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# Modeling the Intergrated Customer Loyalty Program on Blockchain Technology by Using Credit Card

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**Abstract**— Blockchain technology integrates mathematical encryption, open source software, computer networks and incentive mechanisms. It created a crypto call hiding in a token. However, tokens should be used to purchase goods or services from offline retailers, but current tokens are used primarily for investment. Therefore, the most important thing at this point is how to get the royalty-based tokens integrated into the offline store. For this purpose, it is not realistic to install a new payment terminal in an offline store. Based on these perceptions, this study measures the application of investigated components to understand the impact of blockchain technology on customer loyalty programs. The main purpose of this study is to propose an integrated customer loyalty program model for blockchain technology using credit cards. This study shows how to implement an integrated customer loyalty program process in credit card-based blockchain technology and how to identify the importance of block-chain technology to improve customer loyalty programs.

**Keywords**-component; blockchain; criptocurrencies; token; customer loyalty program

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## I. INTRODUCTION

Blockchain technology integrates mathematical encryption, open source software, computer networks and incentive mechanisms. A blockchain is a distributed database associated with a distributed ledger class that is password protected and economically incentivized by passwords. Through a public distribution ledger, the blockchain replaces open verification and consensus on the audit of trusted third parties. In summary, the three aspects of how they work are helpful in terms of block chaining as a new technology. First, the blockchain is a database of ruthless consensus [1]. Second, because blockchains operate on the Internet, the possibility of economic adjustment is limited by the extent of the blockchain [2]. Finally, blockchains are databases, and digital can exist in a blockchain [3]. These blockchain technologies have created cryptocurrencies, which is pure digital assets, and distributed hashing performance is used to solve the complexity of encryption and individual blocks of open ledgers. Because of the computing power required for hash transactions, cryptocurrencies cannot be forged or otherwise cloned. This invariance is due to significant inherent cryptocurrencies. Value can be duplicated or stolen. This is because you can buy goods or services that you are not interested in. In addition, blockchain-based money is transforming into an increasingly valuable store, such as the asset class [4].

Cryptocurrencies involve many kinds of assets, such as currencies, securities, properties, loyalty points, and gift certificates, among others [5]. There are two kinds of blockchain tokens including currency and token. A currency is generally based on a blockchain. Such a currency is generally called a cryptocurrency, for blockchain technology is based upon cryptography. The typical example is Bitcoin that is the currency of the Bitcoin blockchain [6]. The Bitcoin blockchain enables users to store and transfer Bitcoins on a peer-to-peer network. Another one is Ether that is the currency of the Ethereum blockchain. The Ethereum blockchain also enables users to store and transfer Ethers on a peer-to-peer network. Furthermore, the Ethereum blockchain can enable users to do smart contracts and decentralized applications [5]. Unlike a

currency, a token is not based on a blockchain but is created and governed by a smart contract [7]. For example, on the Ethereum platform, most tokens are governed by smart contracts following the common standard called ERC20. It specifies a set of functions and events that all ERC20-compliant smart contracts should provide. Therefore, ERC20 tokens have been created to implement many kinds of digitalized assets, enabling them to play important roles in the Ethereum ecosystem.

Tokens are traded on the current exchange like stocks. However, tokens should be used to pay for real goods purchases or services in order to function as a kind of money. There are two reasons for not doing so. First, in order to acquire tokens, it must be mined or purchased from the exchange. Since the mining takes a long time, tokens are usually purchased from the exchange. However, since only a part of people possesses tokens as a kind of investment assets and ordinary people are not able to use the money as real money, their holdings do not spread. Second, in order to use this tokens as a payment means, a separate terminal for recognizing the tokens as the payment means is required for the retail transaction. However, there is no reason to install a separate terminal for the tokens that the customers do not generally own. In this situation, tokens cannot be used as a means of payment in retail transaction.

Based on these perceptions, this study measures the application of investigated components to understand the impact of blockchain technology in improving customer loyalty programs. The study recognizes the difficulties and complexities associated with changing environments and the complexity of recent workplaces. A blockchain is believed to provide a customer loyalty experience that drives engagement and generates strong referral behavior at all levels leading to higher profits. This study will continue to critically review the current literature on blockchain, customer loyalty programs, and assess the level of emphasis and effectiveness of blockchain technology in improving customer loyalty programs. The main objective of this study is to propose a model of an integrated customer loyalty program for blockchain technology using credit cards. This study

demonstrates how to implement an integrated customer loyalty program process in a blockchain technology using credit cards as well as identifying the importance of blockchain technology in improving customer loyalty programs.

