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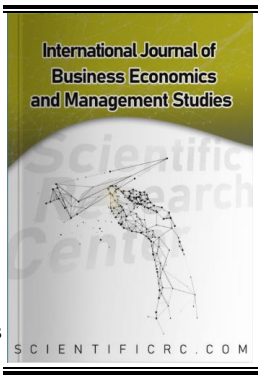

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Presenting an Innovative Strategy for B3F Cosmetic and Personal Care Products with Emphasis on Modern Business Models

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Abstract

The main objective of this research was to propose an innovative model for the strategy of developing B3F cosmetic and personal care products with an emphasis on modern business models. To achieve this, a conceptual framework was designed based on a review of the literature and previous studies in the fields of product innovation, emerging technologies, and the requirements of the cosmetic and personal care industry. Subsequently, the proposed model was tested using a questionnaire and data collected from industry experts and practitioners. Smart PLS software was employed for data analysis and model validation. The findings revealed that the innovative strategy for developing B3F cosmetic and personal care products has a significant relationship with the components of modern business models, including process digitalization, the use of artificial intelligence in product design and recommendation, transparency in the supply chain, and compliance with safety and regulatory requirements. The results of structural equation modelling indicated that all hypothesized paths were statistically confirmed, and the model demonstrated convergent validity, reliability, and good fit. This research not only enriches the theoretical literature on product innovation in the cosmetics and personal care industries but also offers practical implications for managers. By focusing on emerging technologies and customer-centric approaches, managers can design optimal strategies for product development. The findings highlight that adapting to digital trends, leveraging machine learning algorithms, and adhering to safety and ethical standards play a crucial role in enhancing competitiveness and organizational sustainability. Accordingly, it is recommended that managers of companies operating in the cosmetics and personal care industry prioritize technological innovation, smart business mechanisms, customer experience enhancement, and continuous monitoring of regulatory changes in their strategic agendas to strengthen their brand positioning in both domestic and international markets.

Keywords: Innovative strategy, B3F cosmetic and personal care products, modern business model.

Introduction

Formulation and Commercialization of Cosmetic and Personal Care Products: The Role of Innovation

The formulation of cosmetic and personal care products, and consequently their commercialization, is one of the areas with the greatest potential for innovation. Today's consumers are increasingly concerned with skin health, natural ingredients, and product effectiveness. Innovation in this field can include the use of botanical and natural ingredients instead of harmful chemicals, the application of nanotechnology to enhance absorption and efficacy, and the development of multifunctional products that combine several benefits in a single solution. Furthermore, growing public awareness of the harmful effects of chemicals such as parabens, sulfates, and phthalates has encouraged brands to seek safer and healthier alternatives. Innovation in this regard not only enhances customer satisfaction but also creates significant competitive advantage.

The B3F Company's Innovative Approach

B3F has launched its operations with a sustainable development approach and within the framework of modern business models. It has formed a cohesive research and development team consisting of elite and experienced specialists in chemistry, chemical engineering, food engineering, computer engineering, and plant biology. Equipped with a modern laboratory, the company has focused on producing organic, natural, and herbal products—especially shampoos. The B3F product line, exclusively distributed by Raha Gostar Amol Company, includes various shampoos enriched with nutritional and mineral compounds that penetrate deep into the scalp, strengthening and repairing damaged hair. These shampoos are formulated with natural extracts such as aloe vera, chamomile, argan, wheat germ, calendula, caffeine, avocado, mint, and guar; proteins including hydrolyzed keratin and hydrolyzed silk proteins; and vitamins B5, A, and E, all of which have proven benefits in controlling hair loss and stimulating regrowth.

