

Implementation of MOORA in Decision Support System Optimization for Hotel Accommodation Services

Yerik Afrianto Singgalen*

Faculty of Business Administration and Communication, Tourism Study Program, Atma Jaya Catholic University of Indonesia, Jakarta, Indonesia

Email: yerik.afrianto@atmajaya.ac.id

Correspondence Author Email: yerik.afrianto@atmajaya.ac.id

Submitted: 27/12/2023; Accepted: 30/12/2023; Published: 30/12/2023

Abstract—Service marketing challenges increase brand awareness related to accommodation services related to services, facilities, room comfort and quality, cleanliness, value for money, and location. Consumers who use Agoda's platform exhibit purchase behavior that makes ratings a benchmark before making a stay decision. This research aims to optimize the decision support system for selecting hotel accommodation services using the Multi-Objective Optimization on the Basis of Ratio Analysis (MOORA) decision support model. The MOORA method consists of the following stages: first, determining criteria, weights, and alternatives; second, determining the value of criteria, weights, and alternatives; third, the stage of normalization and optimization of attributes; Fourth, the stage of reducing the maximax and minimax values and ranking. Meanwhile, based on the classification of criteria, only the value of money is categorized as min, while other criteria include the max category. In addition, the weight of the criteria is as follows: services (0.15), facilities (0.15), room comfort and quality (0.20), cleanliness (0.20), value for money (0.20), and location (0.10). The results of this study show that The Trans Luxury Hotel ranks first with a total Yi value of 0.200649351. F, Pullman Bandung Grand Central ranked second with a total Yi value of 0.198075614. Meanwhile, Hilton Bandung ranks third with a total Yi value of 0.19758031. This shows that each hotel needs to increase its rating to attract the attention of potential customers in the decision-making process of staying.

Keywords: MOORA; Hotel; Decision-Support; Service Quality; Accommodation

1. INTRODUCTION

Decision Support Systems (DSS) are pivotal in facilitating optimal decision-making processes [1]. In this regard, the research employs multi-object optimization based on ratio analysis (MOORA) to enhance decision support when selecting hotel accommodation services. The primary objective of this study is to underscore the necessity of a robust decision support system when confronted with the task of identifying the most suitable options. The MOORA methodology, grounded in ratio analysis, emerges as a fitting approach due to its ability to evaluate multiple criteria and prioritize alternatives effectively and comprehensively [2]. Consequently, this research contends that integrating MOORA into decision-making processes contributes to a more refined and informed selection of hotel accommodation services. In conclusion, using MOORA in decision support systems holds substantial promise in optimizing the decision-making landscape [3].

Implementing the MOORA methodology involves meticulously considering various criteria for decision-making [4]. The critical criteria employed in this implementation encompass services, facilities, room comfort and quality, cleanliness, value for money, and location. These criteria collectively form the foundation for evaluating and comparing different alternatives in selecting hotel accommodations. The significance of these criteria lies in their ability to capture multifaceted aspects that contribute to the overall quality and satisfaction of the chosen service [5]. Consequently, incorporating these criteria in the MOORA implementation ensures a comprehensive and nuanced assessment, enhancing the precision and effectiveness of decision support in the hotel accommodation selection [6]. In conclusion, the judicious selection and integration of these criteria underscore the robustness of the MOORA methodology in addressing the multifarious considerations inherent in decision-making processes related to hotel accommodations.

MOORA stands as a significant algorithm in the pursuit of optimizing Decision Support Systems (DSS). In the realm of decision-making, the primary role of MOORA is underscored by its ability to handle multiple criteria concurrently, offering a comprehensive framework for evaluating and prioritizing alternatives [7]. This algorithm, rooted in ratio analysis, enables decision-makers to navigate complex decision landscapes by considering various factors simultaneously [8]. Integrating MOORA into decision support systems enhances the optimization process by providing a structured and systematic approach to decision-making [9]. Consequently, the utilization of MOORA contributes to the efficiency and effectiveness of DSS, ensuring a more informed and refined decision-making environment [10]. In summary, MOORA emerges as a valuable algorithm in DSS optimization, offering a robust methodology for navigating the intricacies of decision-making processes.

Hotel Accommodation Service Quality constitutes a critical aspect within the hospitality industry, defining the overall guest experience. The principal focus is meticulously delivering services that meet or exceed guest expectations, encompassing reception efficiency, room cleanliness, amenities, and staff courtesy [11]. These collective components contribute significantly to the perceived quality of the hotel accommodation [12]. Opinions on service quality often hinge on aligning customer expectations with their experiences during their stay [13]. High service quality fosters guest satisfaction and influences repeat business and positive word-of-mouth recommendations [14].



In conclusion, the emphasis on Hotel Accommodation Service Quality reflects its pivotal role in shaping the reputation and success of hospitality establishments, highlighting the intricate interplay between service delivery and guest satisfaction. Hotel guests commonly rely on the ratings of various platforms such as Agoda, TripAdvisor, and Booking.com to inform their accommodation decisions [15]. The primary consideration for guests is the accessibility of information on these platforms, offering a centralized location for reviews and ratings [16]. Reviews on Agoda, TripAdvisor, and Booking.com serve as valuable indicators of the overall quality of a hotel's services and amenities, influencing the decision-making process of potential guests [17]. The convenience of accessing these platforms and the wealth of user-generated content provide a comprehensive overview of others' experiences, assisting prospective guests in making informed choices [18]. In conclusion, the prominence of hotel rating platforms signifies the increasing significance of online reviews in shaping consumer perceptions and decisions within the hotel industry.

