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Research article

GDSS for Selecting Culinary Tourism in Bali Using Profile Matching and Borda

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ABSTRACT

This research proposes a method for determining the best culinary tourism destinations in Bali. Currently, being able to determine the best and potential destinations is a problem for people who want to travel tourism in Bali, both domestic and foreign people. Factors that have a dominant influence in determining potential destinations that still cannot be determined with certainty. This will greatly affect the results of decisions that will be taken by the community in determining the destination to be chosen. For this reason, it is very important to create a model to determine the best destination that can be chosen by the community as a decision support system in making decisions. In this journal Profile Matching has been used to determine the best destination as a category that can be obtained from the rating shown on the selected destination.

1. Introduction

Tourism activities in Indonesia represent one of the key sectors that significantly drive the national economy. This sector contributes in multiple dimensions, serving not only as a substantial source of foreign exchange but also as a major provider of employment opportunities and a crucial catalyst for increasing income among local communities. Empirical data shows that the tourism sector has experienced steady and continuous growth over the years, as evidenced by the rising frequency of both domestic and international travel. The impact of tourism is multifaceted, generating broad benefits such as promoting equitable regional development, increasing foreign exchange reserves, contributing to local government revenues through taxes, creating new job opportunities, and opening up avenues for entrepreneurship and small business development [1].

Nevertheless, a common issue faced by travelers is the emergence of new stressors during their journeys, often due to poorly chosen destinations or unstructured travel plans. In this context, tourism is not merely a recreational activity it fulfills a deeper physical and psychological need, particularly as a means of alleviating mental fatigue caused by daily routines and work pressures. Therefore, selecting the right destination becomes essential. In the case of Bali, for example, culinary tourism has become a favorite among both local and international visitors. However, identifying the most appropriate culinary tourism destination involves complex decision-making that must account for multiple criteria. One of the methods suitable for addressing this kind of problem is the Profile Matching method.

The principle behind Profile Matching is to identify the gap between the visitor's profile comprising preferences, expectations, and needs and the attributes of various culinary tourism destinations. This method compares the characteristics of a tourist destination with the visitor's

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preferences to assess how well they align. The smaller the identified gap, the higher the resulting weighted score, which indicates a better match or prioritization for the tourist. This multi-criteria decision-making technique is grounded in the idea that each alternative option (in this case, each culinary destination) has specific criteria, and each criterion carries a different level of importance or weight. The weighting process allows for a more objective and precise evaluation, ultimately guiding users toward the most suitable alternatives.

By integrating Profile Matching with the BORDA method an established approach for ranking multiple alternatives based on aggregated preferences the decision support system can evaluate and prioritize culinary destinations effectively. The combination of these two methods allows the system to perform comprehensive calculations that match a visitor's unique profile with the specific features of available culinary tourism sites. Consequently, the system can generate a list of recommended destinations that are tailored to the visitor's needs.

Recognizing the importance of effective destination selection, the development of such a system in the tourism sector is essential. This decision support system is intended to assist travelers in identifying the culinary tourism spots that best align with their preferences and expectations. By providing accurate, data-driven recommendations, the system enhances the decision-making process. It takes into account critical factors such as budget considerations, availability of culinary facilities, road access, and visitor preferences, all of which are incorporated into the weighting model. Ultimately, the system outputs destination priorities in the form of a ranked list, allowing users to make informed choices and experience more satisfying and meaningful culinary tourism [3].