These products are formulated with 50% herbal extracts, proteins, and vitamins, contain no preservatives, and deliver long-lasting positive effects without side effects. Natural extracts like aloe vera, chamomile, mint, avocado, calendula, guar, and caffeine hydrate the hair, prevent weakening and shedding, and stimulate growth. Through advanced technology and natural innovation, the shampoos provide anti-inflammatory and antibacterial effects while being free from harmful chemicals such as sulfates, parabens, and silicones. Caffeine stimulates hair growth and boosts scalp blood circulation, while chamomile extract regulates oiliness, combats dandruff, and restores the hair and scalp to a natural balance. With modern technology, the shampoos can significantly reduce hair loss within 1–2 months and support gradual, healthy regrowth within 5–7 months. A key differentiator of B3F products is the mineral content, which opens the cuticles of normal, oily, and dry hair, enhancing the absorption of nutrients, proteins, and vitamins into the keratin layer. The shampoos are scalp-friendly and do not cause irritation or dryness. All B3F products have undergone clinical studies, rigorous quality control, and efficacy validation, with every stage—from ideation to production—covering needs assessment, raw material selection, packaging, and manufacturing methods.

The Importance of Innovation in the Cosmetic Industry

Innovation and creativity are key elements for the success and sustainable development of cosmetic and personal care brands in today's highly competitive markets. From product formulation to packaging design, marketing, advanced technologies, and commercialization, innovation plays a decisive role. Brands that continuously respond to emerging needs through creativity not only secure greater market share but also build long-term trust and loyalty.

An innovative culture fosters technology-based products and advantages that enhance international business performance. Creativity and innovation facilitate a company's willingness and ability to enter international markets; in fact, creativity strengthens the drive toward globalization. Research by Gil Pechang and colleagues shows that proactive behavior, creativity, and innovation have a positive relationship with international entrepreneurship. To leverage international market opportunities, firms must embrace innovation. Increasingly, entrepreneurship, innovation, and internationalization intersect, making innovation essential for flexible management and proactive expansion in today's complex and dynamic world (Bafafa Semirmi & Kasgari Bagherian, 2014).

Industry Challenges and Global Trends

Over recent decades, the cosmetic and personal care industry has witnessed remarkable growth worldwide, becoming one of the most innovative and competitive consumer sectors. However, rapid changes in consumer expectations, rising environmental awareness, and regulatory pressures present considerable challenges. Consumers now demand not only beauty and improved appearance but also skin health, transparency in ingredients, and product safety (Burdock, 2024; Mays et al., 2023). As a result, cosmetic brands must rethink their business models and adopt innovative strategies to meet customer needs while complying with legal and international standards (Pistollato et al., 2021). In competitive markets, product innovation strategies serve as a sustainable competitive advantage that strengthens brand positioning.

A major transformation in this industry is the integration of new technologies, particularly artificial intelligence (AI) and machine learning, into product design and production processes. Recent studies show that AI can support ingredient analysis, predict safety and allergenic risks, and even enable personalized product design tailored to individual consumers (Kalicińska et al., 2023; Xin et al., 2024). Digital tools such as deep learning algorithms allow for personalized skincare recommendations based on biometric analysis and skin conditions (Lee et al., 2024). These approaches not only streamline product development but also reduce market failure risk and increase consumer satisfaction (Young et al., 2020). Nonetheless, implementing such technologies within traditional business models poses limitations, necessitating the design of innovative strategies.

Regulatory pressures and safety concerns around raw materials remain critical obstacles to product innovation. International and regional regulatory agencies enforce strict standards for proving the safety of chemicals and compounds used in cosmetics (Pistollato et al., 2021). At the same time, some

companies' failure to comply with labeling and transparency requirements undermines consumer trust and raises significant risks (Mays et al., 2023). In such a context, innovative strategies must not only focus on technology but also address regulatory compliance and scientific expectations (Reeder et al., 2023). Combining advanced technologies with innovative business approaches and adherence to regulations can pave the way for brand sustainability and success.