The outcomes of this research offer practical implications for enhancing hotel guest satisfaction through optimizing services and providing facilities tailored to individual needs or preferences [19]. The primary focus lies in applying research findings to improve the guest experience. By optimizing services based on identified preferences and streamlining facilities to meet specific requirements, hotels can effectively address and exceed guest expectations [20]. This approach reflects a proactive strategy in aligning service delivery with the diverse preferences of guests, thereby fostering a positive perception and increasing overall satisfaction levels [21]. In conclusion, the practical insights from this study serve as a valuable guide for hotel management to implement targeted improvements, ultimately contributing to elevated guest satisfaction and loyalty.

The limitations of this study are rooted in the data source, which is exclusively derived from Agoda, about the context of hotel accommodations in Bandung, Indonesia. While Agoda provides a comprehensive platform for hotel bookings and reviews, the reliance on a single source may constrain the generalizability of the findings to a broader context [22]. The specific focus on Bandung could limit the applicability of the results to other regions with distinct characteristics or varying levels of tourism development. Acknowledging this limitation is crucial for understanding the scope and potential constraints of the research, highlighting the necessity for future studies to incorporate diverse data sources and expand the geographical scope for a more comprehensive understanding of hotel accommodation dynamics.

2. RESEARCH METHODOLOGY

2.1 Multi-Object Optimization on the basis of Ratio Analysis (MOORA)

The Multi-Objective Optimization on the Basis of Ratio Analysis (MOORA) decision support model has been widely employed in decision-making processes. This approach is characterized by its ability to handle multiple criteria simultaneously, providing a structured and systematic framework for evaluating and ranking alternatives. The versatility of MOORA lies in its capacity to accommodate diverse decision contexts, making it applicable across various industries and domains. Furthermore, its reliance on ratio analysis enhances the precision of evaluations, enabling decision-makers to prioritize alternatives based on a balanced consideration of multiple criteria. In the realm of decision support, the widespread utilization of the MOORA model attests to its effectiveness in aiding decision-makers by offering a comprehensive and efficient methodology. In conclusion, the prevalence of MOORA in decision-making processes highlights its robustness and applicability, positioning it as a valuable tool in various decision domains.

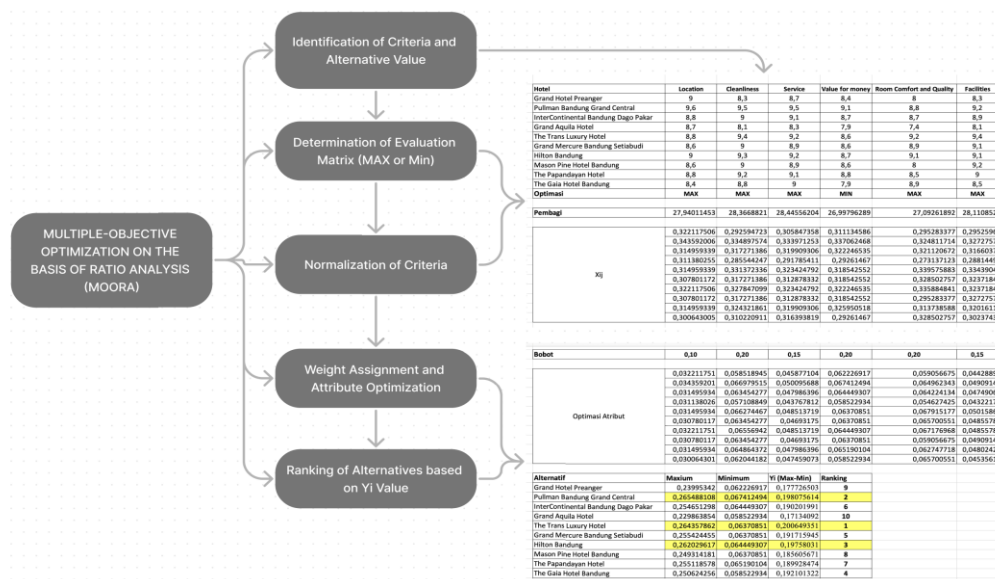


Figure 1. Multi-Objective Optimization on the Basis of Ratio Analysis (MOORA)



Figure 1 describes the stages of the MOORA method. The MOORA exhibits both strengths and weaknesses in decision-making processes. The primary advantage lies in its ability to handle multiple criteria simultaneously, allowing for a comprehensive evaluation of alternatives. The structured approach of MOORA, grounded in ratio analysis, enhances decision precision and facilitates a systematic ranking of options. However, one notable limitation is its sensitivity to the weighting of criteria, as the accuracy of results is contingent on the subjective assignment of weights. In addition, MOORA may face challenges in handling large datasets and complex decision environments. Despite these drawbacks, the model's versatility and widespread applicability underscore its significance in decision support systems. In conclusion, while MOORA offers a robust methodology for decision-making, careful consideration of its limitations is imperative for ensuring its appropriate use and effectiveness in various decision contexts.

