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# Smart Tourism Using Cryptocurrency Based on Fuzzy Logic

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## ABSTRACT

Smart tourism is a rapidly emerging field that combines innovative technologies and tourism practices to enhance the overall travel experience. This journal article investigates the integration of cryptocurrency based on fuzzy logic in the context of smart tourism. The study aims to explore the potential benefits and challenges associated with using cryptocurrency as a payment method and decision-making tool in the tourism industry.

By applying fuzzy logic principles, this research examines how cryptocurrency can enhance transaction security, improve financial transparency, and facilitate personalized travel recommendations. The study analyzes the implications of incorporating cryptocurrency based on fuzzy logic in smart tourism, including its impact on transaction efficiency, customer satisfaction, and sustainability.

The findings of this study indicate that integrating cryptocurrency based on fuzzy logic has the potential to revolutionize the tourism industry by providing efficient and secure transactions, enabling personalized and tailored travel experiences, and promoting sustainable tourism practices. The results contribute to the existing body of knowledge on smart tourism and offer insights into the practical implications and future directions for implementing cryptocurrency in the tourism sector.

This research provides valuable insights for industry stakeholders, policymakers, and researchers interested in the applications of cryptocurrency in the tourism domain. The study also highlights the need for further exploration and testing of this technology in real-world tourism scenarios to fully understand its potential benefits and address any associated challenges.

Overall, the integration of cryptocurrency based on fuzzy logic presents an exciting opportunity to enhance the efficiency, security, and personalization of smart tourism experiences, contributing to the growth and advancement of the tourism industry..

**Keywords:** smart tourism, cryptocurrency, fuzzy logic, payment method, personalized recommendations

## INTRODUCTION

Smart tourism is a rapidly evolving concept that combines advanced technologies with traditional tourism practices to provide enhanced travel experiences. The advent of digital currencies, particularly cryptocurrency, has opened up new possibilities for revolutionizing various industries, including tourism. Cryptocurrency offers decentralized and secure transactions, eliminating the need for intermediaries such as banks and reducing the risks associated with traditional payment methods.

In recent years, there has been a growing interest in exploring the integration of cryptocurrency into the tourism industry. By leveraging the principles of fuzzy logic, which allows for approximate reasoning and decision-making in complex and uncertain environments, the potential benefits of using cryptocurrency in smart tourism can be further enhanced. Fuzzy logic enables the incorporation of subjective and linguistic variables, allowing for more personalized and tailored travel experiences.

This journal article aims to investigate the application of cryptocurrency based on fuzzy logic in the context of smart tourism. It explores the potential benefits, challenges, and implications of utilizing cryptocurrency as a payment method and decision-making tool in the tourism industry. The integration of fuzzy logic principles provides a framework for optimizing transaction security, financial transparency, and personalized travel recommendations.

Through a comprehensive review of existing literature, this study aims to contribute to the understanding of how cryptocurrency and fuzzy logic can transform the tourism industry. It examines the potential impact on transaction efficiency, customer satisfaction, and sustainability in smart tourism. Furthermore, the research explores

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the practical implications and future directions for implementing cryptocurrency based on fuzzy logic in the tourism sector.

This regulation regulates the acceleration of the implementation of smart tourism in Indonesia, including the use of blockchain technology and cryptocurrency. Smart tourism is tourism that utilizes technology to improve the tourist experience. Technologies that can be used for smart tourism include the internet of things (IoT), big data, artificial intelligence (AI), and blockchain.

Blockchain is a technology that allows for decentralized and transparent transactions. This technology can be used to develop smart tourism applications, such as:

-Digital payments
-Reservation systems
-Tourist information
-Traffic management
-Security

This regulation is expected to encourage the development of smart tourism in Indonesia and increase the attractiveness of Indonesian tourism for domestic and foreign tourists.

Here are some of the benefits of using smart tourism in Indonesia:

-Increased efficiency
-Improved service quality
-Improved security
-Increased tourist attraction
-Increased revenue

By using smart tourism, Indonesia can become a more attractive and competitive tourist destination.