Towards Innovative Business Models

Given these challenges and opportunities, the need for innovative strategies in the cosmetic and personal care industry is greater than ever. Modern business models such as digital platforms, data-driven services, and personalized production can serve as foundations for innovative solutions (Grech et al., 2024; Haykal et al., 2024). Such approaches enhance customer experience, improve value chain transparency, reduce safety risks, and enable better regulatory compliance. Therefore, the present study aims to propose a framework for product innovation strategies in the cosmetic and personal care industry within the context of modern business models. This framework not only improves brand competitiveness but also guides the industry toward sustainable and responsible growth.

The global popularity of cosmetics continues to rise, leading to intense competition in the market. Companies that build strong reputations over time are more likely to succeed in this highly competitive landscape. Several factors fuel the rising demand and profitability of the industry, including its high potential for innovation, the diversity of personal care and beauty products, the adaptability of modern technologies, greater consumer focus on health and hygiene, and heightened competition among consumers—particularly women—for enhanced personal grooming. For example, Sehat Company operates in both domestic and international markets, exporting a substantial share of its products abroad. To survive in such a competitive environment, it must adopt innovative strategies and embrace new technologies across all processes. Innovation remains a core axis of business, and by implementing effective innovation strategies, modern business models can reshape and expand the industry. Hence, the central question is: How can effective innovative strategies drive the development of the cosmetic and personal care industry with an emphasis on modern business models?

Research background

The transformation of the cosmetics and personal care industry in recent years has been profoundly influenced by advances in artificial intelligence (AI) and machine learning. The emergence of deep learning algorithms and neural networks has ushered in a new era of product design, production, and even marketing, often referred to as the "AI-driven beauty revolution" (Eppler & Ma, 2025). These technologies have enabled companies to leverage big consumer data, biochemical skin characteristics, and chemical formulations to develop products that are not only innovative but also tailored to individual customer needs. Moreover, the predictive capabilities of AI have reduced the risks of developing ineffective or hazardous products and accelerated the innovation process.

One of the key areas in cosmetics and personal care products is the development of surfactants, which play a fundamental role in the formulation of cleansers and creams. Recent studies have shown that machine learning can effectively predict surfactant phase behavior and optimize their performance (Thacker et al., 2023). This capability allows brands to design more sustainable and efficient compounds that are both effective in cleansing quality and safer for the environment. In addition, quantitative structure–property relationship (QSPR) models powered by machine learning have been able to predict critical indices such as the critical micelle concentration, which is vital for new formulation design (Boukelkal et al., 2024). These advancements signify a shift from traditional trial-and-error approaches toward data-driven and digital simulation models.

In this context, graph neural networks (GNNs) have been applied to analyze and predict surfactant properties. Due to their ability to understand complex molecular structures, these models deliver more accurate results than classical approaches (Ham et al., 2024). The application of such methods in the cosmetics industry can lead to the design of products that are not only highly effective but also safer and more biocompatible. Similarly, AI has demonstrated strong performance in predicting the properties of multicomponent polymeric materials used in the formulation of cleansing foams and other hygiene products (Hamaguchi et al., 2023). This highlights the growing role of intelligent models in designing advanced materials for the beauty industry.

Machine learning also plays a key role in the discovery and design of new polymers, which serve as base materials in many cosmetic products. Research has shown that AI models can accelerate polymer discovery and identify more sustainable and environmentally friendly materials (Yan & Li, 2023). Moreover, the combination of simulation methods with machine learning has achieved precise predictions of properties such as the glass transition temperature of biopolymers (Martí et al., 2023). These advancements ultimately contribute to improving product quality and durability, paving the way toward sustainable development in the industry.

From another perspective, challenges such as predicting the viscosity of complex polymers have been addressed using hybrid models that combine AI with thermodynamic mechanisms (Wang et al., 2024). These approaches help optimize the physicochemical properties of products, resulting in formulations that not only deliver effective performance but also enhance sensory experiences for consumers. Furthermore, the application of machine learning in designing sustainable and functional polymers has emerged as a key strategy in advancing eco-friendly cosmetic products (Tran et al., 2024). This trend aligns with new consumer expectations around sustainability and corporate social responsibility.