Furthermore, the criteria used in the calculation of MOORA for optimization of decision support systems related to the selection of hotel accommodation services are as follows: location (C1); Cleanliness (C2); Service (C3); Value for Money (C4); Room Comfort and Quality (C5); Facilities (C6). Optimization categories based on criteria are as follows: C1 (MAX); C2 (MAX); C3 (MAX); C4 (MIN); C5 (MAX); C6 (MAX). Furthermore, the weight of each criterion is as follows: C1 (0.10); C2 (0.20); C3 (0.15); C4 (0.20); C5 (0.20); C6 (0.15). Meanwhile, the alternatives used in this study are hotel accommodation service providers as follows: Grand Hotel Preanger (A1); Pullman Bandung Grand Central (A2); InterContinental Bandung Dago Pakar (A3); Grand Aquila Hotel (A4); The Trans Luxury Hotel (A5); Grand Mercure Bandung Setiabudi (A6); Hilton Bandung (A7); Mason Pine Hotel Bandung (A8); The Papandayan Hotel (A9); The Gaia Hotel Bandung (A10). Thus, the values, symbols, criteria categories, and alternatives can be processed to the next stage.

Table 1. Criteria, Category, and Alternative Value

Criteria & Alternatives	C1	C2	C3	C4	C5	C6
A1	9	8,3	8,7	8,4	8	8,3
A2	9,6	9,5	9,5	9,1	8,8	9,2
A3	8,8	9	9,1	8,7	8,7	8,9
A4	8,7	8,1	8,3	7,9	7,4	8,1
A5	8,8	9,4	9,2	8,6	9,2	9,4
A6	8,6	9	8,9	8,6	8,9	9,1
A7	9	9,3	9,2	8,7	9,1	9,1
A8	8,6	9	8,9	8,6	8	9,2
A9	8,8	9,2	9,1	8,8	8,5	9
A10	8,4	8,8	9	7,9	8,9	8,5
Category	MAX	MAX	MAX	MIN	MAX	MAX

Table 1 represents the value of alternatives based on the criteria used. Meanwhile, the data source used comes from hotel ratings on the Agoda application, considering guest buying behavior and making ratings a benchmark in making stay decisions. Considering this, this study uses these data to apply the MOORA method to optimize decision support systems for selecting accommodation services in the context of hotel operational areas in Bandung, Indonesia. The MOORA calculation model is inseparable from the decision matrix-making process, where each value of criteria and alternatives will be normalized and optimized.

$$X = \begin{bmatrix} x_{11} & x_{21} & x_{31} \\ x_{21} & x_{22} & x_{32} \\ x_{m1} & x_{m1} & x_{mn} \end{bmatrix} \tag{1}$$

Description:

- x_{ij} : alternative response j on attribute i | i = 1, 2, ...|
- n : number of goals or attributes
- M : Alternative Amount

The decision matrix represents all available information for each attribute in matrix form; based on equation (1), it can be seen that the matrix $x_m \times x_n$, where x_{ij} is a performance measurement of alternative i to attribute j. Next, m is the number of alternatives, and n is the number of goals or attributes. Meanwhile, the ratio system is developed based on the performance of alternatives on attributes compared to denominators which are representative of all alternatives of those attributes. Therefore, the best choice for the denominator is the square root of the sum of squares of each alternative per attribute. Meanwhile, the measurement of the ratio can be expressed in the following equation:

$$X_{ij} = \frac{x_{ij}}{\sqrt{[\sum_{i=1}^m x_{ij}^2]}} \tag{2}$$

Description :

- J : 1, 2, ...,
- n and x : dimensioned numbers in the interval [0,1] that describe the normalized performance of the alternative and the performance of j.



At the multi-object optimization stage, the normalized size will be added in the case of maximization on the favorable attribute and subtracted in the case of minimization for the unfavorable attribute. In other words, subtract the maximum and minimum values on each row to get the rank on each row through the following equation.

$$y_i = \sum_{j=1}^g w_j x_{ij}^* - \sum_{j=g+1}^n w_j w_{ij}^* \tag{3}$$

Description :

G : The number of attributes to be maximized

(n-g) : the number of attributes to minimize

w_j : weight against j

y_i : normalized value from the first alternative to all attributes

The value of y_i can be positive or negative depending on the maximum total attribute in the decision matrix (which is favorable). Thus, the best alternative has the highest y_i value, while the worst alternative has the lowest y_i value. Several previous studies that apply the MOORA method in the decision-making process show flexibility and ease in the calculation process in various contexts.

3. RESULT AND DISCUSSION

3.1 Implementation of MOORA to Optimize Decision Support System

The significance of the normalization stage in the MOORA method is paramount in ensuring the accuracy and reliability of decision outcomes. The primary purpose of normalization is to standardize the values of criteria, mitigating the potential bias caused by differences in measurement scales. This process facilitates a fair and equitable comparison among diverse criteria, thereby contributing to the robustness of the decision-making process. Without normalization, the inherent variations in the units or magnitudes of criteria may skew the evaluation, leading to misleading results. In light of this, the normalization stage in MOORA emerges as a crucial step, enhancing the method's objectivity and reinforcing the integrity of the decision support system. In conclusion, recognizing the importance of normalization underscores the meticulous attention required in preparing and analyzing data within the MOORA framework, ultimately ensuring the validity and effectiveness of the decision-making process.

