

Blockchain Rental Platform for College Students Driven by Reward and Punishment Mechanism

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Abstract. For those who are employed nowadays, the living environment largely affects the quality of work. In order to access employment opportunities in first-tier cities, renting an apartment has become a hot social issue for the new generation of youth, and therefore the development of the rental market has gradually become an important part of the economic development. In order to ensure the stable growth of China's market economy and a favorable employment environment for the new generation of Chinese talents, it is necessary to help the new youth group with insufficient social experience to avoid falling into the trap of rental agents and to match with suitable housing, this paper proposes a solution based on a blockchain rental platform driven by reward and punishment mechanisms for college students, focusing on the innovation of specific reward and punishment mechanisms, through the design of coin issuance mechanism, workload determination mechanism, and reputation mechanism, combined with the design of personalized platform functional blocks for college students, the functional operation of this platform is envisioned based on smart contracts, which fills the gap of blockchain renting for college students as well as the refinement of reward mechanism of blockchain renting platform. This design can be applied to build a practical scenario of a blockchain rental platform serving college students and promote the process of upgrading and transforming the traditional rental industry using blockchain technology.

Keywords: Blockchain, Renting Platform, Reward and Punishment Mechanisms.

1. Background and brief description of the problem

With the rapid development of China's market economy, the adult population's demand for quality of life has gradually increased. In contrast, the high price of urban housing has become a roadblock for young people to further improve their quality of life. In addition, the housing problem has also led to a series of social problems, such as the recent rise of the topic "caravan marriage", "housing surplus". but the public still can not afford the price of urban property. In such a realistic background, more and more people choose to rent housing. According to the statistics of related organizations, the total number of long term rental apartments in Shenzhen has increased four times from 2018 to 2021; during the same period, the number of branded long term rental apartments in Shanghai has increased by 103% and in Beijing by 24%, which is an explosive growth("Accelerate the development of long-term rental housing market"). This is enough to show that the development of the rental market has gradually become an important part of the economic development affecting the economy. And the development of the rental market helps to help young people solve their housing difficulties("Accelerate the development of long-term rental housing market"). However, the rapid development of the rental market has also brought a series of problems and hidden dangers. Among them, college students and graduates, as a new group of young people, often become the target of fraud or abuse by unscrupulous businessmen in the rental process due to their lack of social experience. For example, rental agents take advantage of unequal information to construct consumer traps, and renters withhold information about hidden housing problems. There is also the case of "a second homeowner in Wangjing, Beijing, who ran away", using low prices to attract young consumers who are just entering society and renting out their homes for a second time for profit. In many cities, there is a significant correlation between the GDP per capita and the number of colleges and universities per 10 million people in each province (Shi and Wang), With a mix of people and a high number of

young people in first-tier and second-tier cities where there are more university and job opportunities, the issue of rental housing is of particular concern.

The operation of a rental platform usually consists of a homeowner providing property information to an agent, the agent posting the property information on the Internet, and the consumer unilaterally receiving the second-hand information and spending high agency fees before the agent leads the rental transaction process, contacting both parties and guiding the signing of the contract. The credit and morality of the owner and the agent will determine the quality of the transaction to a great extent. Currently, the main rental problems include low trust of rental consumers, high management cost of rental business, confusion of authority and responsibility, fragmentation of rental data and information, etc (Wang and Ding).

Faced with diverse problems, through relevant literature review, this paper decides to adopt blockchain technology to study the solution. The core features and advantages of blockchain technology, such as decentralization, de-trusting and scalability, can help traditional business economy to make intelligent transformation, promote market development and improve management system (Wang and Ding).

Previous studies on the design of rental platforms usually focus on the functionality of the platform, with the study of tenants' behavioral preferences and usage psychology as the main focus (Xie), or platform design using My SQL database and distributed database technology with platform efficiency as the goal (Guan). The design of rental platforms based on blockchain technology usually focuses on the outstanding advantages of decentralization, with the entire rental population as the research target (Chen). There is a lack of consideration for the needs of the special group of college and beginning workers. Therefore, this study aims to improve the security of the rental process and residence, reduce the influence of intermediary platforms in the rental process, and provide a more complete, clear, and high-quality rental transaction. The young group between 18 and 28 years old is selected as the main research target, and the blockchain technology is combined with the SDLC process to design a housing rental platform and discuss the housing rental mechanism.