Another area of innovation in the cosmetics industry is fragrance design using machine learning algorithms. Predictive odor models and the creation of new fragrance compounds have demonstrated that machine learning can generate novel scents aligned with consumer preferences by analyzing molecular surface charge profiles (Zhang et al., 2021). In addition, the use of graph neural networks in fragrance design, based on consumer feedback, enables the development of blends directly aligned with market tastes (Rodrigues et al., 2024). These advances underscore the growing role of data-driven personalization in cosmetic product innovation.

Deep learning models have also been widely applied in optimizing fragrance formulations. For example, modern neural network architectures have provided systematic solutions for designing optimal scents, a process that once required years of specialized perfumery expertise (Santana et al., 2021). Similarly, combining machine learning with molecular design has enabled the faster and more cost-effective identification of pleasant-smelling compounds (Heng et al., 2022). Even in evaluating the sensory characteristics of molecules, deep learning algorithms have matched the accuracy of human testing, supplying essential data for innovation in fragrance and essence design (Mahmoud et al., 2021).

Alongside these innovations, the use of preservatives in cosmetics has always been a sensitive issue. Concerns over the toxicity and side effects of certain preservatives have spurred interest in applying machine learning to identify safer alternatives. Research has shown that computational models can successfully screen and exclude compounds with neurotoxic potential (Kan et al., 2021).

In addition, combining terahertz spectroscopy with machine learning algorithms has enabled more precise analysis of preservative mixtures (Yan et al., 2022). Such advancements have paved the way for developing safer and more transparent systems to preserve the quality of cosmetic products.

In this regard, the design of antimicrobial peptides using artificial intelligence has been introduced as a novel alternative to traditional preservatives. Research shows that machine learning–based design can identify peptides that maintain antimicrobial properties while offering greater safety for consumers (Yue et al., 2024). This approach is not only important from a public health perspective but also aligns with sustainability strategies and the reduction of reliance on conventional chemical agents. Moreover, the prediction of antioxidant activity in cosmetic compounds through machine learning algorithms has opened new horizons for improving the performance of skincare and anti-aging products (Jung et al., 2024).

Ultimately, what emerges from this theoretical review is that AI and machine learning have assumed a fundamental role across all dimensions of the cosmetics and personal care industry—from raw material design to formulation, fragrance development, and preservative systems. These technologies not only enhance product quality and safety but also accelerate the innovation process and align products more closely with consumer expectations. Therefore, new business models in this industry must be designed to maximize the capacity of data utilization and modern technologies while simultaneously complying with regulatory requirements and sustainability principles.

Theoretical Foundations of the “Innovative Strategy” Component

Innovative strategy, as one of the key pillars of organizational success in competitive environments, refers to the process of designing and implementing creative policies and actions that generate sustainable added value and secure brand differentiation in the market. In the cosmetics and personal care industry, this strategy mainly includes the use of advanced technologies such as AI, machine learning, and molecular modeling to develop new products, predict compound behavior, and enhance consumer experience (Eppler & Ma, 2025). For example, the application of neural networks in the design of new surfactants or

polymers has accelerated the innovation process and reduced the risks associated with costly and time-consuming experiments (Thacker et al., 2023; Ham et al., 2024). Within this framework, innovative strategy focuses not only on the product as an output but also on the entire value chain—from research and development to marketing—mapping out a new pathway for achieving competitiveness in global markets.

From a theoretical perspective, innovative strategy is also linked to concepts such as "dynamic competitive advantage" and "organizational learning." This strategy enables companies to design flexible product development models aligned with environmental changes, emerging consumer needs, and regulatory requirements (Tran et al., 2024). In other words, innovation in this field is not limited to creating new products but also involves redefining processes, applying data-driven decision-making, and designing personalized services for consumers (Yan & Li, 2023; Jung et al., 2024). Therefore, in the cosmetics and personal care industry, innovative strategy is not only a driver of economic growth but also a foundation for sustainability, safety, and corporate social responsibility.

