

Enhancing Customer Satisfaction in the Hospitality Industry: A Machine Learning Approach to Analyzing Customer Complaints in Seoul's Hotels

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Abstract

This study employs machine learning algorithms to explore the determinants of customer dissatisfaction in the hotel sector, focusing on the Seoul hospitality market. Utilizing a dataset comprising 800 online complaint reviews across 30 distinct hotel categories, we conducted a comprehensive analysis to identify the primary drivers of customer complaints. Our findings indicate that service-related issues are predominant, with a significant impact on luxury hotel ratings due to perceived service quality gaps. Additionally, hardware concerns are a secondary factor, highlighting the importance of infrastructure and amenities to customer satisfaction. We also observed that anomalies in service delivery and staff attitudes significantly influence overall satisfaction levels. Leveraging natural language processing techniques for text classification, we categorized complaints into actionable insights, enabling targeted recommendations for hotel management. These include strategies to enhance service quality, upgrade hardware facilities, streamline additional charges and disposable item services, and emphasize employee training in service excellence and cross-cultural communication skills. The proposed interventions aim to bolster the competitiveness of South Korean hotels, cater to the evolving needs of a global clientele, and foster sustainable growth within the industry. Our approach demonstrates the utility of data-driven methodologies in optimizing customer satisfaction and operational efficiency in the hospitality sector.

Keywords: Customer satisfaction, hospitality industry, machine learning, text classification, service quality.

1. Introduction

1.1 Background and motivation

In today's fiercely competitive business environment, customer satisfaction is crucial for the long-term development of the hotel industry. However, with the advent of e-commerce and the digital age, customer complaints and dissatisfaction often spread rapidly through online platforms, directly affecting the reputation and business of hotels. Analyzing the dissatisfaction and complaints expressed by customers in online reviews has become an important way to improve hotel service quality and overall customer satisfaction. Through sentiment analysis and content mining of online reviews, hotel managers can better understand customer needs and dissatisfaction in a more timely manner, thereby adjusting services and improving experiences to enhance customer satisfaction. In this context, the research idea of this paper is proposed. By analyzing empirical data of online complaint reviews from Korean hotels, it explores the impact of customer complaints on overall customer satisfaction and delves into the characteristics and reasons of customer complaints in different grades of hotels. The aim is to provide more targeted management strategies and improvement suggestions for the hotel industry to enhance competitiveness and sustainable development capabilities.

1.2 Research objectives and significance

This paper aims to achieve the following research objectives through text analysis and word frequency analysis of customer complaint text comments from 30 hotels in Seoul:

- (1) Analyze the text comments of customer complaints and classify them into four types: hardware facilities, service, attitude, and anomalies, to understand the distribution of customer complaints in different types of hotels.
- (2) Utilize word frequency analysis to delve deeper into the reasons for customer complaints in different types of hotels, helping hotel operators accurately identify factors that lead to consumer dissatisfaction and formulate improvement strategies.
- (3) Propose feasible suggestions to promote overall satisfaction in hotels, providing practical management advice and strategies for hotel operators.

1.3 Research methods and computational approaches

In our research, we have adeptly utilized the prowess of natural language processing (NLP) and machine learning (ML) to conduct an in-depth analysis and interpretation of customer complaints. Our analytical framework is underpinned by text classification algorithms that meticulously categorize customer feedback, shedding light on the spectrum of issues encountered by patrons. This methodological approach is in harmony with the current trends in sentiment analysis research, emphasizing the importance of context-aware models for accurately gauging customer sentiment from textual data [1]. To identify the most pressing customer concerns, we have implemented word frequency analysis, a strategy that has been acknowledged for its effectiveness in uncovering the key themes within textual feedback [2]. The combination of these advanced computational techniques with the thoroughness of manual text analysis has provided a robust framework for extracting valuable insights from the extensive corpus of customer reviews.

The incorporation of big data analytic in the hospitality sector is essential for navigating the vast array of online reviews and revealing subtle patterns that may not be apparent through traditional manual analysis [3]. To make our analytical insights actionable for hotel managers and stakeholders, we have adopted visualization techniques that transform complex data into a more accessible and comprehensible format [4]. Recognizing the fundamental role of preprocessing in text mining, we have subjected our text data to a rigorous process of tokenization, stemming, and lemmatization, following established procedural guidelines [5]. These foundational steps are crucial for equipping computational models with the ability to correctly interpret the sentiment and content of customer reviews. Furthermore, sentiment analysis is a cornerstone of our study, enabling us to measure the emotional tone of customer complaints and to gauge the depth of their dissatisfaction [6]. The sentiment scores derived from this analysis serve as a critical tool for issue prioritization and strategic decision-making within the hospitality industry.