2. Current Status of Research

The current rental industry has many hot issues that cause social concern, and the drawbacks of traditional rental methods are causing more and more acute conflicts. China Youth Daily has reported the trap of black-hearted agents carrying out the trap of high collection and low rent: black-hearted agents coax up the rent to homeowners to expand the housing supply, and the agents adjust the payment method to lower the price of housing in front of the economically weak college students, attracting college students to pay a one-time long-term release of housing money and then lose contact with the money, causing significant losses to both homeowners and tenants ("Accelerate rental housing market"). Since the outbreak of the new crown pneumonia epidemic, many graduates have chosen to rent apartments for employment directly after graduation due to the pressure of the general economic environment which increase in the target group has made the phenomenon of pitfalls in the black intermediary market more and more serious. The 2018 Blockchain Rental Scene Research Report summarizes the problems of the modern traditional rental method, and the traditional intermediary companies and rental platforms have limited improvement on the rental experience, and the problems of information symmetry and industry regulation as well as trust between owners and tenants are yet to be improved (Liantazhiku). The current four types of rental platforms: national rental portals, dedicated systems of real estate agents, national shared short-term rental platforms, and government-led rental platforms (Li), each have certain problems and are not perfect. Meanwhile commercialized platforms with high information credit, low management cost, wide range of rental types, elimination of intermediary mixing and wide range of applications have not been born. Therefore, it is necessary to introduce new technology to improve the existing rental platform. And the features of blockchain technology such as smart contracts, intelligent decision making,

information sharing and untraced ability can promote the healthy and orderly development of rental housing consumer market.

With the help of blockchain technology, it is possible to enhance the trust of both homeowners and tenants and improve the efficiency of the rental process, so as to effectively avoid the problems of money rolled by intermediaries, inaccurate information of housing sources and information asymmetry to reach a consensus (Wang and Ding). However, according to the scenario research report, blockchain rental platform technology is still in the stage of just starting and testing the water in China, and the projects that have landed successfully are mainly the government-led blockchain rental platform in Xiongan New Area and Lucia project. There are only a few other projects being incubated and tested, and there are almost no typical success stories of commercialized projects in China, only Lucia is expected to develop well in the long run. Meanwhile, there are two relatively complete research papers on building blockchain rental platforms, one focuses on designing and analyzing the use of blockchain technology to realize the data such as tenant information and transaction records are tamper-proof and permanently saved, using smart contracts to ensure the authenticity and trustworthiness of transactions, avoiding the intervention of traditional intermediaries and achieving the result of solving the trust problem (Li). The other one focuses on the technical idea of building a blockchain rental platform, aiming to truly realize the cloud service of the rental platform and the sharing network and client of housing information based on blockchain technology to ensure the feasibility of the technical solution (Chen). However, both of them do not discuss the incentive mechanism of the blockchain rental platform in depth.

In addition, there does not yet exist a blockchain rental platform that targets only college students as a group. Importantly, the protection of tenants' rights and interests in China's housing rental rule of law system is inadequate. This mainly involves that in the lease contract relationship, the tenant is in a naturally vulnerable position, while the lease relationship is unstable and the rights and interests of sub-tenants are difficult to protect (the analysis is made in "The Current Situation, Problems and Improvements of China's Housing Lease Rule of Law Construction"). This is difficult for college students and graduates who have not formally entered the society or have just entered the society and lack of social experience to defend their rights and interests before rental problems and disputes. Therefore, in response to the gap of blockchain platform serving the pain points of college students and graduates, this paper proposes a preliminary sketch of the model of blockchain rental platform for college students based on the research of existing literature and the collection of demand by questionnaire, and especially improves the incentive mechanism which is generally ignored by the current research of blockchain rental platform, so as to help college students and graduates better solve the rental problem, reduce the disputes and It will help college students and graduates to better solve the rental problem, reduce the disputes and conflicts of the rental problem, and enrich the exploration of the blockchain rental platform field in China.

The incentive mechanism includes various forms. In the incentive process, virtual currency rewards are required for tenants and homeowners who are miners, which can improve the efficiency and success rate of transactions between the two parties. The reputation management model proposed by Jiaren Yu, Youliang Tian and Hui Lin, i.e., by submitting workload triggers the smart contract set by the manager in the mining pool and gets rewarded and marked by the pool, this approach optimizes the category identification of miners and satisfies the Markov dynamic process, which helps platform information management. In this paper, we refer to this reputation management mechanism that can avoid the invalid workload of repeated system verification and improve the efficiency of the system in the design process of the penalty mechanism. Based on the quantitative calculation of the economic incentive mechanism of Tian Guanglai, this paper designs the incentive mechanism applicable to the rental platform system - coin issuance, and the incentive of high weight recommendation for users with high reputation value selected by assigning voting rights. In addition to this, it is not common among the existing blockchain incentives that can motivate owners to actively maintain listing information, listen to opinions, and correct their behaviors. With the student community in a vulnerable situation, incentive settings that encourage error correction and correction are needed to

enable a good and recyclable rental relationship. And the incentive model established by the design of the point algorithm based on reward and punishment evaluation in the "Study on the incentive mechanism of mobile virtual learning community tenants" can provide an effective idea for designing the mechanism of coin issuance by the landlords (Li and Huang).