## II. RETERATURE REVIEW

Customer loyalty encourages consumers to shop more consistently [8], because they are customer attitudes and behaviors that favor a brand over all competing products, regardless of whether they are satisfied with the product or service. Customers can demonstrate loyalty to price, brand, company and other customers. However, customer loyalty is the result of recognizing the positive emotional experience, physical attribute-based satisfaction, and the value of experience that includes a product or service [9]. It is assumed that a loyalty program is a structured marketing effort that provides rewards and thus encourages loyal buying behavior that potentially benefits the company [10]. Reward programs are provided to customers who purchase frequently from the company. The loyalty program allows customers to receive advanced access to new products, special offers, or free merchandise. Customers typically register their personal information with the company and sometimes provide value to the customer by providing a monetary or non-monetary program for the company. Customer loyalty and engagement can create or ruin a company. The rewards program therefore represents a strategic investment in all types of organizations. However, as it has grown rapidly, it is still suffering from inefficient conditions. However, the blockchain has been described as a powerful technology that helps realize the value of customer loyalty programs. Any organization with a reward program (from bank to airline) can be mindful of the efficiency, cost savings and brand loyalty that block-chain technology can provide [11].

One of the originalities of the business is that the company moves towards the customer. Research has shown that this is achieved through blockchain technology that improves customer loyalty programs [8]. Recent advances in blockchain technology have given marketing managers the tools to create a new generation of customer data and activities, as well as security and privacy issues that arise with all additional participants to assess the level of control. Blockchain technology is still in the early stages of adoption, but may be useful for loyalty program providers. Even if standardization is far from reality, there are hundreds of block-chain initiatives already taking place in various industries. One attractive feature of loyalty rewards is that they are not central to business revenues and operations, so companies that want to implement a blockchain for customer loyalty programs can help reduce administrative costs, improve customer experience, and promote user engagement. As a rule, the blockchain support loyalty platform is recognized and understood by the organization's corporate and managerial owners who are expected to thrive the most.

Many people experience problems that can penetrate into many areas, including general sales as well as recruitment and retention of loyal customers and employees. The blockchain for customer loyalty programs covers all aspects of most businesses. Recently, it is used to promote a product, service, or organization for sales, attraction, maintenance, and customer retention purposes. There is an academic debate about the effects of blockchain technology on improving customer loyalty programs, especially in developing countries. However, some scholars have argued that this claim does not hinder the

use of block-chain technology to improve customer loyalty programs and should benefit all companies worldwide. However, the efficiency of usage varies from company to company.

## III. MODEL OF THE INTERGRATED LOYALTY NETWORK ON BLOCKCHAIN TECHNOLOGY BY USING CREDIT CARD

Customer loyalty programs have spread throughout travel, retail, financial services and other economic sectors. The result is a cumbersome procedure for exchanging points between program partners, which makes the point system and usage options obsolete. For consumers who are interested in loyalty program arrays, blockchain technology can instantly exchange and exchange multiple loyalty point calls on a single platform [5]. Blockchain technology is revolutionize a lot of things by moving money, clearing trades, making contracts smart and enforcing terms, which allows companies to promote their brand, create stronger partnerships and strengthen consumer loyalty. Blockchain can innovate loyalty by eliminating harassing fragmentation and extending the supported loyalty platform. If continued, all loyalty programs can be kept as a single umbrella, which can mean a high level of issuance and repayment and a high value to the end customer [11]. It can also help leverage knowledge of customer preferences in real time and even enable —end users to become the program operators. It offers new ways to generate revenues and new ways to engage customers in ways that had not been done before. However, blockchain program is intended to streamline loyalty and reward programs for the airlines, and will help promote access to cultural events, and eventually, adjusting the rewards program accordingly.