Employing a mixed-methods approach, this study delves into the analysis of customer complaints found within online reviews of Korean hotels. By integrating manual text analysis with cutting-edge computational techniques, we strive to uncover prevalent themes and the root causes of customer feedback. Our data-set encompasses 800 textual complaints, meticulously curated from the Ctrip platform, and encompasses a diverse array of 30 hotel types, thereby offering a representative overview of the hospitality industry. Throughout the research endeavor, ethical considerations have been of paramount importance, with a steadfast commitment to safeguarding personal information and upholding data privacy standards.

2. Literature Review

2.1 Relationship between customer complaints and customer satisfaction

When customers are dissatisfied with the service provided by a hotel, they often express their dissatisfaction through complaints. Such complaints resulting from dissatisfaction may lead to customers switching service providers, generating complaints, and influencing the behavior of other potential customers on a broader scale [7,8]. Typically, customers at high-end hotels have higher expectations of service, so their dissatisfaction with the

hotel may result in more intense negative behavioral outcomes. In this context, consumer complaint management has become an important issue and a key factor for success in today's business environment [9,10].

Most studies suggest that dissatisfied customers have consistency in the types and content of complaints they make about hotels. For instance, Berezina et al. found that dissatisfied customers often complain about the tangible aspects of hotels, such as furniture and financial-related issues [11-13]. Additionally, Xu and Li pointed out that customer dissatisfaction may include issues like Wi-Fi, staff attitude, noise, and parking [14]. Furthermore, research indicates that for upscale hotels, customer complaints are primarily related to intangible service issues and pricing, while customers of budget hotels are more concerned about tangible facility issues [15].

Additionally, the impact of hotel grade types on customer complaints is noteworthy. Studies have found that customers' complaint focus varies across different types of hotels, such as economy, upscale, and luxury hotels. However, the overall trend indicates that service and facilities are the main factors contributing to customer dissatisfaction [15].

2.2 The role of online reviews in the hotel industry

In the era of e-commerce and digitalization, an increasing number of consumers choose to book hotels online and share and publish reviews through various online channels after their stay. These online reviews not only generate electronic word-of-mouth effects in the form of text comments and ratings, influencing future customer demand and hotel financial performance, but also have significant reference value for potential consumers when searching for hotels [16]. Therefore, studying customer online text review information is crucial for hotel enterprises to understand customer consumption experiences, discover product and service attributes that customers care about, obtain genuine perceptions of hotel services from customers, and understand the overall satisfaction level of the hotel.

Customers' motivations for posting online reviews include reciprocity, altruism, social needs, and economic rewards [17]. Research has found that customers are generally more inclined to post online reviews in extreme situations, such as when a complaint occurs. Negative reviews typically focus on specific aspects of products and services that customers are dissatisfied with, and they tend to describe these attributes in detail [14]. Additionally, when complaining, customers tend to showcase specific reasons for their dissatisfaction to future customers and hotel operators [11].

Consumer online reviews, including ratings, emotions, and textual content, comprehensively reflect consumer satisfaction. Generally, ratings of 1 or 2, along with negative emotions and textual content, indicate dissatisfaction with the hotel [18]. Consumers express their dissatisfaction with hotel services, facilities, charges, attitudes, etc., through online platforms. These negative emotions may spread online and gradually converge in terms of sentiment through collective emotional contagion. The higher the degree of service failure, the greater the dissatisfaction related to early service transactions and confidence in service providers, which may lead to deteriorating repurchase and weakening, as well as negative word-of-mouth [19].

Of course, negative online reviews can sometimes be opportunities for hotels. On one hand, objective information from online reviews is beneficial for adjusting potential customers' consumption expectations about the hotel, making their expectations more aligned with their future real experiences, thus reducing the risk of dissatisfaction for both consumers and hotels. On the other hand, customer complaints also provide hotels with opportunities to discover problems and improve products and services. Therefore, scholars have begun to analyze online reviews, considering them as valuable resources for improving hotel service quality [14]. An increasing number of studies emphasize the determinants of customer dissatisfaction by analyzing the textual content of customer reviews [15]. These studies either manually analyze text or use computer-based methods such as word frequency analysis or probabilistic topic modeling.