A questionnaire was designed to be distributed to college students and graduates and to collect and analyze data. The questionnaire contained 15 multiple choice and two fill-in-the-blank questions, and four of the choices were converted from qualitative to quantitative, using the numbers 1-9 to measure the degree and facilitate analysis. After screening, a total of 55 questionnaire responses were collected. Among them, 56.36% of the respondents expect to rent in first-tier cities and 30.91% expect to rent in second-tier cities, which often have relatively more rental conflicts and disputes and need blockchain rental platform more to help college students and graduates solve their rental problems. Nearly 67.3% of the respondents have no rental experience, 78.2% of the respondents want to rent the whole apartment, nearly 75% of the respondents expect to rent the apartment for half a year or more at one time, 74.5% of the respondents are very concerned about the rental price, but only 20% of them know the market price of the rental apartment. Among the rental conflict issues that respondents are worried about, agents rolling in money and blackmail of damaged items are the most concerned. 74.5% of the respondents are willing to try blockchain rental platform, and among the expectations of blockchain rental platform, they are most concerned about the accuracy of source information and elimination of agent fraud.

The above data fully illustrates that the surveyed group has high requirements for renting, expects more whole rent and in first and second-tier cities, values price but lacks understanding of market price, expects medium to long term rent but lacks experience, has some awareness of possible conflicts and disputes in renting, and is willing to try blockchain rental platform. In addition, we also collected data on the problems of shared rentals to enrich the demanded functions of the platform.

3. Housing Incentive Mechanism

3.1 Landlord coin-issuing mechanism

According to the incentive model of mobile virtual learning community proposed by Xiao Li and Wenpei Huang in "Research on the incentive mechanism of mobile virtual learning community tenants", the tenant evaluation and the dynamic improvement reward system of the landlord in the landlord coin issuance mechanism can be constructed.

The initial points of homeowner i are denoted as $Score_i(0)$, which is 0 before the listing information is uploaded and verified, and the new initial point value $Score_i(0) = SPass$ is obtained after the verification is correct. After n tenants rate homeowner i separately $SRenter(k, i)$, the points of homeowner i are updated as $Score_i(n) = SPass + \sum SRenter(k, i)$.

If the landlord actively maintains and corrects the problem within the specified time after the tenant's comment points out the problem, he/she is given extra points to reward Performance(landlord), and eventually, the points can be exchanged for tokens, thus realizing the incentive mechanism for the landlord to issue coins.

Referring to the formula of tenant behavior penalty score proposed by Xiao Li and Wenpei Huang, this paper proposes the improvement score for each type of problem raised by tenants of listing p .

For listing p of owner i , comments on the same issue are categorized by the length of time since the tenant rented.

Posted after a long period of time since the start of occupancy: ≥ 6 months

Those who posted after a short period of time: < 6 months

According to the survey, more than 73% of the respondents were willing to plan to rent for six months or more, so the problems revealed after a longer period of time are likely to be more noteworthy and may require more time to fix, so they were classified according to time.

In the following equation, Rule(kind) denotes the basic score corresponding to this type of problem in the platform specification; $m_i(1)$ denotes the value of the number of comments published after a

short time for this type of problem; $m_i(2)$ denotes the value of the number of comments published after a long time for this type of problem; $V(p, i)$ denotes the nature of the owner's behavior, whether it is a behavior that needs to be corrected after the tenant gives a bad review (0) or Suggested behavior after a general rating (1); Motive is an incremental initial reward score given to the homeowner's adjustment behavior.

$$Rule(kind, p) = \begin{cases} \text{Max} \left(\text{Motive}, \text{Motive} * \frac{n_i(2)}{n_i(1)} \right), V(p, i) = 1 \\ \frac{\text{Motive}}{n_i(1) + n_i(2)}, V(p, i) = 0 \end{cases}$$

Then Performance (landlord, p) = Rule (kind, p) * ρ , which is the ratio of the specified time to the homeowner's time to complete the corrective action. Ultimately, the points of homeowner i are updated as Scorei (n) = SPass + SRenter(k, i) + $\sum$ Performance(landlord, p). The points are eventually redeemed for tokens.