Theoretical Foundations of the "New Businesses" Component

New businesses refer to emerging organizational and commercial models built on digital technologies, data-centricity, and adaptability to market changes. In the cosmetics and personal care sector, these primarily include digital sales platforms, AI-driven services, personalized product recommendation systems, and collaborative models for product co-creation with consumers (Grech et al., 2024; Lee et al., 2024). The main characteristic of these models is their reliance on big data to analyze consumer preferences and optimize formulations, thereby elevating the purchasing and consumption experience to a personalized and intelligent level. Consequently, new businesses not only enhance operational efficiency and reduce development costs but also play a crucial role in building customer trust through improved transparency and compliance with legal standards (Pistollato et al., 2021).

On a theoretical level, new businesses can be explained as the integration of technological innovation, value chain re-creation, and the creation of digital ecosystems. These businesses have managed to redesign not only the product but also the entire customer experience using data-driven models and machine learning (Haykal et al., 2024). For instance, the application of neural networks in skin data analysis has enabled brands to design personalized formulations for each individual, representing a paradigm shift in both marketing and production (Xin et al., 2024). Furthermore, due to their high scalability and focus on sustainability, new businesses in the cosmetics sector provide a suitable pathway for alignment with global trends such as the digital economy and sustainable development (Reeder et al., 2023).

Research method

The present study is applied in terms of purpose and descriptive–analytical in nature, aiming to propose an innovative strategy for B3F cosmetic and personal care products with an emphasis on modern business models. In this regard, the theoretical framework was first developed through a review of the literature

and previous studies in the fields of artificial intelligence, machine learning, innovation in formulation, and the development of modern business models (Eppler & Ma, 2025; Tran et al., 2024). Subsequently, to identify the indicators and key components of the innovative strategy and modern businesses, qualitative content analysis was employed. Qualitative data were collected through a review of international scientific sources as well as semi-structured interviews with industry experts, including R&D managers, formulation specialists, and digital marketing professionals. The content validity of the indicators was confirmed using expert opinions, and their reliability was verified through the Kappa agreement index. In the next phase, in order to test the conceptual model, a quantitative approach based on structural equation modeling (SEM) using Smart PLS software was applied. The statistical population of the study included managers, experts, and active consumers in the cosmetics and personal care industry in Iran, selected through a combined purposive and convenience sampling method. The sample size was determined to be 300 people, in line with the minimum observation-to-variable ratio rules in SEM. The data collection tool was a researcher-made questionnaire, designed based on the identified components and structured on a five-point Likert scale (ranging from strongly disagree to strongly agree). The reliability of the questionnaire was assessed using Cronbach's alpha and composite reliability (CR), while construct validity was evaluated through average variance extracted (AVE) indices and the overall model fit (GOF). Finally, after data collection, descriptive and inferential statistical methods were applied to analyze the findings, thereby clarifying the role of innovative strategies and modern business models in enhancing competitive advantage and sustainability in the cosmetics and personal care industry.

Data analysis

At this stage, in order to evaluate the conceptual model of the research and to ensure the existence or non-existence of a causal relationship between the research variables, as well as to examine the fit of the observed data with the conceptual model, the research model was also tested using structural equation modeling (SEM). The results of the model test are reflected in the diagrams.