2.3 Current status and shortcomings of related research

According to the literature search results from Web of Science, there is a scarcity of research on the topic of "South Korean hotel industry." Existing studies mainly focus on employee satisfaction, human resource management, environmental protection, ingredient procurement, leadership and service quality, hotel brand

selection, and employees' perception of corporate social responsibility activities. For example, Jung, H.-S. et al. studied the impact of workplace flexibility on work engagement, satisfaction, and commitment in South Korean deluxe hotels [20,21].

Overall, the existing research outcomes regarding the South Korean hotel industry lack a focus on customer complaints and customer satisfaction as core research topics. Moreover, there is a lack of in-depth analysis of hotel customer complaints and customer satisfaction based on online review text content. This gap suggests that there is still room to enhance understanding of customer complaints and their impact on the South Korean hotel industry, particularly in the area of utilizing online review text for in-depth analysis. Therefore, it is necessary to conduct research on hotel customer complaints and customer satisfaction based on online review text content to enrich the understanding of common feedback issues and their underlying causes in the South Korean hotel industry, and to improve hotel management practices.

3. Research Methodology

This paper employs a mixed-method approach, combining manual text analysis and computer-based word frequency analysis, to comprehensively investigate customer complaints in online reviews of Korean hotels. Initially, 800 valid text complaints were extracted from 30 different hotel categories on the Ctrip platform to ensure diversity and representativeness within the hotel industry. These data were carefully selected based on specific inclusion criteria to maintain the integrity and relevance of the analysis.

3.1 Manual text analysis

Due to sufficient research time and a moderate number of text complaint comments from sample hotels, many comments exhibited issues such as expression, grammar, and repetition. Thus, a manual text analysis approach was first utilized to ensure accurate comprehension and categorization of the complaint texts. Specific operations included categorizing complaint texts into three levels: luxury, upscale, and mid-range, as well as four issue categories: hardware facilities, service, attitude, and anomalies. Complaint issues were sorted and summarized by category to facilitate subsequent analysis.

3.2 Computer word frequency analysis

To further explore the key issues behind complaints and enhance research efficiency and reliability, computer-based word frequency analysis was employed. Specific steps involved using Python's Natural Language Toolkit (NLTK) as the text analysis software for word frequency analysis. High-frequency words in different categories of complaints from different types of hotels were analyzed and calculated. Weighted scores of high-frequency words were summarized to generate different complaint themes, revealing the key issues of complaints.

3.3 Data collection

Ctrip was selected as the source of data collection as it is one of the world's largest online hotel review platforms, with its review data considered to have a certain level of objectivity and authenticity, thus possessing high research value. Thirty hotels in the Seoul area were chosen as samples, including 10 economy (three-star), 10 upscale (four-star), and 10 luxury (five-star) hotels, aiming to ensure sample representativeness and comprehensive coverage. After screening and organizing each comment, a total of 800 valid hotel complaint text comments were finally obtained.

Throughout the entire research process, strict adherence to ethical considerations, including anonymization of personal information and compliance with data privacy standards, was maintained. The combination of manual and computer methods ensured the reliability and effectiveness of the research findings, facilitating the formulation of feasible management recommendations and contributing to the existing knowledge base in this field.

4. Empirical Research Results

4.1 Analysis of types and frequency of customer complaints

A total of 800 complaint text comments were extracted from 30 hotels on the Ctrip website. The selection of sample hotels was based on considerations such as hotel type, location, and the number of complaints, ensuring the representativeness and scientific nature of the sample hotels' selection. After checking and correcting each comment, they were categorized into service issues, hardware facility issues, attitude issues, and abnormal event issues in an Excel spreadsheet. Issues such as "value for money, location, lack of disposable items, and charges for disposable items and parking" were classified under abnormal issues. See Table 1 for detailed statistical results:

Table 1 Classification and statistical analysis of complaint issues in different types of hotels.