3.2 Tenant coin issuing mechanism

The blockchain rental platform sets up the corresponding evaluation system and reward mechanism according to the evaluation released by the tenant at the end of the contract, so as to reward the tenants with high activity in the blockchain network, so that they can have a high degree of enthusiasm to participate in the description of the housing experience and housing reality, so as to verify the authenticity of the information provided by the owner and improve the future transaction efficiency. Specifically, in the blockchain rental system, this paper will evaluate the activity of tenants from the two aspects of publishing comments and verifying housing sources.

The first is the rental comments submitted by the tenants. After the tenant completes the rental transaction, if he is dissatisfied with the current housing supply, issues a negative evaluation, and provides feedback on the status quo of the linked housing supply description, he can obtain tokens. In the evaluation, the tenant reveals that there are disputes with the contract and the description of the housing source or that they are inconsistent with reality. The corresponding number of tokens can be obtained according to different items. The positive comments and feedback released by the tenant will also be given a token reward after being certified by the system. The key point is that the system needs to verify the positive and negative evaluations of tenants to avoid fraud in order to obtain tokens. High-quality houses and comments will promote the next rental transaction, namely "hot rental of good houses". Therefore, the system will regularly assign voting rights to system managers to increase the recommended weight for users with large content contributions and high reputation value. By quantifying the behaviors of different users, the voting function $f(VI)$ and recommendation function $f(RI)$ of the content is obtained, and the content contribution value $Wi = f(Vi) * f(Ri)$ is obtained (Tian). The platform ranks the contribution value of information content from high to low. High-weighted tenants can not only obtain token rewards but also get priority to see the house. In addition, tenants can also get token rewards if they actively participate in and complete the offline listing verification issued by other tenants (Tian).

3.3 Miner coin issuance mechanism

Referring to the miner type identification mechanism of reputation management model proposed by Jiaren Yu, Youliang Tian and Hui Lin (Design of miner type identification mechanism based on reputation management model), firstly, this coin issuance mechanism involves three prerequisites.

- 1). Miners can be either tenants or homeowners
- 2). Tenants improve their reputation by submitting transaction fees on time, giving valuable service evaluations or housing feedback, and participating in offline listing verification activities to improve the platform information.
- 3). Homeowners improve their reputation by making repairs with reference to tenant feedback and maintaining a high positive feedback rate.

With this in mind, miners work with the number of transactions on the chain, and the amount of work submitted is proportional to the number of tokens. The workload submitted triggers the smart contract in the mining pool to get the token reward. And by submitting information related to housing transactions, it triggers the smart contract deployed in the blockchain mining pool by the platform manager to quantify the degree of information perfection of the transactions, according to which the workload and work quality of miners are measured and rewarded to ensure efficient and normal operation of the platform.

To prevent miners from misrepresenting the workload during the submission process, this study is designed to construct a reputation mechanism. The mining pool will set one of them as the pool manager to set and check the reputation threshold and information authenticity of the pool and deploy smart contracts. When miners (i.e., tenants and homeowners) misrepresent transaction information or engage in malicious behavior, their own reputation value will be reduced. When the miner's reputation value decreases below a set threshold, the miner will be removed from the platform, and since the account information is bound to personal information, there is no case of one person corresponding to multiple accounts, and the owner's or tenant's unique account will be blocked. The possibility of workload falsification is reduced by subjecting platform tenants to dynamic evaluation and updates. The calculation of credit value is measured by the ratio of actual workload to submitted workload. Also, to ensure efficiency, the percentage of authenticity of transaction information is used as one of the multipliers to affect the reputation value.

The selection and supervision of the pool manager is judged by all miners in the pool. The selection of managers is based on workload and reputation value. The pool manager of the quarter is the one with the highest combined score. Miners who make reasonable suggestions or reports on the actions or decisions of the pool managers will also be rewarded with tokens, thus forming a relationship of mutual supervision and mutual inspection to prevent miners and managers from conspiring to hinder the normal operation of the platform.