2. Research Methodology

2.1. Previous Research

To support this research, the author includes three previous studies as references to strengthen the theoretical foundation and demonstrate the relevance of the applied methods. The following are the three studies reviewed in this context: [4] The first study is titled "Group Decision Support System for E-Commerce Selection Using Profile Matching and BORDA Methods." This study examines the process of evaluating various e-commerce platforms by utilizing a set of predetermined criteria. The Profile Matching method is employed to compare each alternative platform against these criteria, allowing for the identification of the most suitable options. Subsequently, the BORDA method is applied to produce a final ranking based on aggregated preferences, thereby enhancing the decision-making process in a group setting. [5] The second study is titled "Decision Support System Application for Employee Performance Assessment Using Profile Matching Method." This research focuses on the creation of a software-based decision support system aimed at assisting companies in managing human resources. The system leverages the Profile Matching method to assess employee performance across multiple competencies, enabling organizations to conduct more accurate and structured evaluations. Through this approach, the study highlights the potential for companies to improve internal management processes by adopting decision support technologies. [6] The third study is titled "Decision Support System for Housing Location Selection Using Profile Matching Method." This study emphasizes the development of a system that aids users in selecting optimal housing locations. The system utilizes the Profile Matching method to compare available housing options against a comprehensive set of criteria and sub-criteria defined by user preferences. By doing so, the decision-making process becomes more objective and data-driven, ensuring that housing choices align closely with the user's specific needs and expectations. Collectively, these three studies demonstrate the versatility and applicability of the Profile Matching method across various domains, reinforcing its suitability for use in the present research.

2.2. Decision Support System (DSS)

Decision Support System is an interactive system designed to assist decision-making processes by utilizing data and decision models to solve semi-structured or unstructured problems. The concept of a Decision Support System was first articulated in the early 1970s by Scott Morton through his pioneering work. He defined a DSS as a decision-making tool that integrates the use of relevant data and analytical models to address unstructured or partially structured problems, which are often complex and lack a clear solution path. Although the example title "Decision Support System for

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Selecting the Ideal Laptop Using the SAW Method" illustrates a practical application, the fundamental idea remains centered on supporting users in evaluating alternatives and making informed decisions through a systematic, data-driven approach [7][5].