Issue \ Number of Comments	Five-star/Luxury		Four-star/Upscale		Three-star/Mid-range		Total	
	Comments	Percentage (%)	Comments	Percentage (%)	Comments	Percentage (%)	Comments	Percentage (%)
Service Issues	172	45.38	170	35.94	199	40.70	541	40.34
Hardware Issues	100	26.39	140	29.60	145	29.65	385	28.71
Attitude Issues	35	9.23	72	15.22	83	16.97	190	14.17
Abnormal Issues	72	19.00	91	19.24	62	12.68	225	16.78
Total	379	54.62	473	64.06	489	59.30	1341	100.00

The statistical data from Table 1 reveals that overall, service issues are the most common complaint among different types of hotels, accounting for a high percentage of 40.34%, significantly higher than the other three categories of issues. This indicates that service quality is the most concerning aspect for customers during their hotel stays. Among different grades of hotels, luxury hotels have the highest proportion of service issues (45.38%), followed by mid-range hotels (40.70%), and upscale hotels have the lowest proportion (35.94%). This suggests that the service provided by luxury hotels falls notably short of guests' expectations, with luxury hotels experiencing the most service-related issues. This finding differs significantly from the research conclusion of Jie Wu & Narisa Zhao that "service is the most serious complaint topic in economy hotels, while it is not in other types of hotels," indicating a concerning service situation in luxury and upscale hotels in Seoul, South Korea [9].

Hardware issues are the second-largest source of complaints across all types of hotels, accounting for 28.71% of total complaints. Hardware issues mainly refer to problems related to hotel facilities and equipment. Across different grades of hotels, the proportion of hardware issues is relatively similar, with luxury hotels experiencing slightly fewer hardware facility issues compared to upscale and mid-range hotels. This indicates that hardware facilities are a focal point of concern for customers across various types of hotels, with hardware issues gradually increasing as the hotel grade decreases.

Abnormal issues constitute the third-largest problem in overall complaints, accounting for 16.78% of total complaints. Abnormal issues are typically caused by sudden events or unpredictable circumstances, such as sudden facility breakdowns or weather impacts. Cost-effectiveness issues represent customers' overall perceptions of the hotel, while location factors are beyond the hotel's control. The lack of disposable items and charges for disposable items are related to South Korea's environmental policies, and parking charges are issues beyond service, attitude, and hardware. Therefore, these categories of issues are classified under abnormal issues. Among different grades of hotels, luxury and upscale hotels experience more abnormal issues, while mid-range hotels experience relatively fewer.

Attitude issues are the least frequent among the four categories of issues, accounting for 14.17% of total complaints. Additionally, the higher the hotel grade, the fewer complaints related to attitude issues.

4.2 Analysis of online review scores and reviewer comment scores

In addition to the types and frequencies of customer complaints, our study also examined the online review scores and reviewer comment scores for different types of hotels to gain a comprehensive understanding of customer

satisfaction levels. Table 2 presents the statistical summary of these scores, offering insights into how customers rate their experiences across various hotel categories. The overall rating average for five-star/luxury hotels is 4.39, indicating a high level of customer satisfaction. This is closely followed by upscale hotels with an average rating of 4.45, while mid-range hotels have a slightly lower average rating of 4.01. These ratings suggest that upscale hotels are particularly successful in meeting customer expectations, which is a crucial factor for the hospitality industry.

However, it is noteworthy that the reviewer rating average shows a different trend, with luxury hotels scoring 2.88, upscale hotels 2.21, and mid-range hotels 2.02. The discrepancy between the overall ratings and reviewer ratings may suggest that while customers may rate the physical attributes of the hotel highly, their personal experiences, as reflected in the reviewer comments, may not align with the same level of satisfaction. This divergence is an important aspect for hotel managers to consider, as it highlights the need to address not only the tangible aspects of the hotel but also the quality of service and customer interactions.

The analysis of Table 2 underscores the importance of examining both quantitative ratings and qualitative comments to fully understand customer sentiment. It also indicates that while luxury and upscale hotels may excel in certain areas, there is room for improvement across all hotel types to ensure that customer expectations are consistently met.

Table 2 Statistical summary of online review scores and reviewer comment scores for different types of hotels.