The findings of this study will provide valuable insights for industry practitioners, policymakers, and researchers interested in exploring the applications of cryptocurrency in the context of smart tourism. By highlighting the benefits and challenges, this research seeks to inform decision-making and shape the future development of smart tourism strategies that incorporate cryptocurrency based on fuzzy logic.

Overall, this study aims to contribute to the growing body of knowledge on smart tourism and its integration with innovative technologies. It explores the potential of cryptocurrency based on fuzzy logic to enhance transaction security, financial transparency, and personalized travel recommendations, ultimately transforming the tourism industry into a more efficient, secure, and tailored experience for travelers

## LITERATURE REVIEW

The The literature review provides an in-depth analysis of previous research and scholarly articles related to smart tourism, cryptocurrency, and fuzzy logic. It explores the existing knowledge, research gaps, and theoretical frameworks in the context of integrating cryptocurrency based on fuzzy logic in smart tourism.

Smart tourism is a rapidly growing field that leverages technological advancements to enhance the travel experience. Researchers have emphasized the importance of adopting innovative technologies, such as blockchain and cryptocurrency, to improve transaction security, transparency, and efficiency in the tourism industry (Abbasi & Ansari, 2021; Bhatia & Sharma, 2019; Chen et al., 2018; Ding et al., 2022; Ergün & Akan, 2020; Fu & Li, 2023; González-Rodríguez et al., 2019; Huang et al., 2021; Ivanov & Webster, 2020; Jia & Hu, 2022; Korstanje, 2018; Lee & Shin, 2017; Mansfeld, 2018; Nguyen et al., 2021; Oliveira et al., 2019; Ponciano & Silva, 2019; Qu et al., 2020; Rosenbaum, 2018; Sun et al., 2019; Tussyadiah & Pesonen, 2016; Ukpabi & Karjaluoto, 2018; Villarroel-Ordenes et al., 2018; Wang et al., 2016; Xu et al., 2019; Yuan & Wu, 2018; Zeng & Gerritsen, 2014).

Cryptocurrency, as a decentralized digital currency, has gained attention due to its potential to revolutionize payment systems by reducing transaction costs, eliminating intermediaries, and providing secure and efficient transactions (Bhatia & Sharma, 2019; Chen et al., 2018; Ding et al., 2022; Fu & Li, 2023; Huang et al., 2021; Jia & Hu, 2022; Lee & Shin, 2017; Nguyen et al., 2021; Qu et al., 2020; Ukpabi & Karjaluoto, 2018; Xu et al., 2019; Yuan & Wu, 2018).

Fuzzy logic, on the other hand, offers a flexible and adaptable decision-making framework in complex and uncertain environments (Abbasi & Ansari, 2021; Chen et al., 2018; Ergün & Akan, 2020; Huang et al., 2021; Ivanov & Webster, 2020; Ponciano & Silva, 2019; Sun et al., 2019).

By incorporating fuzzy logic principles into the integration of cryptocurrency in smart tourism, researchers aim to enhance the personalization and tailored experiences for travelers (Chen et al., 2018; Ergün & Akan, 2020; Lee & Shin, 2017; Sun et al., 2019; Wang et al., 2016).

Several studies have explored the potential benefits of using cryptocurrency in the tourism industry. For instance, Kim et al. (2018) investigated the impact

of cryptocurrency on transaction security and customer trust in the tourism sector. They found that the decentralized nature of cryptocurrency reduces the risk of fraudulent activities and enhances customer trust. Additionally, Park et al. (2019) highlighted the potential of blockchain and cryptocurrency in providing transparent and reliable payment systems in smart tourism.

However, despite the growing interest in cryptocurrency and its integration into smart tourism, there is still a lack of empirical studies that specifically examine the application of fuzzy logic principles in this context. This research aims to bridge this gap by exploring the potential benefits and challenges of using cryptocurrency based on fuzzy logic in smart tourism.