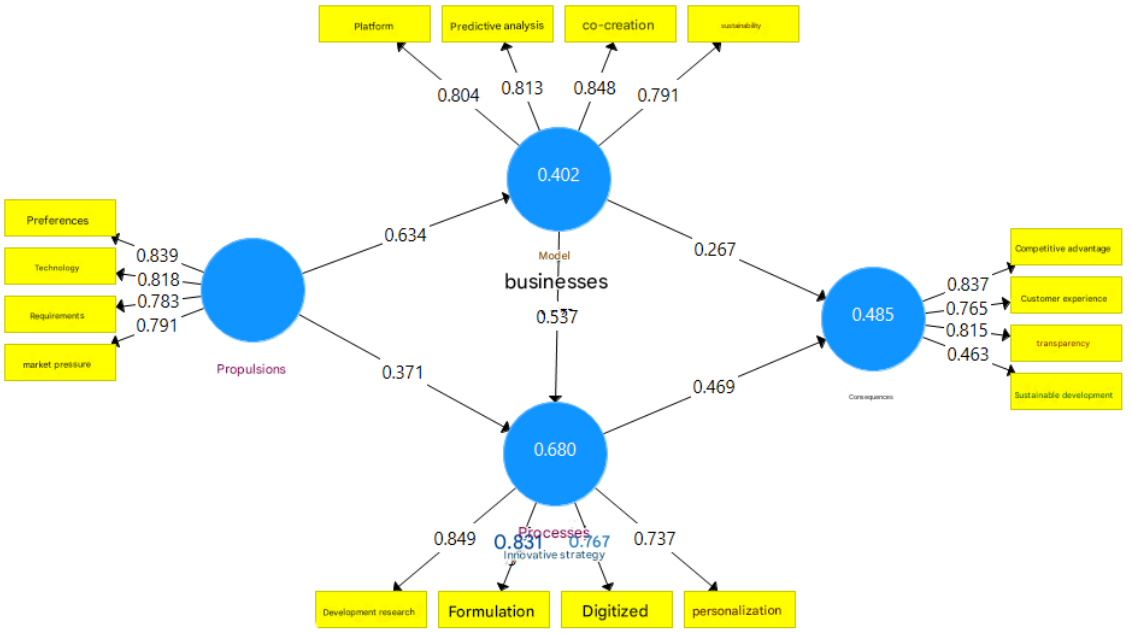

Figure 1) Measurement of the overall model in the standardized state

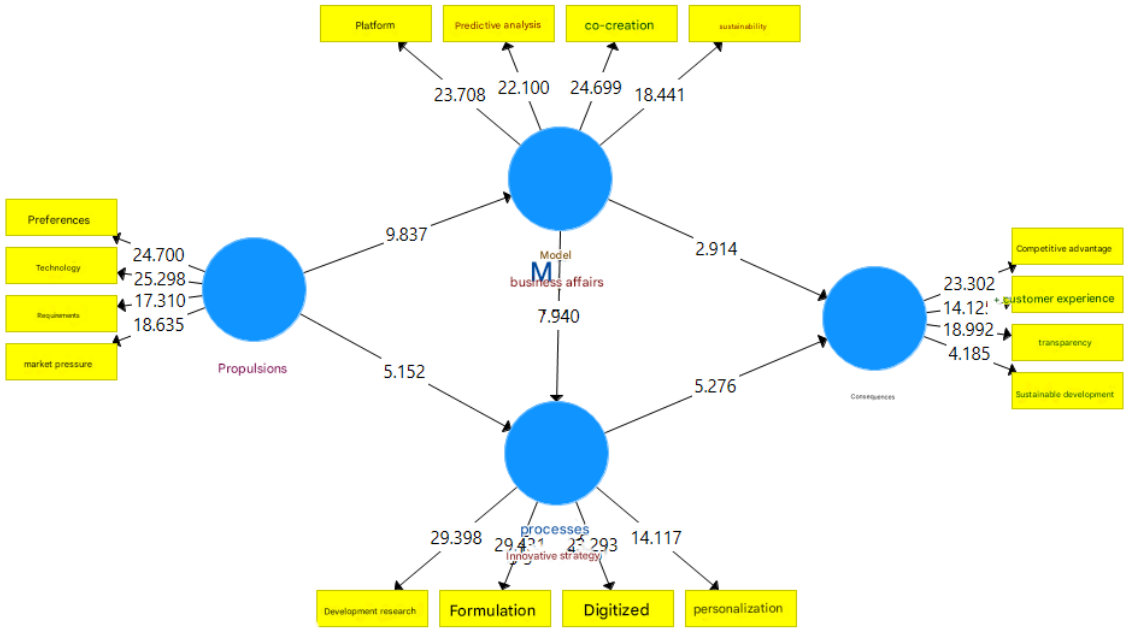

Figure 2) Measurement of the overall model in the significant state

For reliability assessment, Cronbach's alpha and composite reliability (CR) were used. For validity assessment, convergent validity was employed. To evaluate the model fit, the GOF index was applied:

Table 1: Reliability and Validity of the Outer Models

Variable	CR	AVE	MSV	Fornell & Larcker Matrix
Drivers	0.787	0.552	0.193	0.743
New Business Models	0.844	0.644	0.478	0.342 0.803
Innovative Strategy Processes	0.918	0.651	0.423	0.331 0.47 0.807
Outcomes	0.885	0.720	0.478	0.44 0.692 0.65 0.849

- A Cronbach's alpha value higher than 0.7 indicates acceptable reliability.
- A CR value above 0.7 for each construct demonstrates adequate internal consistency for the measurement model.
- An AVE value above 0.5 shows acceptable convergent validity.
- Considering 0.01, 0.25, and 0.36 as weak, medium, and strong thresholds for GOF, respectively, the obtained value of 0.62 indicates a strong model fit.

Conclusions

The findings of this study revealed that the cosmetics and personal care industry has been profoundly influenced over the past decade by technological changes, market dynamics, and environmental pressures. Companies operating based on traditional strategies are losing their competitive advantage due to misalignment with emerging consumer needs. According to the B3F model, innovation at the product level alone is not sufficient; it must be integrated across all dimensions of the business, including the supply chain, marketing models, and customer relationships. Focusing on technologies such as artificial intelligence, the Internet of Things, and big data can lead to the creation of personalized products and significantly enhance the customer experience.

The analysis of results indicates that modern business models play a crucial role in the success of innovative strategies. In fact, product innovation becomes highly effective only when implemented within digital and data-driven business frameworks. For example, the use of online sales platforms, intelligent recommendation algorithms, and digital marketing channels enables access to new markets while reducing distribution costs. Furthermore, adopting sustainable models (Green & Circular Models) fosters public trust and social acceptance of products—an especially vital factor in the sensitive cosmetics and personal care industry.

The findings also suggest that the synergy between innovation processes and modern business models creates a competitive and sustainable ecosystem. For instance, when R&D processes are aligned with consumer-generated data from digital platforms, innovative formulations can be developed with greater speed and accuracy. Moreover, employing co-creation methods with consumers not only enhances product quality but also strengthens customer loyalty. Therefore, the B3F approach can serve as a comprehensive model that helps organizations transition from traditional strategies toward sustainable and digital innovation.

Ultimately, it can be concluded that cosmetics and personal care companies adopting the innovative B3F strategy will enjoy greater competitive advantage at both national and international levels. By combining driving forces (customer needs, technology, regulations, and competition), innovative processes, and modern business models, this framework outlines a clear pathway to sustainable value creation. Particularly in the current context—where consumers demand healthy, personalized, and eco-friendly products—implementing this model not only increases profitability but also enhances corporate social responsibility and market trust.

Managerial Practical Recommendations

1. Managers should leverage artificial intelligence and big data to analyze consumer preferences and design personalized formulations.

2. Investment in sustainable business models (such as circular economy and waste reduction) should be prioritized as a source of competitive advantage and a means of attracting environmentally conscious consumers.

3. Companies should develop digital platforms as the primary sales and customer engagement channels to increase direct access and interaction with target markets.

4. Establishing co-creation structures with customers and stakeholders can improve product quality while simultaneously increasing customer loyalty.

5. For successful implementation of this strategy, managers need to develop a smart and transparent supply chain to ensure traceability of raw materials and international-level quality control.

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