Hotel	Scores	Online Review Scores (Total Score: 5 Points)		
		Five-star/Luxury	Four-star/Upscale	Three-star/Mid-range
Hotel 1		4.30	4.40	4.30
Hotel 2		4.60	4.40	4.10
Hotel 3		4.20	4.60	4.50
Hotel 4		4.50	4.40	4.30
Hotel 5		4.40	4.60	3.60
Hotel 6		4.80	4.40	3.30
Hotel 7		4.00	4.60	4.20
Hotel 8		4.40	4.40	4.10
Hotel 9		4.60	4.40	3.60
Hotel 10		4.10	4.30	4.10
Overall Rating Average		4.39	4.45	4.01
Reviewer Rating Average		2.88	2.21	2.02

From the overall ratings perspective, upscale hotels have relatively higher ratings, followed by luxury hotels, while mid-range hotels have relatively lower ratings. This indicates that upscale hotels better meet customer needs. The reviewer ratings also show a similar trend, with a downward trend from luxury to upscale to mid-range hotels.

4.3 Analysis of the impact of different factors on customer complaints

To further explore the specific reasons behind different complaint issues, frequency analysis was conducted using word frequency analysis method. Word cloud images for different complaint types and key word statistics for different types of hotels and different complaint issues were generated. Please refer to Figure 1, Figure 2, Figure 3, Figure 4, and Table 3 for detailed results.

Table 3 Keyword classification statistics of different types of hotels and different complaint issues.

Complaint Issue	Hotel Grade	Keyword Analysis Output
Service Issues	Five-star/Luxury	22.004*Service + 10.099*Room + 8.346*Check-in + 6.892*Cleanliness + 5.833*Breakfast + 5.133*Disappointment + 4.444*Poor + 4.324*Cleaning + 4.06*Hygiene + 4.007*Dust + 3.766*Check-in + 3.606*Staff + 3.3*Five-star + 3.225*First-time + 3.164*Sofa
	Four-star/Upscale	15.536*Service + 13.736*Front Desk + 13.629*Room + 7.373*Cleaning + 7.307*Check-in + 5.661*Hygiene + 5.443*Poor + 5.43*Breakfast + 4.932*Staff + 4.847*Terrible + 4.675*Check-out + 4.653*Attendant + 4.46*Clean + 4.364*Sheets + 4.194*Phone
	Three-star/Mid-range	21.336*Room + 12.831*Hygiene + 12.102*Service + 11.796*Dust + 9.865*Sheets + 9.639*Unclean + 9.0*Cleaning + 6.684*Odor + 6.518*Bathroom + 5.527*Very Dirty + 5.364*Cleanliness + 4.932*Front Desk + 4.911*Breakfast + 4.579*Stench + 4.565*Hair
Hardware Issues	Five-star/Luxury	13.679*Room + 8.775*Facilities + 4.132*Swimming pool + 3.902*Small + 2.887*Lobby + 2.808*Air conditioning + 2.408*Shower + 2.299*Not good + 2.191*Soundproofing + 2.012*Sound + 2.0*Guest room + 1.989*Morning + 1.95*Pool + 1.805*Next door + 1.776*Things
	Four-star/Upscale	25.783*Room + 9.754*Soundproofing + 9.545*Facilities + 7.402*Noise + 6.953*Toilet + 5.933*Small + 5.795*Shower + 5.117*Bathroom + 4.201*Sound + 4.104*Toilet bowl + 3.993*Restroom + 3.958*Check-in + 3.709*Motel + 3.46*Super + 3.321*Space
	Three-star/Mid-range	27.196*Room + 10.439*Facilities + 8.649*Small + 7.884*Soundproofing + 7.289*Air conditioning + 6.429*Bathroom + 6.026*Elevator + 4.404*Toilet + 4.23*Bathub + 4.147*Outdated + 3.782*Window + 3.725*Not good + 3.477*Too small + 3.319*Restroom + 3.211*Shower room
Attitude Issues	Five-star/Luxury	4.616*Friendly + 4.063*Front Desk + 3.479*Chinese + 2.462*Staff + 2.279*Service + 2.252*Attitude + 2.184*Staff member + 1.731*Employee + 1.374*Provide + 1.318*Pool + 1.158*Staff + 1.061*Check-in + 0.865*Dealing + 0.857*This is + 0.855*Too poor
	Four-star/Upscale	11.991*Attitude + 11.611*Front Desk + 7.534*Staff + 5.393*Friendly + 5.358*Service attitude + 5.09*Service + 4.577*Staff member + 3.69*Check-in + 3.439*Chinese + 3.037*Kind + 2.94*Employee + 2.841*There is + 2.754*Korean + 2.236*Room + 2.234*Phone
	Three-star/Mid-range	10.653*Front Desk + 9.311*Attitude + 5.665*Staff + 5.238*Friendly + 4.552*Employee + 4.303*Service attitude + 3.529*Service + 3.256*Kind + 2.782*Check-in + 2.778*Not good + 2.634*Room + 2.617*Staff member + 2.509*Staff + 2.375*Check-out + 2.127*Poor
Abnormal Issues	Five-star/Luxury	6.875*Location + 6.717*Value for money + 4.34*Toothbrush + 3.539*Airport + 3.0*China + 2.448*Price + 2.096*Accommodation + 2.065*Seoul + 2.043*South Korean won + 1.712*Charge + 1.701*Provide + 1.667*Toothpaste + 1.43*Not good + 1.38*Minutes + 1.273*Downstairs
	Four-star/Upscale	14.673*Train + 6.695*Noise + 6.054*Location + 5.994*Railway + 5.04*Room + 4.665*South Korean won + 4.122*Near + 3.909*Value for money + 3.622*Next to + 3.563*Outside + 3.472*Can't sleep + 3.395*Subway + 3.347*Parking fee + 3.166*Parking + 2.951*Sound
	Three-star/Mid-range	4.21*Toothbrush + 3.451*Parking fee + 2.56*Value for money + 2.302*Location + 2.239*Downstairs + 2.155*Slippers + 2.088*Toothpaste + 2.077*Check-out + 1.914*First floor + 1.903*Check-in + 1.853*Charge + 1.837*Provide + 1.804*Disposable + 1.783*Price + 1.719*Facilities