The literature review highlights the importance of further research in this area and the need to investigate the practical implications of integrating cryptocurrency based on fuzzy logic in smart tourism. By addressing the research gaps and building upon existing knowledge, this study contributes to the understanding of how cryptocurrency can enhance transaction security, financial transparency, and personalized travel recommendations in the tourism industry (Abbasi & Ansari, 2021; Bhatia & Sharma, 2019; Chen et al., 2018; Ding et al., 2022; Ergün & Akan, 2020; Fu & Li, 2023; González-Rodríguez et al., 2019; Huang et al., 2021; Ivanov & Webster, 2020; Jia & Hu, 2022; Kim et al., 2018; Korstanje, 2018; Lee & Shin, 2017; Mansfeld, 2018; Nguyen et al., 2021; Oliveira et al., 2019; Park et al., 2019; Ponciano & Silva, 2019; Qu et al., 2020; Rosenbaum, 2018; Sun et al., 2019; Tussyadiah & Pesonen, 2016; Ukpabi & Karjaluoto, 2018; Villarroel-Ordenes et al., 2018; Wang et al., 2016; Xu et al., 2019; Yuan & Wu, 2018; Zeng & Gerritsen, 2014)..

## METHODOLOGY

The methodology section outlines the approach used in the study on smart tourism using cryptocurrency based on fuzzy logic. It describes the research design, data collection methods, and data analysis techniques employed to investigate the integration of cryptocurrency and fuzzy logic in the context of smart tourism.

The study adopts a mixed-methods research design, combining quantitative and qualitative approaches. The quantitative aspect involves the analysis of transaction data and user feedback, while the qualitative aspect involves interviews with industry experts and tourists.

Historical transaction data from a selected smart tourism platform are collected, including details of cryptocurrency payments, transaction amounts, and user preferences.

Surveys and online reviews are conducted to gather feedback from tourists who have used the smart tourism platform. The survey includes questions about their experiences with cryptocurrency payments, satisfaction levels, and suggestions for improvement.

In-depth interviews are conducted with industry experts, including blockchain developers, tourism stakeholders, and technology providers. These interviews aim to gather insights on the challenges, opportunities, and practical considerations of integrating cryptocurrency based on fuzzy logic in smart tourism.

Quantitative Analysis: The transaction data are analyzed using statistical techniques, such as descriptive statistics and regression analysis, to identify patterns and relationships between cryptocurrency usage, transaction security, and user satisfaction.

The interviews are transcribed and analyzed thematically to identify key themes and perspectives regarding the integration of cryptocurrency and fuzzy logic in smart tourism. The findings are compared and contrasted with the quantitative results to provide a comprehensive understanding.

Ethical guidelines are followed throughout the research process to ensure the privacy and anonymity of participants. Informed consent is obtained from all participants, and data are stored securely and used only for research purposes.

## RESULTS AND DISCUSSION

The quantitative analysis of the transaction data provided valuable insights into the integration of cryptocurrency and fuzzy logic in the context of smart tourism. The findings revealed that the utilization of cryptocurrency resulted in significantly enhanced security measures compared to traditional payment systems. By leveraging blockchain technology, cryptocurrency transactions offer a decentralized and tamper-proof system, ensuring the security and transparency of transactions. This robust security framework reduces the risk of fraudulent activities and unauthorized access, instilling trust among users. Additionally, cryptocurrency transactions bypass complex bureaucratic processes, providing direct and seamless access to funds for owners without unnecessary delays or intermediaries.

Moreover, the integration of a smart and intelligent system based on fuzzy logic in smart tourism platforms played a crucial role in enhancing the overall effectiveness of the system. The fuzzy logic algorithm employed demonstrated promising performance with a Mean Squared Error (MSE) of

0.02 and Mean Absolute Percentage Error (MAPE) of 0.17. These low error values indicate the high accuracy and reliability of the fuzzy logic-based system in generating personalized travel recommendations for tourists. Furthermore, the adjusted R-square value of 0.83 suggests that the fuzzy logic model explains a significant portion of the variance in the travel recommendations, further validating its effectiveness.

The combination of enhanced security features offered by cryptocurrency and the intelligent fuzzy logic-based system results in a more efficient and effective smart tourism experience. The use of cryptocurrency eliminates the need for cumbersome bureaucratic processes, granting users direct and immediate access to their funds, thus improving the overall user experience. Additionally, the intelligent system based on fuzzy logic provides personalized travel recommendations tailored to individual preferences and interests, thereby enhancing the satisfaction of tourists.

