

Optimizing Fragrance Longevity: Integrating Advanced Formulation and Environmental Control Strategies for Enhanced Performance and Consumer Satisfaction

Mifta Nurfitria, Andi Ade Zulkifli, Daniel Adolf Ohyver, Ahmad AB, Sudarmi, Ernawati AB

Politeknik Pariwisata Makassar
coelenowe@gmail.com

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Abstract

The hospitality industry increasingly recognizes the significance of auxiliary services, such as laundry and housekeeping, in enhancing overall guest satisfaction and repeat business. This study addresses the need for effective and sustainable laundry services in hotels by evaluating the performance of natural microcapsule-based fragrances versus traditional chemical-based alternatives. The primary focus was on assessing fragrance longevity and user satisfaction with both types of fragrances. Key findings reveal that methanol-based perfumes, utilizing fixatives, generally provide superior fragrance retention compared to water-based microcapsule perfumes, which exhibit more variability in performance. Despite the environmental benefits of microcapsule-based fragrances, they often deliver less consistent results in terms of aroma longevity. The study concludes that while natural microcapsule fragrances offer an eco-friendly alternative, methanol-based formulations are currently more effective in maintaining fragrance quality over time. Recommendations for future research include expanding the sample size and exploring different formulations and concentrations to optimize the effectiveness and sustainability of laundry products in the hospitality sector. This comprehensive approach aims to enhance the overall guest experience while addressing environmental concerns in the industry.

Keywords: *Microencapsulated, Sustainable Practices, Customer Satisfaction, Fragrance Longevity*

Abstrak

Industri perhotelan semakin menyadari pentingnya layanan tambahan, seperti binatu dan tata graha, dalam meningkatkan kepuasan tamu secara keseluruhan dan bisnis yang berkelanjutan. Studi ini membahas kebutuhan layanan binatu yang efektif dan berkelanjutan di hotel dengan mengevaluasi kinerja pengharum berbasis mikrokapsul alami dibandingkan dengan alternatif berbasis bahan kimia tradisional. Penelitian ini menggunakan kombinasi data primer dari uji coba eksperimental yang dilakukan di Laboratorium Laundry Poltekpar Makassar dan data sekunder dari literatur yang ada. Temuan utama mengungkapkan bahwa parfum berbasis metanol, yang menggunakan fiksatif, umumnya memberikan retensi wewangian yang lebih unggul dibandingkan dengan parfum mikrokapsul berbasis air, yang menunjukkan lebih banyak variabilitas dalam kinerja. Terlepas dari manfaat lingkungan dari parfum berbasis mikrokapsul, parfum ini terbukti memberikan hasil yang kurang konsisten dalam hal daya tahan aroma. Studi ini menyimpulkan bahwa meskipun wewangian mikrokapsul alami menawarkan alternatif yang ramah lingkungan, formulasi berbasis metanol saat ini lebih efektif dalam menjaga kualitas wewangian dari waktu ke waktu. Rekomendasi untuk penelitian di masa depan termasuk memperluas ukuran sampel dan mengeksplorasi formulasi dan konsentrasi yang berbeda untuk mengoptimalkan efektivitas dan keberlanjutan produk binatu di sektor perhotelan. Pendekatan komprehensif ini bertujuan untuk meningkatkan pengalaman tamu secara keseluruhan sekaligus mengatasi masalah lingkungan perhotelan sebagai industri.

Kata kunci: *Mikroenkapsulasi, Praktik Berkelanjutan, Kepuasan Pelanggan, Daya Tahan Wewangian*



INTRODUCTION

In the past decade, much research has focused on the optimization of the hospitality industry, particularly in enhancing customer satisfaction through various service improvements. Research shows that efficient management, including adequate staffing and proper skills, directly impacts service quality (Priyanto et al., 2024; Zulkifli, 2023). Similarly, in the broader hospitality industry, improving managerial aspects such as staff training and increasing personnel enhances customer satisfaction. Supportive environmental conditions and unique local culture further enrich the guest experience, much like how hotels create a pleasant atmosphere (Danurdara et al., 2024; Suardana et al., 2020). Thus, improving management and leveraging local uniqueness contribute to higher customer satisfaction, aligning with industry strategies. A significant part of this research has examined the role of auxiliary services such as laundry and housekeeping, which are critical in maintaining the overall guest experience (Bhatnagar & Nim, 2019; Handhini et al., 2022). Studies have consistently shown that the cleanliness and freshness of hotel amenities, including linens and personal garments, significantly impact customer satisfaction and repeat business (Chrisma Sigarlaki et al., 2022). Therefore, the development and implementation of effective laundry services within the hotel industry have become a central topic of interest.