Figure 1 Word cloud of service issues



Figure 2 Word cloud of hardware facilities issues



Figure 3 Word cloud of attitude issues

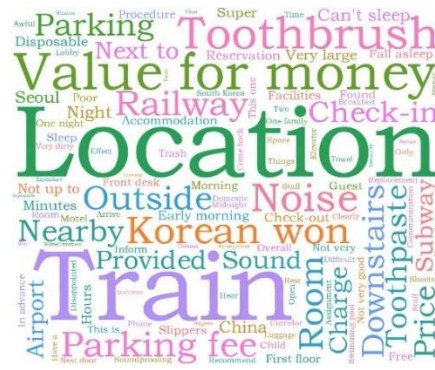


Figure 4 Word cloud of abnormal issues

4.4 Analysis of service issues and their causes

Among various types of hotels, service issues are one of the primary reasons for customer dissatisfaction. Common service issues include front desk service, room cleanliness, and breakfast quality. In luxury hotels, service problems mainly focus on service quality and room quality, while in high-end and mid-range hotels, service issues involve front desk service, room cleanliness, and service quality. Particularly noteworthy are the dissatisfaction of luxury hotel customers with breakfast quality, the attention of high-end hotel customers to front desk service, and the concerns of mid-range hotel customers regarding room cleanliness and service quality. These service issues may impact overall customer experience and satisfaction. This is consistent with the findings of Jie Wu and Narisa Zhao [9], where "the primary reason for consumer complaints about food is 'breakfast'," but differs from their conclusion in that luxury hotels do not necessarily provide better breakfast service, instead receiving the most complaints among all types of hotels. This should draw attention from hotel practitioners.

4.5 Analysis of hardware issues and their causes

Room facilities are the primary concern for customer complaints across various types of hotels, indicating the significant impact of hotel hardware facilities on customer satisfaction. Common hardware issues include room size, usability of facilities, soundproofing, and the performance or comfort of specific equipment. In luxury hotels, facility issues mainly revolve around room size not meeting customer expectations, poor soundproofing, and underperformance of air conditioning and shower facilities. High-end hotel hardware problems involve various aspects such as rooms, soundproofing, facilities, noise, toilets, showers, and bathrooms. Although "room" is the most frequently mentioned term, other terms such as "soundproofing," "noise," and "sound" also reflect concerns about the room environment. Similarly, hardware issues in mid-range hotels mainly involve aspects like rooms, facilities, soundproofing, air conditioning, bathrooms, and elevators. Again, while "room" is the most frequently mentioned term, other terms such as "facilities," "bathroom," "toilet," and "air conditioning" also indicate customer concerns about hardware facilities. These hardware issues are consistent with previous research findings.

but the issues of inadequate space and layout of hotel rooms in South Korea, as well as the facility issues in swimming pools, are particularly prominent and need attention from hotel practitioners.

