection included red pigments from roselle, yellow from turmeric, green from gotu kola, and blue from butterfly pea (Khoo et al., 2017). The process prioritized herbs abundant in Thailand with demonstrated color stability and skin safety (Hatier & Gould, 2009).

#### *4.2 Extraction Process*

A cold extraction method (wet process) was employed to extract pigments without the use of heat or harsh chemicals, preserving the herbs' natural properties (Minocha et al., 2009). The pigments underwent freeze-drying to improve their stability and extend storage life (Hughes & Smith, 2007).

#### *4.3 Prototype Development*

The natural pigments were formulated into various cosmetic products, including liquid lipsticks, tints, and eyeshadows. Packaging and preservation techniques were designed to meet hygiene and quality standards, ensuring consumer safety and satisfaction.

#### *4.4 Instrument Validation*

Tools used to assess the stability and safety of the herbal extracts were validated through pilot testing. Reliability was confirmed using Cronbach's alpha coefficient, while expert reviews ensured the relevance and accuracy of the instruments (Moran & Porath, 1980).

#### *4.5 Data Collection*

Qualitative and quantitative data were collected through interviews and surveys. Interviews with experts in cosmetic production and community enterprise management provided insights into operational and market challenges. Surveys targeting potential consumers assessed preferences and willingness to pay for herbal-based cosmetics.

#### *4.6 Technology Transfer and Training*

Workshops and training sessions were conducted to transfer the research findings and production processes to community enterprises and start-ups. These sessions were tailored to align with industry standards, equipping participants with the knowledge and skills necessary to replicate the methods successfully.

The research methodology was carefully structured to combine scientific rigor with practical application, ensuring that the outcomes contribute to the sustainable development of Thailand's herbal cosmetic sector.

### **5. Results**

This research demonstrates significant advancements in the development and marketability of herbal-based facial cosmetics derived from Thai herbs. The key findings are summarized as follows:

### 5.1 Color Extraction and Stability

Natural pigments were successfully extracted from various Thai herbs, including roselle (red-purple), turmeric (yellow), malabar spinach (green), and butterfly pea (blue). These pigments exhibited color characteristics comparable to synthetic cosmetics. However, certain pigments, such as the magenta from dragon fruit, displayed lower stability under high-temperature conditions (40°C), resulting in color fading.

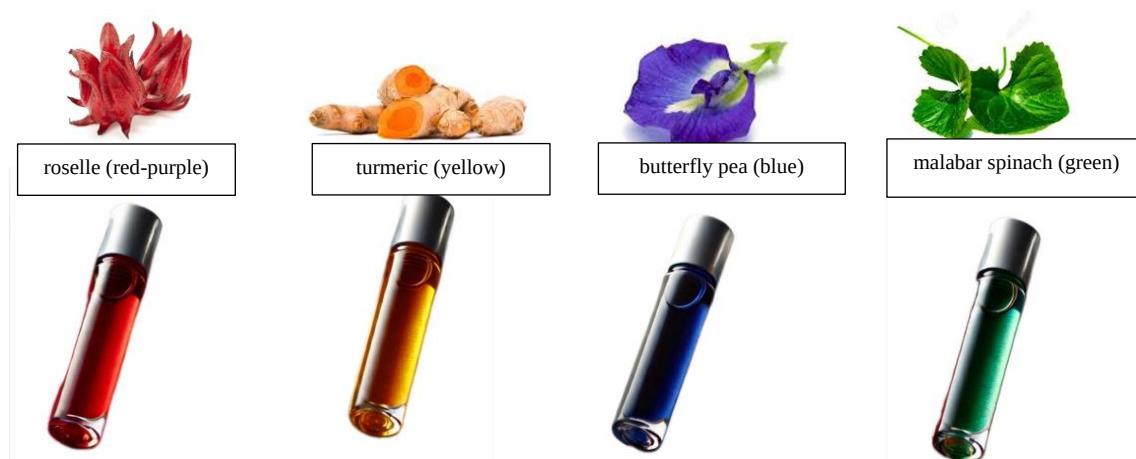


Fig. 1. Prototype Herbal Cosmetic Products

### 5.2 Prototype Development

The extracted herbal pigments were formulated into cosmetic prototypes, including liquid lipsticks, cheek tints, and eyeshadows. These products met cosmetic quality standards, ensuring safety, hygiene, and performance. As a result, they present viable and sustainable alternatives to chemical-based cosmetics.



Fig. 2. Prototype Development Products

### 5.3 Consumer Preferences

Survey findings indicated a strong willingness to pay among consumers for chemical-free, herbal-based cosmetics. Respondents showed a clear preference for products that are natural, eco-friendly, and safe for sensitive skin (Murray & Hackett, 1991).

### 5.4 Economic Value and Market Potential

The study highlights the economic potential of integrating Thai herbs into the cosmetics industry. Herbal cosmetics were identified as a promising opportunity for generating sustainable income for community enterprises, capitalizing on Thailand's rich biodiversity and unique herbal resources.

### 5.5 Knowledge Transfer and Training

Training sessions were conducted to share research findings with community enterprises and start-ups. Participants gained practical knowledge of production techniques, compliance with quality standards, and marketing strategies for herbal cosmetics, enabling them to effectively adopt and implement the innovations.

These findings underscore the feasibility and sustainability of utilizing Thai herbs to produce high-quality, chemical-free facial cosmetics. The research supports the growth of community enterprises and contributes to the local economy while addressing consumer demand for natural and eco-friendly products.

## 6. Conclusion and Discussion

This study successfully developed herbal-based facial cosmetics free from chemical substances, demonstrating the potential of Thai herbs as natural alternatives to synthetic colorants. The pigments extracted from roselle (red-purple), turmeric (yellow), malabar spinach (green), and butterfly pea (blue) proved suitable for cosmetic applications, offering vibrant and natural options for color cosmetics. However, challenges were observed, particularly the low thermal stability of the magenta pigment from dragon fruit, which experienced color degradation at higher temperatures.

The findings emphasize the importance of knowledge transfer and the empowerment of community enterprises through training in modern production techniques. By equipping local producers with the necessary skills and expertise, the study enhances the economic value of herbal resources and promotes sustainable practices. These efforts align with the global trend toward eco-friendly, natural, and chemical-free cosmetic products, meeting consumer demand and addressing environmental concerns.

In conclusion, this research presents a sustainable and innovative model for the cosmetics industry. By leveraging Thailand's rich biodiversity and supporting local enterprises, it contributes to creating a competitive advantage in the global market while fostering economic development and environmental sustainability. Future research should focus on advanced techniques for stabilizing herbal pigments, particularly those sensitive to heat, and explore expanded market opportunities to further enhance the scalability and economic impact of herbal-based cosmetics.

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