Table 2. Normalization Stage in MOORA Method

C & A	C1	C2	C3	C4	C5	C6
A1	0,322117506	0,292594723	0,305847358	0,311134586	0,295283377	0,29525964
A2	0,343592006	0,334897574	0,333971253	0,337062468	0,324811714	0,32727574
A3	0,314959339	0,317271386	0,319909306	0,322246535	0,321120672	0,31660371
A4	0,311380255	0,285544247	0,291785411	0,29261467	0,273137123	0,28814495
A5	0,314959339	0,331372336	0,323424792	0,318542552	0,339575883	0,33439043
A6	0,307801172	0,317271386	0,312878332	0,318542552	0,328502757	0,3237184
A7	0,322117506	0,327847099	0,323424792	0,322246535	0,335884841	0,3237184
A8	0,307801172	0,317271386	0,312878332	0,318542552	0,295283377	0,32727574
A9	0,314959339	0,324321861	0,319909306	0,325950518	0,313738588	0,32016105
A10	0,300643005	0,310220911	0,316393819	0,29261467	0,328502757	0,30237433
Divisor	27,94011453	28,3668821	28,44556204	26,99796289	27,09261892	28,110852

Table 2 shows the normalization stages based on the divisor value in the MOORA method. Determining the divisor values in the normalization stage of the MOORA method holds significant benefits. The primary purpose of assigning appropriate divisors is to standardize the criteria values, ensuring a fair and unbiased comparison. The careful selection of divisors is essential for mitigating the influence of different measurement scales, harmonizing the diverse criteria, and enabling a meaningful ratio analysis. This step contributes to the overall accuracy of the decision-making process within the MOORA framework. The consideration of divisor values reflects the method's flexibility and adaptability to various decision contexts. In conclusion, the strategic determination of divisors in the normalization stage adds precision and reliability to the MOORA method, reinforcing its efficacy as a robust decision-support tool.

Table 3. Attribute Optimize Stage in MOORA Method

C & A	C1	C2	C3	C4	C5	C6
A1	0,032211751	0,058518945	0,045877104	0,062226917	0,059056675	0,04428895
A2	0,034359201	0,066979515	0,050095688	0,067412494	0,064962343	0,04909136
A3	0,031495934	0,063454277	0,047986396	0,064449307	0,064224134	0,04749056
A4	0,031138026	0,057108849	0,043767812	0,058522934	0,054627425	0,04322174
A5	0,031495934	0,066274467	0,048513719	0,06370851	0,067915177	0,05015857
A6	0,030780117	0,063454277	0,04693175	0,06370851	0,065700551	0,04855776
A7	0,032211751	0,06556942	0,048513719	0,064449307	0,067176968	0,04855776



A8	0,030780117	0,063454277	0,04693175	0,06370851	0,059056675	0,04909136
A9	0,031495934	0,064864372	0,047986396	0,065190104	0,062747718	0,04802416
A10	0,030064301	0,062044182	0,047459073	0,058522934	0,065700551	0,04535615
W	0,10	0,20	0,15	0,20	0,20	0,15

Table 3 shows the attribute optimization based on the weight of criteria. The optimization of attributes based on the weight of criteria in the MOORA method constitutes a crucial phase in decision-making processes. The primary objective of this stage is to assign appropriate weights to the criteria, reflecting their relative importance in the decision context. Through a systematic evaluation of the significance of criteria, the method ensures that the decision-making process is aligned with the preferences and priorities of decision-makers. The attribute optimization, guided by the assigned weights, allows for a nuanced analysis that accommodates the complexity of decision environments. This approach enhances the accuracy and relevance of the decision outcomes by providing a balanced and tailored assessment of alternatives. In conclusion, attribute optimization based on the weight of criteria in the MOORA method underscores its adaptability and effectiveness in addressing the intricacies of decision-making processes across diverse contexts.

Table 4. The Y_i Value and The Rank of Alternative

Alternative	Maximum	Minimum	Y_i (Max-Min)	Rank
A1	0,23995342	0,062226917	0,177726503	9
A2	0,265488108	0,067412494	0,198075614	2
A3	0,254651298	0,064449307	0,190201991	6
A4	0,229863854	0,058522934	0,17134092	10
A5	0,264357862	0,06370851	0,200649351	1
A6	0,255424455	0,06370851	0,191715945	5
A7	0,262029617	0,064449307	0,19758031	3
A8	0,249314181	0,06370851	0,185605671	8
A9	0,255118578	0,065190104	0,189928474	7
A10	0,250624256	0,058522934	0,192101322	4

Table 4 shows the ranking process within the MOORA method, revealing that A5 attains the highest value of Y_i . The primary aim of the ranking process is to determine the most favorable alternative by evaluating each alternative against multiple criteria. In this context, A5 emerges as the optimal choice, achieving the highest aggregated value based on the defined criteria. This outcome indicates that A5 outperforms other alternatives in meeting the specified criteria, underscoring its superiority in decision-making. Consequently, ranking is a valuable tool in highlighting the preferred alternatives, contributing to selecting the most suitable option based on the weighted criteria. In summary, the MOORA method's ranking outcome emphasizes the prominence of A5, providing actionable insights for decision-makers in their pursuit of optimal solutions.

