Blockchain Implementation in the Information Management of Ritz-Carlton Tianjin

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Abstract: Based on the blockchain technology, this article analyzes the problems encountered by the Ritz-Carlton Tianjin in the process of informatization. It is found that the hotel is not strict enough to protect customer information. It relies too much on the increased occupancy rate of the OTA, which makes the platform commission rate higher and higher. The hotel network evaluation effect is not good, etc. In response to the corresponding problems, combined with blockchain technology, the paper proposed solutions, hoping to provide help for the informatization process of the Ritz-Carlton, Tianjin.

1. Introduction

As a comprehensive service industry, the hotel industry receives more and more information internally and outward. Therefore, how to efficiently collect and organize information is particularly important. In the hotel industry, the vast majority of consumers will advance on the platform or website browse online reviews of hotels. As a reference, these comments can help them to understand the situation of the hotel, to make trading decisions, that is to say, other consumers' reviews to a large extent affected the consumer whether to trade. According to a survey, more than 90% of consumers have the habit of browsing online reviews, and more than 83% of consumers believe that online reviews will affect their purchase decisions [1].However, the problem is that not every reviewer is very responsible, they may write a perfunctory or random comment, which has a bad impact on the quality of the review, make it no reference value at all.

Blockchain technology is a key technology to ensure the safe operation of Bitcoin transactions. The idea of applying blockchain technology to hotel systems has been proposed by hotel industry professionals in the past few years and is still being studied and experimented with. In recent years, some enterprises have applied blockchain technology to the hotel industry, which has made a good change. Tripio, for example, directly connects global travel companies and consumers through blockchain technology, making travel accommodation booking the main sales direction, and building a zero-commission booking model that is trusted by both parties. In order to make the hotel have greater development space in the future, the hotel information management system is one of the systems that need to be improved. This study takes Ritz-Carlton Tianjin as the research object, analyzes the problems existing in the Ritz-Carlton Tianjin information management system, and puts forward corresponding countermeasures based on blockchain technology.

2. Literature Review

2.1 Blockchain and Smart Contracts

Blockchain technology is the underlying core and basic technology of Bitcoin system. It is a decentralized distributed data management technology based on data encryption, time stamp, distributed consensus and other mechanisms. It has the characteristics of tamper-proof, traceable, highly trusted and highly available[2]. In a narrow sense, blockchain refers to a ledger of data shared by nodes in a decentralized system. Blockchain consists blocks linked together in a chronological chain structure. Block is a special data structure consisting of block header and block

body. The block header stores the metadata of the block and is divided into two groups. One group is timestamp, difficulty, and nonce. The other group related to mining is related to the block itself, including the parent block hash, the version number, and the root of the merkle tree. The block body contains a sequence of transactions. The logical structure of blockchain is shown in Figure 1.
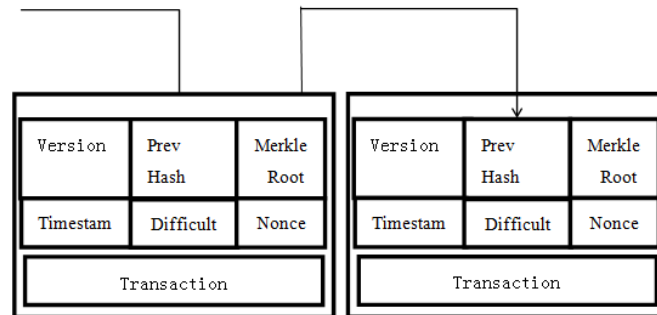

Version	Prev Hash	Merkle Root		Version	Prev Hash	Merkle Root
Timestam	Difficult	Nonce		Timestam	Difficult	Nonce
Transaction				Transaction		

Fig.1 Blockchain Framework

This is how the block chain is "linked" by a chain structure. Each block records multiple transactions that have occurred since the last block, as well as metadata for the block itself.

Ethereum model, a representative of version 2.0 of blockchain combined with smart contract technology, was published in 2014 [3]. As soon as it was released, it became one of the hottest, most likely commercialized technologies of the moment. The advent of computers and blockchain has led scholars to revisit smart contracts. As the center of blockchain, smart contract is a computer program that makes promises in the form of numbers. Both parties to the contract reach a consensus by implementing the above numerical definition [4]. During the transaction process, it can be triggered by certain conditions to run and verify itself, so that it can run on the shared data ledger, with the function of receiving, storing and sending. Smart contracts are procedural codes that involve business and algorithms, which are equivalent to the programing of the complex relationship between law and people to improve security and reduce costs.