If there is only one "wallet" for the point, the consumer does not have to find the options, restrictions and usage rules for each program. All loyalty programs are vulnerable to the block chain revolution, but the travel industry is probably the most dangerous [12]. Travel loyalty programs tend to be complex and multi-currency, unlike banks that offer cash refunds or single currencies that are generally easy to use at retailers or merchants who run simple discount programs. In some cases, travel loyalty program points are different for travel components (flights, car rentals, hotels, meals), leading to defrag points. The estimates vary widely, but the typical "breakage" rate (percentage of unconstrained score) is about 10-20%. It can also be difficult for an average person to get enough points to get meaningful rewards. People have gained a lot of experience in technology that has successfully reduced inefficiency and friction in many industries. Large travel companies such as airlines and hotel chains pay billions of dollars annually to Priceline, Expedia and other online travel agencies, allowing customers to travel by air, hotel, and car rental. Loyalty platforms based on blockchain technology can bring another chaos.

Early adopters can get significant benefits. First, the blockchain technology can help alleviate the balance sheet liability that many people in the industry are facing [13]. Loyalty programs have long relied on affiliate cards and partnerships to sell points and generate incremental revenue. However, the number of airline seats and hotel rooms available for salvation in recent years has been limited by record personnel and load factors. As a result, new unused points have increased. The new accounting standard has become a headache. People must postpone the return for the value of their loyalty points until you redeem your miles. By adopting blockchain technology, companies can quickly add and

maintain loyal partnerships without adding complexity to the program. A strong, frictionless partner network can mean more bonus options in addition to core travel products, which can create the valves you need for these growing balance sheet pressures. Second, using blockchain technology allows people to move away from the loyalty program mold of a tightly defined single-size program and the hassle-free restraint process [14]. Consumers increasingly expect personalized (simply non-segmented) travel products and digital one-stop services. The growth of online travel agencies is evidence for that part. With blockchain technology, people can seamlessly add both large partners and local partners, effectively eliminating the backend issues of providing trends and making trends much easier to meet.

What will a loyalty network based on a blockchain look like? Initially, each loyalty program can develop its own solution, but over time, small loyalty programs can be grouped together to compete effectively with larger customers. Ultimately it is expected the development of four to six blockchain-based loyalty networks fixed by major airlines, major hotel chains or small travel company groups. Of course, introducing one or more blockchain platforms that incorporate multiple loyalty programs can present a number of risks. These platforms can add transaction layers between consumers and program operators and sellers, which can lower the cost per transaction that can grow over time, just like online travel agent fees. Customer data, the most valuable asset of a loyalty program, is available to other network participants, even competitors.

But the most important thing at this point is how to get the royalty-based tokens integrated into the offline store. For this purpose, it is not realistic to install a new payment terminal in an offline store. Therefore, this study proposes that blockchain platform deployment and maintenance should make strategic partnerships with network providers such as credit card processors.

Figure 1 shows the process to use integrated loyalty program by credit card.

- ① Retailers pay their royalties to customers for the integrated token
- ② The card user decides that he / she uses the token as the payment amount by making a credit card payment, and the retailer charges the credit card company
- ③ The credit card company pays the cash to the retailer
- ④ The credit card company claims and receives the customer's token
- ⑤ The token received by the credit card company is sold and realized by the token exchange market
- ⑥ The credit card company charges and receives cash from the customer's bank account on the customer's credit card payment date

Retailers pay customers tokens that are part of the amount of money they have used according to the policies of their loyalty program. This integrated token model will allow retailers to eliminate the inconvenience of having to associate a royalty program between certain retailers as they are now, and the inconvenience of having to use royalty points only in certain retailers.

When purchasing a product or service from a retailer who is actually offline, the customer decides how much to

pay for the token while paying with a credit card. This is similar to the customer deciding to deduct the payoff point on his card as he pays the pizza value. As a result, the retailer does not need to install a separate terminal for token settlement, and can use the existing credit card payment. At this time, the retailer can process the royalty point payment as token payment.

Retailer informs the card company about the token payment amount by charging the customer with the payment made by the card, and the card company pays all the amount paid by the card to the retailer. At this time, the card company pays the retailer cash in full, not cash and tokens distributed from the payment amount. This would allow retailers to spread their use of tokens by providing the same process as the existing card usage process.

The card company charges the customer's token wallet to the customer for the amount of the token payment made by the customer from the retailer, and the customer's token wallet will send the token payment to the card company. At this time, the credit card company should also have a token wallet, which allows the token to be exchanged through the functions provided by the integration token on the basis of the customer's token wallet and block chain technology.