General trends in the hospitality and laundry industries highlight a growing demand for environmentally friendly and sustainable practices (Wibisana et al., 2022). This shift has been driven by increased consumer awareness and preference for eco-friendly products, as well as regulatory pressures to reduce environmental impact (Tamboli et al., 2023). Research has highlighted the potential benefits of using natural ingredients and innovative technologies, such as microencapsulation, to enhance the effectiveness and sustainability of laundry products (Peng et al., 2023). Microcapsules, in particular, have garnered attention for their ability to encapsulate fragrances and release them gradually, thereby extending the freshness of laundered items (Mamusa et al., 2021). Research in the past decade highlights the importance of auxiliary services such as laundry in the hospitality industry, with trends towards eco-friendly practices and innovative technologies like microencapsulation to enhance the effectiveness and sustainability of laundry products (Daniel Adolf Ohlyver et al., 2024).

Previous research has explored various aspects of microencapsulation technology and its application in the laundry industry. For instance, studies have examined the stability and release mechanisms of encapsulated fragrances, as well as their impact on fabric softness and freshness (Perinelli et al., 2020). Research has also compared the performance of microencapsulated fragrances with traditional chemical-based alternatives, often finding superior longevity and user satisfaction with the former (He et al., 2019). This body of work provides a strong foundation for further investigation into the use of natural microcapsules in laundry applications, particularly in the context of hotel services where maintaining high standards of hygiene and guest satisfaction is paramount (Ab. et al., 2024).

It remains unclear why traditional chemical-based fragrances continue to dominate the laundry industry despite growing evidence of the advantages offered by natural microcapsule-based alternatives. Recent research within the last five years has highlighted the potential of microencapsulation technology in extending the longevity and enhancing the quality of fragrances used in laundry services (Kłosowska et al., 2023). However, there is a noticeable gap in the literature regarding comprehensive evaluations of natural microcapsules in commercial laundry applications, particularly within the hospitality industry. This study aims to fill this gap by examining the durability and effectiveness of natural microcapsule-based fragrances compared to traditional chemical-based ones.

The present research seeks to evaluate the performance of natural microcapsule fragrances in a real-world hotel laundry setting, focusing on their aroma longevity and

overall user satisfaction. Preliminary findings suggest that microcapsule-based fragrances may offer superior long-lasting freshness and a more environmentally friendly alternative to synthetic chemicals. This study will first outline the methodology used for testing and evaluating the fragrances, followed by a detailed analysis of the results. The final section will discuss the implications of these findings for the hospitality industry and potential directions for future research (Kłosowska et al., 2023).

The purpose of this study was to investigate the effectiveness of natural microcapsule-based fragrances compared to traditional chemical-based fragrances in hotel laundry services. The present research focuses on evaluating the aroma longevity and overall user satisfaction associated with these two types of fragrances. Our principal findings indicate that natural microcapsule fragrances not only provide longer-lasting freshness but also offer a more environmentally friendly solution. This paper will first outline the methodology used for the comparative analysis, then present the detailed results, and finally discuss the implications for the hospitality industry and potential future research directions.

METHODOLOGY

The data used for this study were collected through a combination of primary and secondary sources. Primary data were obtained from direct observations and experimental trials conducted at the Laundry Laboratory of Politeknik Pariwisata Makassar. Observations were carried out to assess the performance and longevity of natural microcapsule fragrances on various fabrics. This involved detailed monitoring of the fragrance retention over time and the overall satisfaction of users with the aroma durability. Secondary data were gathered from existing literature, including previous research studies, scholarly articles, and relevant books, providing a foundational understanding of the use of microencapsulation technology in laundry applications (Sugiyono, 2020).

For data analysis, a descriptive qualitative approach was employed. This involved several steps to ensure the accuracy and relevance of the collected data. Initially, data were checked for completeness and consistency. The next step was the organization of data, where information was categorized based on the objectives and focus of the research. This facilitated a structured analysis and comparison of findings. Finally, the data were analyzed using theoretical frameworks and previous research references to draw meaningful conclusions about the effectiveness of natural microcapsule fragrances in enhancing the longevity and user satisfaction of laundry services. This thorough analysis process helped in validating the research findings and providing actionable insights for the hospitality industry.

RESULT

The findings of this study clearly show that the formulation and application of laundry perfumes can significantly impact their effectiveness and longevity. The research highlights that the choice of base solvent—whether methanol or water—affects not only the fragrance's persistence but also its chemical composition. For instance, the methanol-based perfumes, which utilize fixatives and methanol as solvents, tend to offer more robust aroma retention compared to the water-based microcapsule perfumes. This is due to the fixatives that help in binding and extending the fragrance's duration. On the other hand, water-based microcapsule perfumes, despite being simpler in formulation and environmentally friendly, present varying results in fragrance longevity depending on the concentration of the microcapsules used.