Blockchain technology tends to use code to regulate individual behavior and transactions, rather than relying solely on the law. The combination of blockchain and smart contracts has created a new regulatory model that is code-centric and has spawned a new way of thinking about law. In fact, as more and more contract terms and legal rules are incorporated into smart contract code, traditional law, as a flexible rule with inherent ambiguity, needs to be better integrated with the code.

2.2 Application of Blockchain in Hotel Industry

Blockchain and its underlying applications first received a lot of attention from fintech companies and academic research in the field. This is mainly because blockchain combines technologies such as distributed data storage, peer-to-peer transmission, secure transactions, consensus mechanisms, and encryption algorithms, which are easily applicable to the financial industry compared to other industries. However, the hotel industry is extremely sensitive to customer sentiment, as the blockchain mechanism is most likely to have a direct impact on a company's brand value and market share. Therefore, some important blockchain applications should also start to be applied to the hospitality industry.

In general, digital ID technology is regarded as a practical solution to various privacy problems in people's lives. However, blockchain technology is consistent with the demand of digital ID due to its decentralized and encryption characteristics. Its decentralized nature can significantly reduce the possibility of leaks due to attacks on centralized servers. Blockchain encryption itself is not fundamentally different from centralized encryption -- it's public key encryption, but blockchain can protect data from theft or tampering through one-way hashing and distributed storage. This means that blockchain maintains confidentiality and authentication, providing a solution to the risk of theft of identity and privacy.

In addition, digital ID technology helps to create a more trustworthy rating system using a

unique private key, avoiding duplicate opinions in the client platform [5]. Another of its most popular applications is to simplify contracts between hotels and middlemen [6]. Contracts based on blockchain technology can automatically execute traceable, unchangeable and irreversible transactions. In this regard, blockchain can facilitate disintermediation and create a new distribution network that anyone can participate in, which will save costs [7]. Finally, tracking food and monitoring is one of the best uses of blockchain in restaurants and hotels to understand the true origin of products and authenticate organic food or ingredients from local channels [8].

3. Methodology

3.1 Information Management Status of the Ritz-Carlton Tianjin

In the daily operation and management, the basic information directly generated by the hotel consumers and the customer preference, customer demand and other information generated in the customer archives is called the hotel industry customer information. In addition, in order to provide customers with personalized services, Ritz-Carlton Tianjin will have employees observe the customer's living habits and dining habits in the case of room cleaning and dining, which will be recorded in the customer's information file. Before the development of blockchain technology, in order to make it easy for hotel service staff to retrieve customer information files and provide personalized services, the hotel adopts the centralized storage mode. Although it is convenient for daily operation and management, it also faces potential dangers.The centralized storage mode will only set up warning and blocking programs in the outer space of the storage file system. Once deciphered by criminals or the careless operation of hotel staff, the hotel customer information will be completely stolen by criminals and sold at a high price.

3.2 Questionnaire Survey

In order to evaluate the application of blockchain technology in the information management of Ritz-Carlton Tianjin, we conducted a questionnaire survey among the customers of Ritz-Carlton Tianjin, and a total of 170 samples were obtained. More women (62.9%) than men (37.1%). In the age distribution, the samples under 18 years old accounted for 3.53%, the samples between 18 and 30 years old accounted for 48.24%, the samples between 31 and 40 years old accounted for 30%, the samples between 41 and 50 years old accounted for 19.41% and the samples between 51 and 60 years old accounted for 2.35%. Next, descriptive statistics and relationships between variables were performed by using IBM SPSS.

The survey found that 74% of respondents had heard about the leak at Ritz-Carlton Tianjin, while 26% had not. 93.53% of the respondents were worried about their information being leaked during the process of booking hotels, and only 6.47% of the respondents were not worried about being leaked. This data shows that most people pay attention to the problem of hotel information leakage and have such concerns when choosing a hotel. Usually, in this case, customers will prefer hotels with better reputation within the acceptable range.