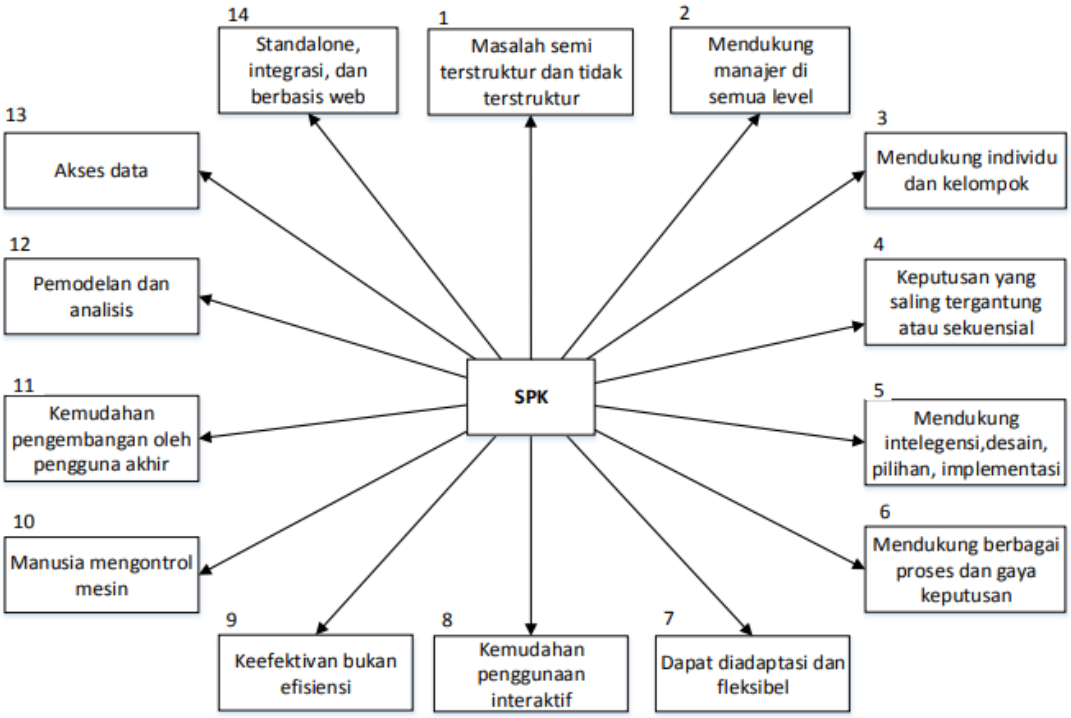

Fig. 1. Characteristics of DSS

2.3. Profile Matching

Profile Matching is a method used to compare a person's profile with specific criteria required for a position or study program. In general, profile matching involves the process of comparing data from the profile being assessed with the predetermined expected values, enabling the identification of any gaps that may exist between them. This method allows evaluators to measure how closely an individual's qualifications or characteristics align with the ideal standards. The outcome of this comparison is quantified in the form of a gap; the smaller the resulting gap, the higher the weighted score achieved. This reflects a better match between the individual's profile and the desired criteria, thereby indicating greater suitability for the targeted position or program [2], [8]. Below are several stages and formulas used in the Profile Matching method:

1. Gap Value Mapping

Mapping the competency gap (profile) by identifying the difference from the target profile. To obtain the difference between the two profiles, Equation 5 can be used.

$$Gap = Value\ Atribut - Value\ Target \quad (1)$$

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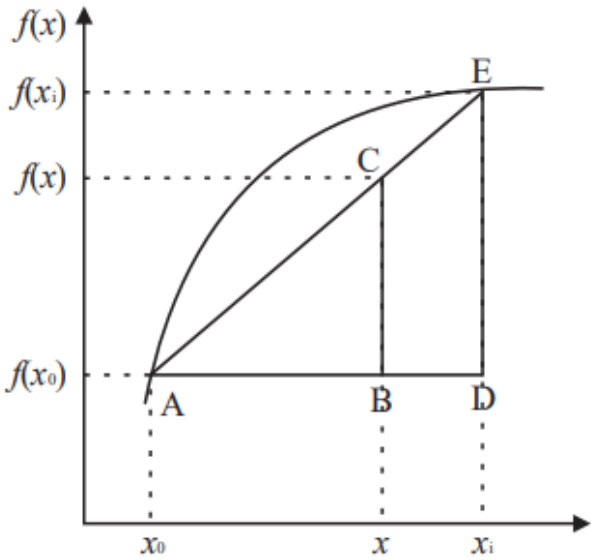

Fig. 2. Linear Interpolation

2. Weighting

Determining the weight of the competency gap values. This stage will determine the weight of each gap value, referring to Table 1, which shows the weight of the gap values.

Table 1. Gap Value Weight

	Nilai	
K1	1	Tidak
	2	Ya
K2	5	Rp 0 - Rp 10.000
	4	Rp 11.000 - Rp 20.000
	3	Rp 21.000 - Rp 30.000
	2	Rp 31.000 - Rp 40.000
	1	Rp 41.000 Keatas
K3	1	Sulit dijangkau
	2	Agak sulit di jangkau
	3	Mudah di jangkau
K4	5	0-10 Km
	4	11-25 Km
	3	26-35 Km
	2	36-45 Km
	1	Lebih dari 46 Km
K5	5	Bintang 5
	4	Bintang 4
	3	Bintang 3
	2	Bintang 2
	1	Bintang 1

3. Core and secondary factor

At this stage, the values for each aspect within the core factor and the secondary factor will be determined. The core factor refers to the most prominent or essential competencies required for a specific position. These competencies are considered the key elements that significantly contribute to achieving optimal performance. On the other hand, the secondary factor includes aspects that, while not categorized as core competencies, still play an important role in supporting overall performance. Although they are not the primary focus, the evaluation of secondary factors remains essential to provide a comprehensive understanding of an individual's capabilities in fulfilling their role and responsibilities.