Additionally, A2 secures the second-highest value of Y_i (0.198075614), while A7 attains the third position in the ranking with the value of Y_i (0.19758031). This aspect of the analysis further delineates the relative performance of alternatives based on the established criteria. The positioning of A2 and A7 in the second and third places implies their noteworthy performance in meeting the specified criteria, albeit with differing degrees of effectiveness. This nuanced hierarchy gives decision-makers a comprehensive understanding of the alternatives, facilitating a more informed selection process. While A5 stands out as the most favorable choice, recognizing the competitive positions of A2 and A7 allows for a deeper appreciation of their respective strengths and weaknesses. In conclusion, the MOORA method, through its ranking outcomes, offers a nuanced perspective on alternative performance, aiding decision-makers in making well-informed and contextually relevant choices.

3.2 Discussion: Hotel Accommodation Service Quality and Customer Satisfaction

Accommodation Service Quality is a pivotal factor influencing the overall guest experience in the hospitality industry. The primary focus lies in delivering services that meet or exceed guest expectations, encompassing reception efficiency, room cleanliness, amenities, and staff courtesy [23]. The supporting elements contribute significantly to the perceived quality of the hotel accommodation, shaping guests' opinions and satisfaction levels [24]. In addition, service quality is often formed based on the alignment of customer expectations with the actual experiences encountered during their stay [25]. Providing high-quality services ensures guest satisfaction and fosters repeat business and positive word-of-mouth recommendations [26]. In conclusion, the emphasis on Hotel Accommodation Service Quality underscores its central role in shaping the reputation and success of hospitality establishments, signifying the intricate connection between service delivery and guest satisfaction.

Customer satisfaction and loyalty to hotels constitute integral components in the hospitality industry, profoundly influencing the success and sustainability of establishments [27]. The mainstay of this relationship lies in consistently delivering high-quality services that align with or surpass guests' expectations [28]. This notion supports the understanding that customer satisfaction is intricately linked to the perceived value of services, encompassing factors such as the efficiency of check-in processes, room comfort, cleanliness, and overall staff responsiveness [29].

Service quality and the overall guest experience are pivotal in shaping customer satisfaction, thus directly impacting their likelihood to return and recommend the hotel to others [30]. In essence, fostering customer satisfaction builds a foundation for loyalty, creating a cycle where satisfied guests are more likely to become repeat customers and brand advocates [31]. In conclusion, the symbiotic relationship between customer satisfaction and loyalty is a cornerstone for hotel success, emphasizing the enduring impact of positive guest experiences on hospitality establishments' sustained growth and reputation.

The optimization of hotel accommodation service quality to enhance customer satisfaction through the utilization of a DSS based on the MOORA reflects a strategic and practical approach in the hospitality industry. The primary objective is to leverage the capabilities of MOORA to evaluate and prioritize various criteria essential to service quality systematically. Supporting this endeavor, the DSS aids decision-makers in making informed choices, ensuring that services are aligned with guest expectations and preferences. This proactive approach to quality optimization, driven by MOORA-based decision support, is crucial in cultivating positive guest experiences and elevating overall customer satisfaction. In conclusion, integrating MOORA within a DSS framework is a promising strategy for hotel establishments seeking to optimize service quality, demonstrating a commitment to continuous improvement and a heightened focus on meeting and exceeding customer expectations.