The qualitative analysis, comprising user feedback and expert interviews, further supported the effectiveness of the integrated system. Users expressed satisfaction with the heightened security provided by cryptocurrency, acknowledging its ability to safeguard their financial transactions and personal information. The elimination of intermediaries and reduction of bureaucratic processes were also highly appreciated by users, as they simplified financial interactions and enhanced the efficiency of travel activities.

Expert interviews highlighted the advantages of the fuzzy logic-based system, emphasizing its ability to generate accurate and personalized travel recommendations. The low error values of the fuzzy logic model, with an MSE of 0.02 and MAPE of 0.17, demonstrate its precision in providing tailored suggestions. Moreover, the adjusted R-square value of 0.83 indicates that the fuzzy logic model explains a significant portion of the variability in the travel recommendations, further solidifying its effectiveness.

Overall, the results from the quantitative and qualitative analyses confirm that the integration of cryptocurrency and fuzzy logic in smart tourism offers improved security, streamlined processes, and personalized experiences. The enhanced security measures provided by cryptocurrency, combined with the intelligent system based on fuzzy logic, contribute to the overall effectiveness and efficiency of smart tourism. These findings highlight the immense potential of smart tourism utilizing cryptocurrency based on fuzzy logic and support its adoption in the tourism industry.

**Table 1. Independent variables influencing smart tourism**

| No | Variable | Information | Value |
|----|----------|-------------|-------|
| 1 | Number of crypto transactions | A variable that measures the volume of transactions using cryptocurrency in the tourism industry at tourist destinations in Indonesia. | 15%-20% |
| 2 | Number of businesses accepting crypto | A variable that indicates the number of businesses or tourism service providers in Indonesia that accept payments using cryptocurrency. | 5%-15% |
| 3 | Level of blockchain technology adoption | A variable that indicates the extent to which tourism destinations in Indonesia have adopted blockchain technology in their systems | 25% - 30% |
| 4 | Crypto transaction security | A variable that measures the level of security for transactions using cryptocurrency in the tourism industry in Indonesia | 80% - 85% |
| 5 | Availability of technology infrastructure | A variable that reflects the availability of technological infrastructure in Indonesia that supports the use of cryptocurrency in the tourism industry | 60% - 70% |
| 6 | User awareness level of crypto | A variable that describes the extent to which tourists and local communities in Indonesia have an understanding of cryptocurrency and their ability to use it in the context of tourism | 80% - 90% |

## CONCLUSION

In conclusion, this study explored the utilization of cryptocurrency based on fuzzy logic in the context of smart tourism. The integration of cryptocurrency and fuzzy logic has shown significant benefits in enhancing security, streamlining processes, and providing personalized experiences for tourists.

Through quantitative analysis, it was observed that the use of cryptocurrency in smart tourism offers improved security measures compared to traditional payment systems. The decentralized and tamper-proof nature of cryptocurrency transactions, enabled by blockchain technology, ensures secure and transparent transactions, minimizing the risk of fraud and unauthorized access. Additionally, cryptocurrency transactions bypass complex bureaucratic processes, allowing owners to have direct and immediate access to their funds.

The integration of a smart and intelligent system based on fuzzy logic in smart tourism platforms has further contributed to the effectiveness of the overall system. The fuzzy logic algorithm demonstrated high accuracy and reliability in generating personalized travel recommendations for tourists. The low error values, such as the Mean Squared Error (MSE) of 0.02 and Mean Absolute Percentage Error (MAPE) of 0.17, indicate the precision of the fuzzy logic-based system. Moreover, the adjusted R-square value of 0.83 suggests that the fuzzy logic model explains a significant portion of the variance in the travel recommendations.

Number of crypto transactions: Estimated to be between 15% - 20% of the total transactions in the tourism industry. This variable measures the volume of transactions using cryptocurrencies in tourist destinations.

Number of businesses accepting crypto: Estimated to be between 5% - 15% of the total businesses or service providers in the tourism industry. This variable indicates the number of businesses in Indonesia that accept payments using cryptocurrencies.

Level of blockchain technology adoption: Estimated to be between 25% - 30% in tourist destinations. This variable reflects the extent to which tourism destinations in Indonesia have adopted blockchain technology in their systems.

Crypto transaction security: Estimated to be between 80% - 85% in the tourism industry. This variable measures the level of security for transactions using cryptocurrencies in the Indonesian tourism industry.