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4. Total Value Calculation

Calculating the total value of all aspects based on the average values of core factors and secondary factors, with the percentage of each factor inputted. The core factor is given a value of 60%, while the secondary factor is given a value of 40%. Below is Equation 6 used to calculate the total value.

$$N = (x)\%.NCF + (x)\%.NSF \quad (2)$$

Keterangan:
N : Nilai total
X : Besarnya nilai persen
NCF : Nilai *core factor*
NSF : Nilai *secondary factor*

5. Ranking

Determining Ranking Value. The final result of the Profile Matching model calculation process is the determination of the employee performance ranking. The ranking can be determined using Equation

$$Rangking = ((x_1).N_1) + ((x_2).N_2) + \cdots + ((x_n).N_n \quad (3)$$

Keterangan:
x : Bobot yang dimasukkan tiap parameter.
N_1 : Nilai akhir parameter ke-1
N_2 : Nilai akhir parameter ke-2
N_n : Nilai akhir parameter ke-n

2.4. BORDA

The Borda method is a voting method used to resolve group decisions, where in its application, each decision-maker (DM) assigns ratings to each option based on the available alternatives. The voting procedure for the Borda method involves providing a set of alternatives. Assuming there are n alternative candidates, the voter or decision-maker gives n points to the first candidate or alternative. The second candidate receives n-1 points, and so on. The winner or best option is determined based on the highest score. The most valued option is the one with the highest score [9].

There are three decision-makers symbolized by DM, which are explained in Table 2. There are also four alternatives shown in Table 3 and five criteria presented in Table 4. In this study, the process for determining the best culinary tourism destination involves several steps, which include:

1. Determining the alternatives and the criteria for each DM.
2. Determining the values for each criterion and calculating the weight of each alternative for each DM.
3. Ranking the alternatives individually for each DM.
4. Group ranking based on the rankings generated by the DMs.

Table 2 Decision Makers for the Best Restaurant and Their Criteria

DM						
Kode	Keterangan	Kriteria				
DM 1	Wisatawan Lokal	K1	K2	K3	K4	K5
DM 2	Wisatawan Domestik Asing	K1	K2	K3	K4	K5
DM 3	Wisatawan Asing	K2	K4	K5		

Each tourist group has different criteria based on the Decision Maker (DM). DM1 consists of local tourists who prioritize criteria based on their familiarity with the region and local preferences. DM2 includes domestic foreign tourists who often seek a balance between local experiences and convenient amenities. Meanwhile, DM3 represents foreign tourists who frequently visit Bali and have preferences that often focus on premium services and unique cultural experiences. These criteria are detailed in Table 4, reflecting the diverse considerations of each tourist category.

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Table 3. Restaurant Criteria

Kriteria	
Kode	Keterangan
K1	Parkiran Luas
K2	Harga Range Harga
K3	Akses Jalan
K4	Jarak
K5	Rating

The alternatives consist of four options, selected based on observations of restaurants and those most frequently visited by tourists, as shown in Table 4. The criteria for each DM in selecting the marketplace are explained in Table 3.

Table 4. Restaurant Alternatives

Kode	Nama Restoran
A1	The Coffe Library
A2	Warung Mak Beng
A3	Ayam Betutu Men Tempeh
A4	sari organik

2.5. Tourist Destinations

Tourist destinations are one of the key sectors currently being actively promoted by the government as part of a broader strategy to boost national economic development. In an effort to support and strengthen the tourism sector, the government is not solely focused on infrastructure development such as building roads, transportation networks, and public facilities but also implements a range of complementary measures aimed at enhancing the overall performance and appeal of tourism in regions with high potential. These measures include the formulation and execution of strategic promotional campaigns, the improvement of service quality, the development of human resources within the tourism industry, and the integration of digital technologies to increase accessibility and visibility. By adopting these comprehensive strategies, the government seeks to elevate the competitiveness of local tourist destinations, attract more domestic and international tourists, and ultimately generate sustainable economic benefits for communities involved in the tourism value chain.

2.6. Culinary

Culinary tourism is one of the most popular types of tourism among travelers, as it offers a unique and immersive experience by allowing visitors to explore and enjoy the distinctive cuisine of a region. To effectively introduce and highlight a city's culinary uniqueness, appropriate promotional media are essential. In this context, culinary tourism requires strategic promotional efforts to showcase local food specialties and attract potential visitors. Traditionally, one of the methods used involves the creation of long-duration promotional videos. However, such videos are often perceived as less effective due to their length and the limited attention span of modern audiences.