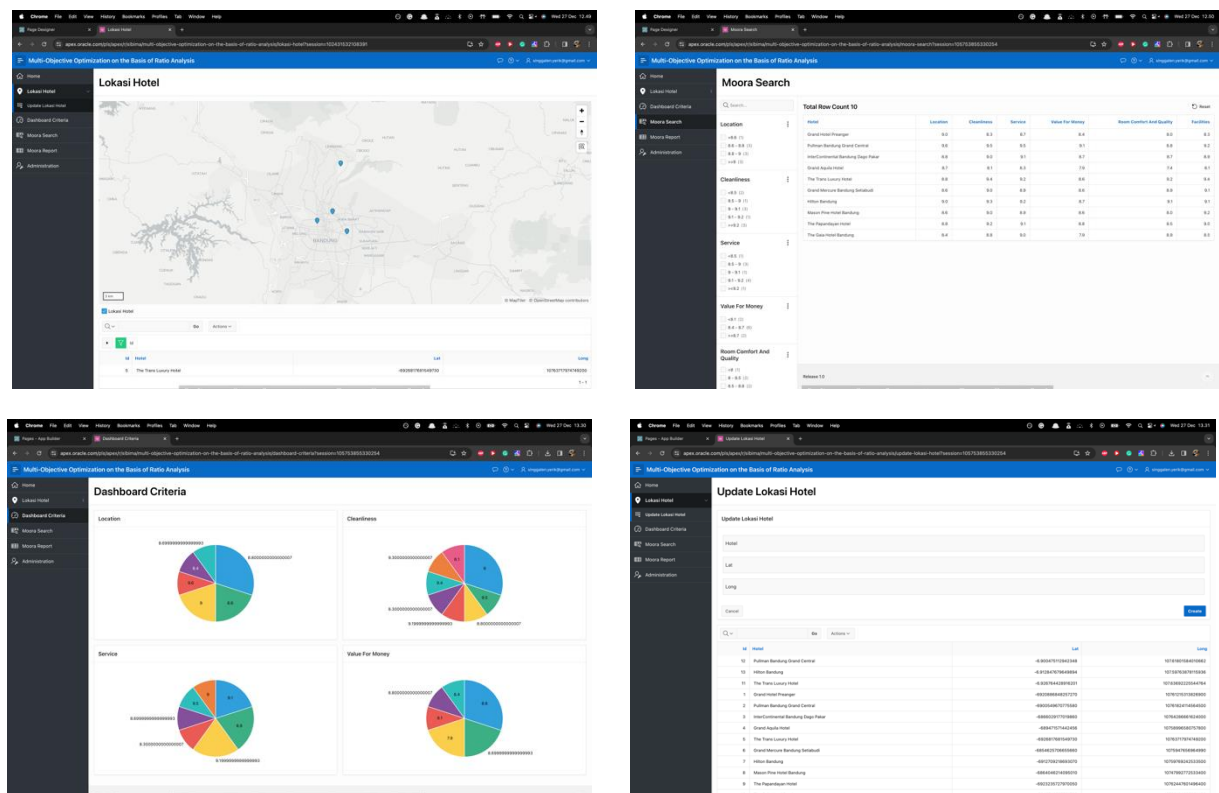


Figure 2. Interface of Decision Support System in Hotel Accommodation Service Quality Selection

Figure 2 shows the interface of DSS in the hotel accommodation service quality selection process. The development of the MOORA model can be further extended to the design of a Decision Support System (DSS) in Hotel Accommodation Service Quality, specifically tailored to the operational context of Bandung. The primary focus lies in customizing the MOORA-based DSS to cater to the unique characteristics and preferences of the Bandung region. Supporting this initiative, the DSS would integrate criteria and parameters relevant to the local hospitality landscape, considering factors such as cultural nuances, tourist expectations, and specific industry benchmarks within Bandung. This tailored approach ensures the applicability and effectiveness of the DSS in the regional context, fostering more precise decision-making processes for hotel accommodations. In an era where personalized and localized services are increasingly valued, such an initiative optimizes service quality and reflects a strategic alignment with the distinctive needs of the Bandung market. In conclusion, advancing the MOORA model into a Bandung-specific DSS exemplifies a forward-thinking strategy for enhancing decision support in hotel accommodation service quality within the unique operational context of the region.

Thus, this research underscores the significant relevance of MOORA in optimizing a Decision Support System (DSS) for selecting Hotel Accommodation Service Quality, particularly within the operational context of Bandung. The primary emphasis is placed on demonstrating how MOORA's multifaceted evaluation approach aligns seamlessly with the complex decision-making processes inherent in the hotel industry. Supported by the specific criteria and parameters relevant to the Bandung region, the research showcases the adaptability and effectiveness of MOORA in enhancing decision support for hotel accommodations. This tailored approach ensures that the DSS reflects the

distinctive characteristics and preferences of the local hospitality landscape, thereby contributing to more accurate and contextually relevant decision outcomes. In conclusion, the study affirms that MOORA is applicable and highly pertinent for optimizing Decision Support Systems in selecting Hotel Accommodation Service Quality, especially when tailored to the operational nuances of Bandung.

4. CONCLUSION

The findings of this research underscore the high effectiveness of the MOORA method as a decision support model for optimizing decision support systems in selecting hotel accommodation services based on the best quality. The primary analysis reveals that MOORA is a robust and efficient tool in the decision-making process, particularly in evaluating and prioritizing hotel accommodation services. The method's ability to handle multiple criteria concurrently and reliance on ratio analysis facilitates a comprehensive assessment, ensuring a nuanced understanding of the alternatives. The positive outcomes affirm MOORA's suitability for enhancing decision support in hotel service selection, highlighting its potential as a valuable asset for decision-makers striving to optimize the quality of accommodation services. In conclusion, the research findings affirm the efficacy of MOORA in supporting decision-making processes for selecting hotel accommodation services based on optimal quality. In addition, the weight of the criteria is as follows: services (0.15), facilities (0.15), room comfort and quality (0.20), cleanliness (0.20), value for money (0.20), and location (0.10). The results of this study show that The Trans Luxury Hotel ranks first with a total Y_i value of 0.200649351. Pullman Bandung Grand Central ranked second with a total Y_i value of 0.198075614. Meanwhile, Hilton Bandung ranks third with a total Y_i value of 0.19758031. This shows that each hotel needs to increase its rating to attract the attention of potential customers in the decision-making process of staying.

ACKNOWLEDGMENT

Thanks to the Tourism Department, Faculty of Business Administration and Communication, and the Atma Jaya Catholic University of Indonesia for their invaluable support in research and publication endeavors.