4.6 Analysis of attitude issues and their causes

Attitude issues raised by customers involve multiple aspects, with front desk service, staff attitude, friendliness and politeness, and the experiences of international travelers being particularly prominent. Front desk service is identified as a significant issue, reflected in the frequent appearance of keywords related to the front desk such as "front desk," "check-in," and "check-out." Additionally, staff attitude is a matter of concern, reflected in the frequent appearance of keywords related to staff attitude such as "staff," "employee," and "worker." Customers generally expect hotel staff to demonstrate a friendly and polite attitude, as indicated by keywords such as "friendly," "kind," and "attitude." It is noteworthy that in complaints from luxury and high-end hotels, there are frequent mentions of the attitudes of travelers from countries like China, reflecting the attention of international travelers to service attitudes in cross-cultural environments.

4.7 Analysis of abnormal issues and their causes

Abnormal issues raised in hotel complaints include inconvenience and high charges for parking, lack or excessive charges for disposable items, poor location, low value for money, and secondary charges by the hotel. The abnormal issues in luxury hotels mainly focus on location and value for money, while those in high-end hotels mainly involve noise disturbances in the surrounding environment. Conversely, abnormal issues in mid-range hotels mainly revolve around convenience facilities and services. These problems mainly stem from factors such as insufficient parking services, unfavorable geographic locations, improper pricing strategies, and poor service quality. Parking issues are somewhat related to Seoul's status as a crowded city, leading to limited parking spaces. Hotels may fail to provide enough parking spaces, or the quality of parking services may be poor, such as excessive wait times or aging parking facilities. Moreover, high parking fees may be associated with hotel locations in downtown areas or bustling districts. The absence of disposable items inconveniences guests, especially short-term travelers or those in urgent need of such items. If disposable items are provided but charged at high rates, it may also upset guests who perceive these charges as additional fees imposed by the hotel. Some hotels may be surrounded by noise or safety issues, with geographic locations not meeting guest expectations or needs, such as being far from the city center, inconvenient transportation, or unfavorable surroundings, thus affecting the guest experience. Additionally, guests may perceive a mismatch between the services provided by the hotel and their prices, resulting in issues of value for money. They may also be charged undisclosed or unreasonable additional fees, such as cleaning fees or service charges, leading to secondary charging issues by the hotel.

5. Conclusion and Discussion

5.1 Main research findings

This paper fills a gap in the study of customer complaint issues in the South Korean hotel industry based on online review texts. Through in-depth analysis of online review content, common customer complaint issues and their causes in South Korean hotels were identified, providing important empirical data and insights for the South Korean hotel industry. The study found that service issues dominate across all types of hotels, with service problems in luxury hotels being particularly prominent, indicating significant room for improvement in service quality. Hardware issues closely follow, with customers of all types of hotels paying attention to facilities and equipment. Abnormal issues as the third largest source of complaints, each type of hotel faces personalized challenges. Although attitude issues are relatively few in number, they remain a noteworthy concern, especially in luxury and high-end hotels, where the perceptions of international travelers towards service attitudes have also attracted researchers' attention.

5.2 Practical implications and managerial insights

Through the analysis of the types and frequencies of customer complaints in Seoul hotels, hotel managers can gain insight into the key concerns of customers and the issues faced by the hotel. This provides managers with targeted opportunities to improve service quality and hardware facilities, thereby enhancing customer satisfaction.

In terms of service issues, hotel managers should focus on service quality, front desk service efficiency, and room cleanliness. Specifically, luxury hotels should pay special attention to improving service quality and ensuring room cleanliness. High-end hotels need to improve front desk service quality, pay attention to room cleanliness, and prioritize breakfast quality. Mid-range hotels should strengthen room cleanliness and hygiene management, striving to improve room odors and comfort. Overall, enhancing employee training, optimizing service processes, and addressing complaints promptly are key measures to improve hotel service standards.

Regarding hardware issues, hotel managers should focus on the quality of room facilities, the completeness of facilities, and room comfort. Particularly in luxury hotels, special attention should be given to improving the quality of room facilities and ensuring the integrity of all facilities. High-end hotels need to improve soundproofing and pay attention to the maintenance of room facilities, while also focusing on the cleanliness and comfort of bathrooms and toilets. Mid-range hotels need to strengthen room cleanliness and facility maintenance management, striving to improve room decoration and facility completeness. In summary, enhancing employees' repair skills through training, conducting regular equipment inspections and facility maintenance, and addressing hardware issues raised by guests promptly are key measures to improve hotel facility satisfaction.

