

Integrated Group Decision-Making Framework for Evaluating the Tourism Mobile E-Commerce Service Quality Using Probabilistic Linguistic Information

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ABSTRACT

The purpose of evaluating mobile e-commerce service quality in tourism is to determine how effectively these platforms meet user needs, enhance customer satisfaction, and improve travel experiences. This process identifies strengths and weaknesses in areas like usability, reliability, responsiveness, and personalization. Evaluating tourism mobile e-commerce service quality is a complex multiple-attribute group decision-making (MAGDM) problem. Recently, methods such as the logarithmic TODIM (LogTODIM) and the VIKOR have been widely used to address MAGDM challenges. However, uncertainty and vagueness often arise due to the subjective nature of human judgment. To address this, probabilistic linguistic term sets have emerged as a valuable tool, enabling decision-makers to express preferences more flexibly and accurately. This paper introduces a novel approach, the probabilistic linguistic LogTODIM-VIKOR (PL-LogTODIM-VIKOR) method to handle MAGDM problems within the probabilistic linguistic term sets framework. A numerical case study demonstrates the feasibility and effectiveness of the proposed method for evaluating tourism mobile e-commerce platforms.

KEYWORDS

Multiple-Attribute Group Decision-Making (MAGDM), Probabilistic Linguistic Term Sets (PLTSs), LogTODIM, VIKOR, Service Quality Evaluation

INTRODUCTION

The evaluation of tourism mobile e-commerce service quality is essential in ensuring that platforms meet user expectations and provide a seamless travel experience (Kamel & Sherif, 2001; Y. X. Li et al., 2003; Palkoska et al., 2003). Mobile e-commerce has transformed the tourism industry, offering a wide range of services, such as travel bookings, itinerary planning, and personalized recommendations. As the competition among platforms intensifies, evaluating service quality becomes a critical factor in improving customer satisfaction and maintaining a competitive edge (Chen & Yang, 2006; S. Liu, 2005; S. Q. Liu, 2005; Z. X. Yan et al., 2004). Tourism mobile e-commerce platforms are characterized by their dynamic and customer-oriented nature. Their success relies on delivering

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efficient, secure, and user-friendly services. Evaluating service quality involves analyzing various aspects, such as platform performance, user experience, and the ability to adapt to diverse customer needs (Daries et al., 2021; K. Liu et al., 2020; Xu, 2020). With the increasing use of mobile devices, customers demand faster, more personalized, and more reliable platforms. Service quality assessments help identify gaps and areas for improvement, ensuring that platforms remain relevant in a highly competitive market. One of the key challenges in evaluating tourism mobile e-commerce service quality is the inherent subjectivity of user perceptions. Customers often evaluate platforms based on their personal experiences, which can vary significantly. To address this, advanced decision-making methods are employed to handle the uncertainty and vagueness in user judgments (Pan & Zhang, 2021; Tang & Zeng, 2021; G. Wei et al., 2021; H. Zhang et al., 2021). Furthermore, the evaluation of service quality is not only beneficial for platform providers but also for customers. It enables providers to refine their services, enhance platform functionality, and deliver a better user experience (Xie et al., 2022; W. Yang & Lin, 2022). For customers, it ensures they have access to platforms that offer convenient, reliable, and high-quality services (X. Liu et al., 2022; Peng, 2022). The insights gained from these evaluations can also guide policymakers and industry stakeholders in setting standards and benchmarks for mobile e-commerce platforms in the tourism sector (K. Li, 2022; Lin et al., 2022; M. Zhao et al., 2021). In conclusion, evaluating the quality of tourism mobile e-commerce services is crucial for fostering innovation and improving customer experiences. It provides valuable insights that help platforms evolve and adapt to changing customer demands. As the tourism industry continues to grow, systematic evaluations of service quality will remain an integral part of ensuring sustainable development and customer satisfaction in mobile e-commerce (Yin & He, 2022; Yu et al., 2022; J. Zhao & Zhang, 2023).

Multiple-attribute group decision-making (MAGDM) is a decision-making method used to select the optimal alternative or rank alternatives in situations involving multiple attributes and multiple decision-makers (Zheng et al., 2024; Zhou et al., 2024; Zhu et al., 2024). This method is widely applied in complex decision-making scenarios, such as resource allocation, project evaluation, and service quality assessment. In MAGDM, each attribute typically represents a critical factor in the decision problem, such as cost, efficiency, or user satisfaction, while each decision-maker evaluates the alternatives based on their own knowledge and experience. Since decision-makers' opinions may vary and attribute weights may differ, MAGDM requires integrating diverse perspectives and effectively managing uncertainty and subjectivity (Liang et al., 2025; M. Wu et al., 2024; S. Wu & Zhang, 2024; S. Yan et al., 2024; G. -R. Yang et al., 2024). To enhance the scientific rigor and accuracy of decision-making, MAGDM often incorporates mathematical models and technical tools, such as the weighted average method, the entropy method, the technique for order of preference by similarity to ideal solution (TOPSIS), and a *v*lekriterijumsko kOmpromisno rangiranje (VIKOR), which is Serbian for “multi-criteria optimization and compromise solution,” as well as the fuzzy theory and probabilistic linguistic term sets (PLTSs; Pang et al., 2016). These methods can effectively address information ambiguity, preference differences, and complex datasets, ensuring that the final decision is more objective and reasonable. The significance of MAGDM lies in its ability to optimize the decision-making process for complex problems, provide reliable support for managers and researchers, and improve decision-making quality and efficiency in practice (Sharika et al., 2024; Touqeer et al., 2024; Ushada, Amalia, et al., 2022); (Ushada, Trapsilawati, et al., 2022).

The evaluation of tourism mobile e-commerce service quality is a complex MAGDM problem. In recent research, methods such as logarithmic tomada de decisão interativa e multicritério (LogTODIM), which is Portuguese for logarithmic interactive and multi-criteria decision-making (Leoneti & Gomes, 2021; Sun et al., 2022), and VIKOR (Opricovic & Tzeng, 2004, 2007) have been widely applied to address challenges in MAGDM scenarios. However, due to the inherent uncertainty and vagueness in decision-making, PLTSs (Lin et al., 2018; Pang et al., 2016; Zhai et al., 2016; Y. Zhang et al., 2016) have emerged as valuable tools for capturing subjective judgments and enhancing the reliability of evaluations. While previous studies have applied traditional LogTODIM and VIKOR

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