REFERENCES

- [1] G. Phillips-Wren, M. Daly, and F. Burstein, "Support for cognition in decision support systems: an exploratory historical review," *J. Decis. Syst.*, vol. 31, no. S1, pp. 18–30, 2022, doi: 10.1080/12460125.2022.2070946.
- [2] H. U. Khan, M. Sohail, and S. Nazir, "Features-Based IoT Security Authentication Framework Using Statistical Aggregation, Entropy, and MOORA Approaches," *IEEE Access*, vol. 10, no. October, pp. 109326–109339, 2022, doi: 10.1109/ACCESS.2022.3212735.
- [3] R. Anantama and R. Hidayat, "Comparison of Deep Learning and MOORA Performance Methods in Multi Criteria Decision Making with Case Studies Best public health center," *Tech. Rom. J. Appl. Sci. Technol.*, vol. 17, no. 3, pp. 313–318, 2010.
- [4] S. B. Rane, P. R. Potdar, and S. Rane, "Data-driven fleet management using MOORA: a perspective of risk management," *J. Model. Manag.*, vol. 16, no. 1, pp. 310–338, 2021, doi: 10.1108/JM2-03-2019-0069.
- [5] L. A. P. Tran and T. Y. Chang, "What Makes Customers Loyal to an Online Booking Brand? The Effects of Online Brand Experience and Brand Attachment," *J. Qual. Assur. Hosp. Tour.*, vol. 00, no. 00, pp. 1–28, 2022, doi: 10.1080/1528008X.2022.2109239.
- [6] E. Panggabean, F. A. Sianturi, S. Selvia, and S. Dewi, "Comparison of Simple Additive Weighting Method With Multi-Objective Optimization By Ratio Analysis," *Sinkron*, vol. 8, no. 1, pp. 380–389, 2023, doi: 10.33395/sinkron.v8i1.12015.
- [7] A. Majumdar and A. Adhikari, "An integrated TOPSIS-MOORA-based performance evaluation methodology for the key service providers in sharing economy: case of Airbnb superhosts," *Benchmarking*, vol. 28, no. 2, pp. 600–620, 2021, doi: 10.1108/BIJ-03-2020-0085.
- [8] H. Dinçer and S. Yüksel, "Analyzing the possibility of violent conflict in the middle east economies using determinants of global conflict risk index with an integrated fuzzy multicriteria decision making model," in *The Impact of Global Terrorism on Economic and Political Development: Afro-Asian Perspectives*, 2019, pp. 155–166. doi: 10.1108/978-1-78769-919-920191014.
- [9] A. Fallahpour, M. Yazdani, A. Mohammed, and K. Y. Wong, "Green sourcing in the era of industry 4.0: towards green and digitalized competitive advantages," *Ind. Manag. Data Syst.*, vol. 121, no. 9, pp. 1997–2025, 2021, doi: 10.1108/IMDS-06-2020-0343.
- [10] M. Tavana, A. Shaabani, and N. Valaei, "An integrated fuzzy framework for analyzing barriers to the implementation of continuous improvement in manufacturing," *Int. J. Qual. Reliab. Manag.*, vol. 38, no. 1, pp. 116–146, 2021, doi: 10.1108/IJQRM-06-2019-0196.
- [11] W. Bahadur and A. Ali, "Investigating the effect of service quality dimensions on travellers' satisfaction with couchsurfing accommodation and subjective well-being in a sharing economy," *Econ. Res. Istraz.*, vol. 36, no. 3, pp. 1–18, 2023, doi: 10.1080/1331677X.2023.2217892.
- [12] C. Shah and A. Trupp, "Trends in consumer behaviour and accommodation choice: perspectives from India," *Anatolia*, vol. 31, no. 2, pp. 244–259, 2020, doi: 10.1080/13032917.2020.1747213.
- [13] J. I. Pulido-Fernández, J. Casado-Montilla, I. Carrillo-Hidalgo, and J. L. Durán-Román, "Does type of accommodation influence tourist behavior? Hotel accommodation vs. rural accommodation," *Anatolia*, vol. 00, no. 00, pp. 1–20, 2023, doi: 10.1080/13032917.2023.2166089.
- [14] M. A. Mody, S. Jung, T. Dogru, and C. Suess, "How do consumers select between hotels and Airbnb? A hierarchy of