The card company cashes the token received from the customer's token payment at the token exchange market. Generally, when a token is sold at a token exchange market, the tokens are exchanged for Ethereum, and then sold by selling the Ethereum. At this time, since the token payment amount may vary depending on the token and Ethereum price, the credit card company must charge and receive the token that the customer made through the credit card in real time, and instantly realize it in the token exchange.

The card company will charge the cash amount from the customer's bank account on the day based on the card company's policy and the contract with the customer. At this time, if there is insufficient cash in the customer's bank account, the customer can sign a contract with the customer using the card to charge and receive a token corresponding to the insufficient cash in the token wallet.

In this study, I proposed a token model based on block chain technology which integrates royalties program using credit card as above. This model solves the problem of payment terminals, which is the main reason why offline retailers have not been able to use tokens as a means of payment for goods and services. Customers can still use tokens received as royalties while using credit cards as before, just as if they were currently using separate affiliated loyalty points. Also, by providing a variety of royalties points as tokens, the tokens can be spread quickly.

#### IV. CONCLUSION

A block chain is a distributed database associated with a distributed ledger class that is password protected and economically incentive. This blockchain technology creates pure digital assets, cryptocurrencies, and distributed hashing performance is used to solve the complexity of encryption and individual ledger blocks. However, tokens should be used to purchase products or services from offline retailers, but current tokens are used primarily for investment. Therefore, the most important point at this point is how to integrate royalty-based tokens into the offline store. Research has shown that customer loyalty programs, such as blockchain technology, can achieve this [8]. One of the attractive features of royalty rewards is that it is not at the heart of business revenues and operations, so a



company that wants to implement a block chain for customer loyalty programs can help reduce administrative costs, improve customer experience, and improve user engagement. Block Chain Support Loyalty platforms are recognized and understood by organizations and executives who are expected to thrive in principle. By adopting block-chain technology, companies can quickly add and maintain loyal partnerships without adding complexity to the program. Using Blockchain technology, people can escape the hassle free process of loyalty program molds with tightly defined single-size programs [14]. But the most important thing at this point is how to get a royalty-based token integrated into your offline store. For this, it is not realistic to install a new payment device in an offline store. Therefore, this study suggests that if you need to install and maintain a block-chain platform, you should form a strategic partnership with a network provider such as a credit card processor. This study proposed a token model based on the blockchain technology that integrates the credit card - based loyalty program. This model solves the problem of payment terminals, which is why retailers are not able to use tokens as a way to pay for goods and services. Customers can use their credit cards as well as tokens received in royalties, as if they were using separate affiliate membership points. Tokens can also be spread quickly by providing a variety of loyalty points in tokens.

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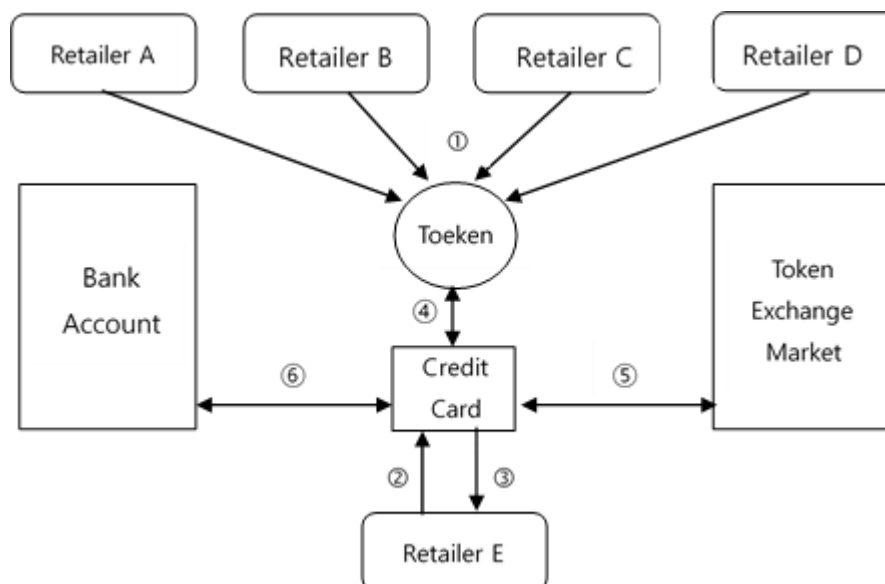


Figure 1. The process to use integrated loyalty program by credit card