In addition, 93.53% of the respondents in the survey of "the degree of distress caused by information leakage to customers" thought that data leakage would cause them trouble. This is a potential hidden danger in the process of hotel room sales. In addition, if customer information leakage occurs in the hotel, the customer's impression and satisfaction with the hotel will also decline, as shown in Figure 2.
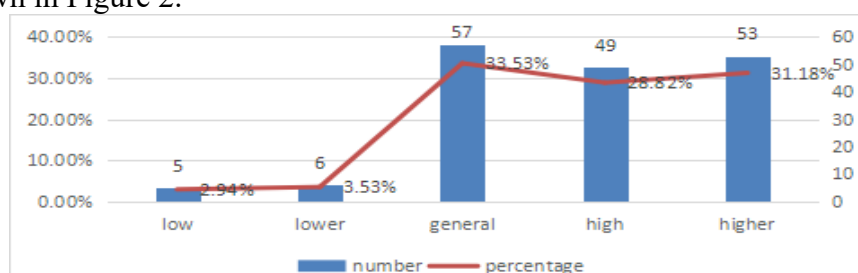

Fig.2 The Degree of Distress Caused by Information Leakage to Customers

As for online reviews, 60% of the respondents relied heavily on online reviews when choosing hotels, and only 6.47% of the respondents relied less on online reviews. According to the survey, some hotels malicious competition, will be through some improper means, such as through the form of brush poor reviews deliberately defame the home. Some are also tampered with internally, so sometimes online reviews lose their reference value and consumers choose hotels with good reputation around them.

In addition, 75.88% of the respondents used online booking when choosing hotels and regarded online reviews as a reference standard for their purchase. Among them, 48.82% of buyers thought the quality of online reviews is the key to their decision, and 28.24% of respondents thought the quantity of online reviews is the key to their decision to buy. 15.29 % of the respondents were concerned about the timeliness of online evaluation. The evaluation content is related to the hotel's products and services, and the evaluation content is detailed and complete. The survey results are shown in Figure 3.
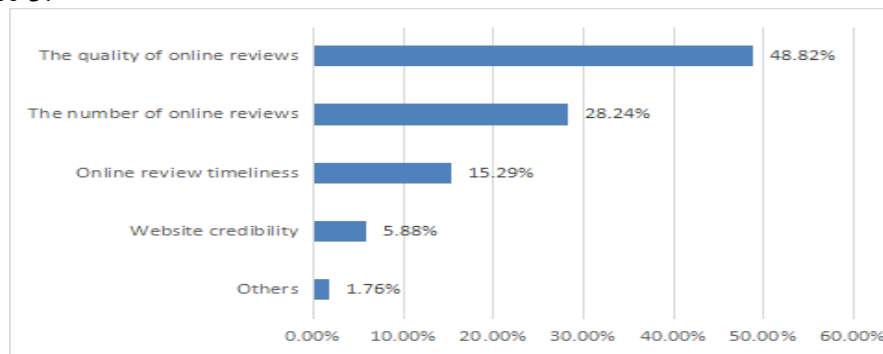

Fig.3 Influencing Factors of Online Evaluation

4. Conclusion

In recent years, well-known hotel brands such as Hilton Hotel and InterContinental Hotels have also been repeatedly reported to have customer information posted online for sale by unscrupulous individuals. One of the reasons is that hotels use a central repository to store customer information. Although it is very fast, it is easy to access all the stored customer information in the hotel by conquering a few nodes. Therefore, the following recommendations are made.

First, the decentralized and distributed storage structure of blockchain is used to store customer information in a decentralized manner. In the concept of centralization, there is a "deciding platform" through which all data or information can only be transmitted to other places. In a decentralized model, there is no "platform of decision", where power is dispersed and users can connect directly to each other point-to-point. But all data that moves between users is recorded, so each node on the blockchain is independent. In the real world, the physical form is fixed, but in the digital world, it can be in any form and the data is the same.

Second, the hash function is used to encrypt data. The hash function in cryptography is equivalent to a binary conversion program, which can convert any information into a 256-bit binary string, thus ensuring the security of information. Therefore, when the data is entered into the system, the background automatically converts the input information into a string of fixed values. With the continuous increase of a customer's information, the later input information will be converted into binary on the basis of the previous string.

Third, using asymmetric encryption to strengthen data protection. After the customer information is entered and converted into a string of equal length, the public key and private key are used to encrypt and decrypt the information for convenience of later viewing. The public key is shared in the hotel, and all the front desk staff have the permission to know it. The private key is secret and only senior management has the right to know it. This task can be accomplished only when the private key matches the public key during information retrieval.

Thus, it prevents managers from uploading hotel customer information to the Internet by mistake, and also resists criminals from accessing the system. Hotel front desk agents only have access to

partial information. They can only get the complete customer data through private chain authentication. Even if the network defense system is compromised or an undetected penetration occurs, outsiders can only get strings.

Acknowledgment

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