Given this challenge, there is a growing need for more targeted and engaging promotional media that can both support the dissemination of culinary information and provide practical recommendations for visitors. In response to this need, promotional videos have been developed specifically to introduce and recommend culinary tourism in Bali. These videos incorporate the use of the BORDA and Profile Matching methods to ensure that the recommendations presented align closely with visitor preferences and interests. The Profile Matching method helps identify the best culinary options by comparing visitor preferences with the characteristics of culinary destinations, while the BORDA method is used to rank these destinations based on aggregated scoring.

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The promotional videos produced through this approach are designed not only to inform but also to persuade, offering visually appealing and content-rich presentations of Bali's culinary landscape. To maximize outreach and accessibility, the videos have been officially published on the government-managed social media accounts of Bali City, including platforms such as YouTube, Instagram, and Facebook [10]. These channels provide broad exposure and allow the content to reach both domestic and international audiences, enhancing the visibility of Bali's culinary tourism and supporting its ongoing promotion in the digital era.

2.7. Data Collection Method

In this study, the author uses two data collection methods: the literature study method and the interview method. The literature study is used to find methods or approaches used to test data and solve the issues in this research. Meanwhile, the interview method is used to complement the data with the perspectives or choices of tourists that are used in the evaluation.

1. The data search method through literature study, also referred to as the library research method, is a systematic approach employed to gather data and information by accessing and reviewing various written sources relevant to the research topic. This method emphasizes the collection of secondary data from a range of credible sources, such as academic books, scientific journals, scholarly articles, theses, dissertations, and other previously published materials. The primary objective of the literature study method is to accumulate a broad and in-depth understanding of existing knowledge related to the research focus. By analyzing and synthesizing this information, researchers can build a solid conceptual and theoretical foundation to support their research objectives and develop a deeper insight into the topic under investigation [11].

   In applying this method, researchers begin by identifying and selecting literature that is directly aligned with the research questions they intend to explore. The process involves a thorough reading and critical evaluation of each selected source. Researchers then extract relevant data, highlight significant findings, and organize these insights according to the framework of the ongoing research. This analytical process allows for the integration of various perspectives, the comparison of theoretical concepts, and the refinement of research arguments based on previously established knowledge. The literature is not only used as supporting evidence but also serves as a tool for identifying research gaps and formulating hypotheses or recommendations.

   One of the notable advantages of the literature study method is its efficiency. It saves considerable time, effort, and financial resources that would otherwise be required to conduct primary data collection. Moreover, it enables researchers to gain a comprehensive overview of the research topic and to reinforce their studies with well-established theories and findings. Despite these strengths, the method does present certain limitations. Access to specific and up-to-date literature may be restricted due to subscription barriers or the unavailability of sources. Additionally, the process may be subject to bias if researchers selectively include literature that aligns with preconceived notions or exclude opposing viewpoints. The lack of direct control over data quality and the inability to interact with original sources further constrain the method's reliability. Consequently, literature study is often used in combination with other empirical research methods to enhance the overall validity and credibility of the research outcomes.
2. The information retrieval method based on interviews is a qualitative data collection technique that involves direct interaction between the researcher and the respondent to gather detailed information related to the research topic. In this approach, the researcher asks a series of carefully designed questions aimed at obtaining specific insights or knowledge from the respondent. Interviews can be conducted face-to-face, providing a personal and immediate communication channel, or remotely via telephone, video calls, or other digital communication platforms. To guide the interview process, researchers often prepare an interview guide that outlines key topics and questions to be covered, ensuring that the conversation remains focused and relevant. Depending on the research objectives and desired flexibility, interviews may be

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structured—with a fixed set of questions—semi-structured, allowing some adaptability, or unstructured, which encourages open-ended discussions and exploratory responses.

This interview method offers several notable advantages. Firstly, it enables the researcher to gain a rich, in-depth understanding of the respondent's personal experiences, opinions, and attitudes, which may not be accessible through other data collection techniques. Secondly, the interactive nature of interviews allows the researcher to ask follow-up questions or seek clarification when responses are ambiguous or incomplete, enhancing the quality and depth of the information collected. Thirdly, interviews facilitate a dynamic dialogue where both parties can engage in meaningful discussions, potentially uncovering new insights and perspectives beyond the initial questions posed.