**Picture 4.1** Seedling parfum**Picture 4.2** Fixative**Picture 4.3** Metanol

Figure 4.1 shows the perfume concentrate, the primary ingredient that imparts the distinctive fragrance to the laundry perfume. Figure 4.2 depicts the fixative, a substance used to preserve and extend the fragrance's longevity on fabrics by binding aromatic molecules to prevent them from evaporating quickly. Figure 4.3 illustrates methanol, the solvent used in the creation of methanol-based laundry perfume, which dissolves the perfume concentrate and fixative to ensure a uniform mixture. These three components are crucial in the process of making methanol-based laundry perfume, each playing a key role in determining the quality and effectiveness of the final product.

The study also emphasizes the importance of understanding the chemical interactions and properties of the components involved. The methanol-based formula proves more effective for scenarios requiring longer-lasting fragrance, while the water-based microcapsules offer a sustainable alternative with moderate scent longevity. These findings underscore the need for careful consideration of both the chemical properties and the intended application of the perfume to optimize performance. Consequently, industries focusing on laundry fragrances must weigh their priorities between sustainability and long-lasting effectiveness to choose the most appropriate formulation for their needs.

DISCUSSION

One explanation for the observed differences in fragrance longevity between microcapsule and methanol-based laundry perfumes may lie in their distinct chemical properties and modes of action. Microcapsule-based perfumes, using a water base, often show varying degrees of residue and less consistent fragrance retention. This inconsistency can be attributed to the different concentrations of microcapsules used, as indicated by the results showing residues at lower microcapsule concentrations. In contrast, methanol-based perfumes, with their use of fixatives, generally exhibit better and more uniform fragrance retention. The fixatives in methanol-based perfumes help to stabilize the fragrance molecules, reducing evaporation and ensuring longer-lasting effects, as corroborated by the literature on perfume formulation and stability (Putri et al., 2023; Zhan et al., 2020).

Another important factor affecting fragrance retention is the storage environment. The data indicates that clothing stored in open environments, exposed to air and external odors, experiences faster fragrance dissipation compared to clothing stored in closed spaces. This finding supports the notion that exposure to air accelerates the degradation

of fragrance molecules, a well-documented phenomenon in the study of volatile compounds (Selli & Kilic Buyukkurt, 2020). Thus, the choice of storage conditions can significantly impact the perceived longevity of laundry perfumes, highlighting the need for controlled environments to maintain fragrance quality.

The findings of this study underline the importance of tailoring perfume formulations to specific use cases and storage conditions to maximize fragrance longevity. Building on the understanding that methanol-based perfumes with fixatives generally outperform microcapsule-based alternatives in terms of fragrance retention, it is evident that incorporating advanced technologies could further enhance product efficacy. For instance, innovative microcapsule technologies designed to release fragrance more gradually or hybrid formulations that combine the benefits of both systems could be explored. Additionally, the role of storage conditions in preserving fragrance highlights a crucial area for product optimization. Research supports that controlling environmental factors, such as air exposure and humidity, can significantly impact the stability of volatile compounds (Wu et al., 2023). Therefore, developing packaging solutions that minimize air exposure or incorporating stabilizing agents could provide practical benefits in extending fragrance life. Overall, these insights advocate for a balanced approach in product formulation and environmental control to achieve superior performance and consumer satisfaction. Future research should focus on integrating these findings to refine existing technologies and explore new innovations in fragrance delivery systems.

Moreover, the results suggest that fabric type does not significantly influence the longevity of the fragrance, but the duration of exposure plays a critical role. Fabrics exposed to longer periods of activity or storage show a decrease in fragrance intensity, which aligns with the known effects of heat and moisture on volatile compounds (Design et al., 2023; Selli & Kilic Buyukkurt, 2020). For instance, active wear that encounters sweat and high temperatures shows a more rapid reduction in fragrance, emphasizing the impact of environmental factors on perfume performance.

In practical terms, these findings imply that while both microcapsule and methanol-based perfumes have their advantages and limitations, the choice of formulation should align with the intended use and storage conditions. Industries and consumers alike should consider these factors when selecting laundry perfumes to ensure optimal performance and satisfaction. Adjustments in product formulation, such as increased use of fixatives or improved microcapsule technology, could enhance fragrance retention and overall product efficacy, providing valuable insights for future research and development in the field of laundry care.

CONCLUSION

This study was limited by several factors, including the variability in fabric types and environmental conditions which could have influenced the results of fragrance longevity. Additionally, the sample size for the evaluation of fragrance persistence in different scenarios was relatively small, which may not fully represent broader consumer experiences. Future research should consider expanding the sample size and incorporating a wider range of fabrics and environmental conditions to provide a more comprehensive understanding of fragrance stability. Moreover, exploring different concentrations and formulations of microcapsule and methanol-based perfumes could offer further insights into optimizing product performance in various laundry applications.

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