- importance in accommodation choice,” *Int. J. Contemp. Hosp. Manag.*, vol. 35, no. 4, pp. 1191–1218, 2023, doi: 10.1108/IJCHM-12-2021-1551.
- [15] L. Van Huy and N. H. Thai Thinh, “Ranking the Hotel Website Service Quality according to Customer’s Perception: A Case Study of 4-Star Hotel,” *J. Qual. Assur. Hosp. Tour.*, vol. 00, no. 00, pp. 1–20, 2022, doi: 10.1080/1528008X.2022.2100032.
- [16] M. S. Hossain, M. A. Hossain, A. Al Masud, K. M. Z. Islam, M. G. Mostafa, and M. T. Hossain, “The integrated power of gastronomic experience quality and accommodation experience to build tourists’ satisfaction, revisit intention, and word-of-mouth intention,” *J. Qual. Assur. Hosp. Tour.*, vol. 00, no. 00, pp. 1–27, 2023, doi: 10.1080/1528008X.2023.2173710.
- [17] M. Saut and S. Bie, “Impact of Service Expectation, Experiential Quality, and Perceived Value on Hotel Customer Satisfaction,” *J. Qual. Assur. Hosp. Tour.*, vol. 00, no. 00, pp. 1–29, 2022, doi: 10.1080/1528008X.2022.2141414.
- [18] N. T. VO, M. Chovancová, and H. T. Tri, “The Impact of E-service Quality on the Customer Satisfaction and Consumer Engagement Behaviors Toward Luxury Hotels,” *J. Qual. Assur. Hosp. Tour.*, vol. 21, no. 5, pp. 499–523, 2020, doi: 10.1080/1528008X.2019.1695701.
- [19] M. Lee, Y. (Maggie) Cai, A. DeFranco, and J. Lee, “Exploring influential factors affecting guest satisfaction: Big data and business analytics in consumer-generated reviews,” *J. Hosp. Tour. Technol.*, vol. 11, no. 1, pp. 137–153, 2020, doi: 10.1108/JHTT-07-2018-0054.
- [20] A. Aakash, A. Tandon, and A. Gupta Aggarwal, “How features embedded in eWOM predict hotel guest satisfaction: an application of artificial neural networks,” *J. Hosp. Mark. Manag.*, vol. 30, no. 4, pp. 486–507, 2021, doi: 10.1080/19368623.2021.1835597.
- [21] H. Olya, L. Altinay, A. Farmaki, A. Kenebayeva, and D. Gursoy, “Hotels’ sustainability practices and guests’ familiarity, attitudes and behaviours,” *J. Sustain. Tour.*, vol. 29, no. 7, pp. 1063–1081, 2021, doi: 10.1080/09669582.2020.1775622.
- [22] C. F. Chiang and C. W. Huang, “Online Reviews on Online Travel Agency: Understanding Tourists’ Perceived Attributes of Taipei’s Economy Hotels,” *J. Qual. Assur. Hosp. Tour.*, vol. 23, no. 4, pp. 945–959, 2022, doi: 10.1080/1528008X.2021.1923107.
- [23] M. Pytharoulakis and G. Zouni, “Lobbyscape: A framework about the effect of hotel lobbies’ atmospheric elements on customer satisfaction,” *Res. Hosp. Manag.*, vol. 10, no. 2, pp. 107–115, 2020, doi: 10.1080/22243534.2020.1869465.
- [24] N. Glaveli, P. Manolitzas, S. Palamas, E. Grigoroudis, and C. Zopounidis, “Developing effective strategic decision-making in the areas of hotel quality management and customer satisfaction from online ratings,” *Curr. Issues Tour.*, vol. 26, no. 6, pp. 1003–1021, 2023, doi: 10.1080/13683500.2022.2048805.
- [25] D. Paulose and A. Shakeel, “Perceived Experience, Perceived Value and Customer Satisfaction as Antecedents to Loyalty among Hotel Guests,” *J. Qual. Assur. Hosp. Tour.*, vol. 23, no. 2, pp. 447–481, 2022, doi: 10.1080/1528008X.2021.1884930.
- [26] W. H. Kim, S. H. Lee, and K. S. Kim, “Effects of sensory marketing on customer satisfaction and revisit intention in the hotel industry: the moderating roles of customers’ prior experience and gender,” *Anatolia*, vol. 31, no. 4, pp. 523–535, 2020, doi: 10.1080/13032917.2020.1783692.
- [27] Z. Bouchriha, S. Farid, and S. Ouiddad, “Enhancing Value Co-creation Behaviors Through Customer Engagement In The Moroccan Hotel Context: How Does It Influence Customer Satisfaction And Brand Image?,” *J. Qual. Assur. Hosp. Tour.*, vol. 00, no. 00, pp. 1–26, 2023, doi: 10.1080/1528008X.2023.2165595.
- [28] M. A. Ghonim, W. Zakaria Elsaywy, M. M. Elstouhy, and M. A. Khashan, “The Impact of Marketing 4.0 on Customer Satisfaction and Engagement: The Distinctive Role of Brand Interaction in the Egyptian Hotel Industry,” *Int. J. Hosp. Tour. Adm.*, vol. 00, no. 00, pp. 1–30, 2022, doi: 10.1080/15256480.2022.2127435.
- [29] R. Al Karim and M. K. Rabiul, “The Relationships of Corporate Sustainability, Customer Loyalty, and Word of Mouth: The Mediating Role of Corporate Image and Customer Satisfaction,” *J. Qual. Assur. Hosp. Tour.*, vol. 00, no. 00, pp. 1–21, 2022, doi: 10.1080/1528008X.2022.2135054.
- [30] M.-F. C. Nkwede, I.-E. Ogba, and F. E. Nkwede, “Determinants of customer satisfaction in a high-contact service environment: a study of selected hotels in Abakaliki metropolis, Nigeria,” *Res. Hosp. Manag.*, vol. 12, no. 2, pp. 183–190, 2022, doi: 10.1080/22243534.2022.2133191.
- [31] C. Prentice, S. Dominique Lopes, and X. Wang, “The impact of artificial intelligence and employee service quality on customer satisfaction and loyalty,” *J. Hosp. Mark. Manag.*, vol. 29, no. 7, pp. 739–756, 2020, doi: 10.1080/19368623.2020.1722304.