However, the interview method also presents certain limitations that must be carefully managed. One significant challenge is that interviews can be time-consuming and resource-intensive, requiring substantial effort to schedule, conduct, and transcribe. Additionally, the potential for bias exists, whether from the researcher's phrasing of questions or interpretation of answers, or from respondents providing socially desirable or guarded responses rather than fully truthful or comprehensive information. Finally, the quality of the data collected heavily depends on the skill of the interviewer and the willingness of respondents to participate openly. To mitigate these issues, thorough planning of the interview process, careful selection of respondents, and rigorous data interpretation are essential to ensure the reliability and validity of the research findings [11].

3. Results and Discussion

The calculation results using the profile matching method provide rankings for each individual DM as shown in Table 5. Each DM has different ranking results. In DM1, local residents preferred the culinary tourism recommendation of Sari Organik restaurant, followed by Warung Mak Beng, The Coffee Library, and lastly Ayam Betutu Men Tempeh. In DM2, domestic foreign tourists favored Sari Organik restaurant as the top culinary destination, followed by Warung Mak Beng, Ayam Betutu Men Tempeh, and lastly The Coffee Library. In DM3, foreign tourists preferred The Coffee Library as their culinary tourism destination, followed by Ayam Betutu Men Tempeh, then Warung Mak Beng, and lastly Sari Organik.

Table 5. Comparison of Algorithms

	Ranking		
	DM 1	DM 2	DM 3
RESTORAN	Wisatawan Lokal	Wisatawan Domestik Asing	Wisatawan Asing
A1	13	11	15
A2	15	13	10
A3	12	12	11
A4	18	14	7

The ranking results using the BORDA method are shown in Table 6. The calculations show that in DM1, Sari Organik Restaurant ranked first, followed by Warung Mak Beng, The Coffee Library, and finally Ayam Betutu Men Tempeh. In DM2, the first place was occupied by Sari Organik Restaurant, followed by Warung Mak Beng, Ayam Betutu Men Tempeh, and lastly The Coffee Library. In DM3, The Coffee Library ranked first, followed by Ayam Betutu Men Tempeh, Warung Mak Beng, and finally Sari Organik Restaurant.

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Table 8 shows the assessment of the BORDA method, which is obtained through the specific rating table shown in Table 7.

Table 6. Determining Ranking

RESTORAN	Ranking		
	DM 1	DM 2	DM 3
A1	3	4	1
A2	2	2	3
A3	4	3	2
A4	1	1	4

Table 7. Ranking Assessment

Poin	4	3	2	1
Ranking	1	2	3	4

Table 8. Assessment of the Ranking in the Borda Method

RESTORAN	Point Borda			Total	Ranking
	DM 1	DM 2	DM 3		
A1	2	1	4	7	3
A2	3	3	2	8	2
A3	1	2	3	6	4
A4	4	4	1	9	1

4. Conclusion

Based on the research results using the profile matching and Borda methods on the data above, the author has drawn conclusions about the preferences of three different types of tourists. From the perspective of local tourists, it is evident that they prefer Sari Organik over Ayam Betutu Men Tempeh. This indicates a high interest among local tourists in quality organic products.

Meanwhile, domestic foreign tourists also have an interest in Sari Organik but are less attracted to The Coffee Library. This suggests that organic products are a strong attraction for domestic foreign tourists, while the café may not be as popular among them.

For foreign tourists, it is observed that they prefer The Coffee Library over Sari Organik. This indicates a special interest from foreign tourists in unique café experiences and perhaps a particular preference for coffee.

Based on both methods, the author concludes that tourists visiting Bali seeking culinary tourism can consider Sari Organik Restaurant as the most recommended choice, followed by Warung Mak

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Beng as the second recommendation, The Coffee Library as the third, and Ayam Betutu Men Tempeh as the last recommendation.

Declaration of Competing Interest

We declare that we have no conflict of interest.

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