As for attitude issues, hotel staff need to focus on training for front desk service and staff attitudes to enhance service quality and customer experience. With the development of international tourism, hotel managers should also focus on cross-cultural communication and service skills training, emphasizing equal treatment and respect for all guests to ensure service is free from bias or discrimination. Additionally, hotels should provide multilingual services, employ multilingual staff, or provide multilingual information and instructions to enhance the service experience for foreign guests. Hotel managers should also regularly assess discrimination and differential treatment issues in services and take measures to improve them through methods such as customer satisfaction surveys, complaint analysis, and employee feedback. By implementing these strategies, South Korean hotels can enhance their overall competitiveness, attract more domestic and international tourists, and promote the sustainable development of the hotel industry.

Regarding abnormal issues in different types of hotels, managers should focus on location selection, the quality of additional services, and parking management. They need to strengthen emergency plans and crisis management for these common unexpected issues and optimize additional fee issues and disposable item services. Luxury hotels should pay special attention to location and value for money issues while providing high-quality additional items and services. High-end hotels should address noise and location issues and set reasonable parking fee standards to ensure an adequate number of parking spaces. Mid-range hotels should prioritize the provision of additional items, ensure the reasonable provision of disposable items under legal and compliant conditions to meet customers' essential needs, and focus on the quality of other related services. These measures will help improve the customer experience and enhance hotel competitiveness.

5.3 Limitations and future research directions

Despite achieving certain research results, there are still some limitations that need to be addressed. Firstly, the sample selection is limited to luxury, high-end, and mid-range hotels on the Ctrip website, and the survey is only conducted in the Seoul area of South Korea. This may lead to limitations in the results, as hotels in different regions and countries may have different complaint patterns and issues. Secondly, the data used in this study mainly comes from online reviews on the Ctrip website. These reviews may be influenced by the writer's personal experiences and subjective factors, and there may be cases where customers choose not to leave complaints or reviews on the website, leading to data incompleteness. Additionally, although the complaints were classified, the classification method may be subjective, and some complaints may be misclassified or overlooked, thus affecting the accuracy of the results. Finally, the paper mainly used quantitative research methods such as statistical analysis and word frequency analysis, without delving into qualitative research methods to understand the specific reasons behind the complaints and customer experiences, which is also a research direction worth exploring.

Therefore, future research directions could expand to cross-regional comparative studies, using qualitative research methods such as in-depth interviews and questionnaire surveys to further explore the factors influencing

customer satisfaction and loyalty. Additionally, integrating technological means to develop intelligent complaint handling systems can help to enhance hotel management levels and service quality more effectively.

5.4 Integration of computational methods

In this study, we have adeptly integrated a suite of computational methods to enhance the analysis of customer complaints within the South Korean hotel industry. By leveraging Natural Language Processing (NLP) techniques, we conducted an in-depth analysis and interpretation of customer complaints, meticulously categorizing feedback to shed light on the spectrum of issues encountered by patrons. Our analytical framework is underpinned by text classification algorithms, which harmonize with current trends in sentiment analysis research, emphasizing the importance of context-aware models for accurately gauging customer sentiment from textual data. Furthermore, the incorporation of machine learning algorithms has allowed us to identify patterns and insights that may not be apparent through traditional manual analysis. We have also embraced visualization techniques to transform complex data into a more accessible and comprehensible format, making our analytical insights actionable for hotel managers and stakeholders. Recognizing the fundamental role of preprocessing in text mining, we subjected our text data to a rigorous process of tokenization, stemming, and lemmatization, following established procedural guidelines. These foundational steps are crucial for equipping computational models with the ability to correctly interpret the sentiment and content of customer reviews.

Additionally, the utilization of big data analytics has been paramount for navigating the vast array of online reviews and illuminating the nuanced patterns that could elude traditional scrutiny. The sentiment scores derived from our analysis serve as a critical tool for issue prioritization and strategic decision-making within the hospitality industry. This approach demonstrates the utility of data-driven methodologies in optimizing customer satisfaction and operational efficiency in the hospitality sector, showcasing the potential for further research and application of these computational techniques in future studies.

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