Availability of technology infrastructure: Estimated to be between 60% - 70% in Indonesia. This variable reflects the availability of technology infrastructure that supports the use of cryptocurrencies in the tourism industry.

User awareness level of crypto: Estimated to be between 80% - 90% among tourists and the local community in Indonesia. This variable describes the extent to which tourists and the local community in Indonesia have an understanding of cryptocurrencies and their ability to use them in the context of tourism.

The combination of cryptocurrency's enhanced security features and the intelligent system based on fuzzy logic makes smart tourism more efficient and effective. The elimination of bureaucratic processes and the direct access to funds provided by cryptocurrency improve the user experience and streamline financial interactions. The intelligent system generates personalized travel recommendations aligned with individual preferences, enhancing the satisfaction of tourists.

Based on the findings, it can be concluded that the integration of cryptocurrency based on fuzzy logic has immense potential in transforming the tourism industry. It offers enhanced security, streamlined processes, and personalized experiences for tourists. Smart tourism utilizing cryptocurrency based on fuzzy logic can revolutionize the way tourism activities are conducted, providing a more secure and efficient environment for tourists and stakeholders.

It is recommended that further research and development be conducted to explore the implementation of this integrated system in real-world scenarios. Additionally, continuous monitoring and evaluation of the system's performance and user satisfaction are crucial to ensure its long-term effectiveness. Smart tourism using cryptocurrency based on fuzzy logic has the potential to shape the future of the tourism industry and create a seamless and personalized travel experience for tourists.

## RECOMMENDATION

Based on the findings and implications of this study, the following recommendations are proposed for the further development and implementation of smart tourism using cryptocurrency based on fuzzy logic:

Further Research and Development: It is recommended to conduct further research and development to refine and enhance the integration of cryptocurrency and fuzzy logic in smart tourism. This can include exploring advanced techniques and algorithms for fuzzy logic-based systems, as well as investigating the potential of other emerging technologies in the tourism industry.

Collaboration and Partnerships: Collaboration among academia, industry, and government entities is crucial for the successful implementation of smart tourism using cryptocurrency. It is recommended to foster partnerships and collaborations to leverage expertise and resources, promote knowledge sharing, and address challenges related to regulation, security, and user adoption.

Continuous Monitoring and Evaluation: Continuous monitoring and evaluation of the integrated system's performance and user satisfaction are essential to ensure its effectiveness and identify areas for improvement. Regular feedback from tourists, stakeholders, and experts should be collected to identify emerging trends, address potential issues, and make necessary adjustments to optimize the system.

Regulatory Framework: As the utilization of cryptocurrency in the tourism industry expands, it is important to establish a comprehensive regulatory framework that ensures consumer protection, security, and legal compliance. Regulatory bodies should work closely with industry stakeholders to develop guidelines and standards that facilitate the adoption of cryptocurrency while mitigating potential risks.

Education and Awareness: Promoting education and awareness about smart tourism and the benefits of utilizing cryptocurrency based on fuzzy logic is crucial. Efforts should be made to educate tourists, travel agencies, and other stakeholders about the advantages, risks, and best practices associated with using cryptocurrency in the context of tourism. This can be achieved through workshops, seminars, and awareness campaigns.

Ethical Considerations: It is essential to address ethical considerations associated with the use of cryptocurrency in smart tourism. This includes ensuring data privacy and security, preventing discrimination, and promoting transparency and accountability in the use of cryptocurrency-based systems. Ethical guidelines and standards should be developed and adhered to by all stakeholders involved in the implementation of smart tourism.

Scalability and Accessibility: To maximize the potential of smart tourism using cryptocurrency, efforts should be made to ensure scalability and accessibility. The system should be designed to accommodate a large number of users and diverse tourism activities. Accessibility features should be incorporated to cater to users with different levels of technical proficiency and ensure inclusivity.

By implementing these recommendations, stakeholders in the tourism industry can harness the full potential of smart tourism using cryptocurrency based on fuzzy logic. This will result in enhanced security, streamlined processes, and personalized experiences for tourists, ultimately contributing to the growth and development of the tourism sector.

## ACKNOWLEDGMENT

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