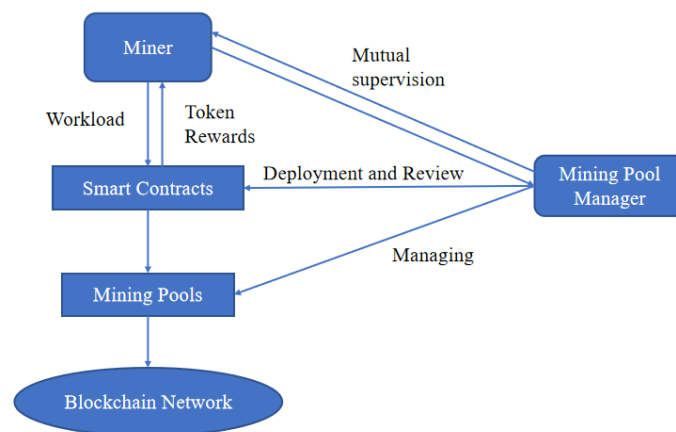


Figure 1. Miner coin issuance mechanism

3.4 Penalty mechanisms

In the rental transaction process, we introduce a tenant reputation management mechanism to penalise malicious tenants and landlords who engage in dishonest behavior by referring to the miner identification strategy of Yu, Chia-Yen et al. i denotes the i -th tenant or landlords; j denotes the j -th transaction (131-132).

$$R_{p_{ij}} = \frac{R_{p_{i(j-1)}} \cdot \partial + v_i - f_i - d_i}{v_i + f_i + d_i + 1}$$

Where $R_{p_{ij}}$ represents the credit value accumulated by the i -th tenant or landlord to the j -th transaction; f_i parameters indicate that tenant comments or landlord corrections are invalid; d_i

indicates that the user or landlord disagrees with the validation result of a particular transaction validator. If a user's or landlord's objection to the result is confirmed as valid by the reviewer, the reputation score of both the proposer and the reviewer is increased by 1. If the validator's validation results are disputed by multiple users and reviewed and approved, the validator's d_i plus one. If the comment submitted by the user is verified as valid, v_i add 1; otherwise, f_i add 1. ∂ represents the authenticity index of a user or landlord in a given transaction and can be expressed as:

$$\partial = \begin{cases} 1 & 100\% \text{ authenticity} \\ \frac{1}{n} & n\% \text{ authenticity} \\ 0 & \text{Invalid/ no comments submitted} \end{cases}$$

For users, n is determined based on the verifier's judgement. The verifier's inspection of the user is divided into two parts: firstly, based on a site visit to the property, the user's comments are compared with the actual situation. Secondly, the landlord will compare the up-linked records of the landlord's inspection of the property's equipment before, during and after the user's rental period with the user's comments at the end of the rental period. If there is a conflict between the user's comments and the up-linked records, the user will be judged to have maliciously damaged the property and will be required to compensate the landlord at the market rate, and the comments will be judged to be invalid.

For landlords, n depends on the extent to which common issues raised by users are improved in 3 consecutive transactions; if the landlord does not rectify any issues in 3 consecutive transactions, it is judged to be invalid and ∂ is 0; and a low reputation mark is attached to the listing.

Where the reputation value $R_{p_{ij}}$ for the first transaction between a user and a landlord is the threshold η for the transaction to take place, i.e. when the rental blockchain network is first put into operation, the reputation values of all nodes are set to the transaction entry threshold η .

After the blockchain is operational, Users or landlords with a final reputation value $R_{p_{ij}}$ below the transaction entry threshold η for 3 consecutive transactions will be disqualified from future transactions.

4. System function design and implementation

The housing rental agency platform is an important basic system that connects landlords, agents and tenants for information interaction and transaction, so the main tenant segment includes three parts.

A. Lease front portal: displayed on the tenant's homepage

1) Registration and Login: Used for tenant registration of tenant identity or registration of personal information and account registration for new tenants, which involves specific identity information, contact information, address, property situation, etc.

2) Announcement information: Manage information about updates and repairs of the system itself, or updates and modifications of platform functions and regulations, to facilitate synchronization to tenants.

3) Listing information: information perfected by the owner-tenant, which includes the basic information of the listing, housing inspection permit, consent for irregular supervision, security certification and other related housing certifications to help the tenant screen the preferred housing.

4) Message comments: Used for communication between owners and tenants and agents.

5) Personal rental information: improve information about rental experience, rental preferences, and facilitate the collection of preferred properties.

6) Verification tasks: Receive and submit comments verification tasks posted by other tenants, view task descriptions and target payoffs.

7) Transaction package: Provide the entrance of transaction package calculation.

8) Common tools: additional functions of the platform. Including one-to-one property consultation with landlords, token wallet, etc. Among them, tokens are the rent return mechanism designed by the platform for tenants.

B. Homeowner Front Desk Portal: displayed on the homeowner's home page

1) Registration and Login: Used for tenant login as a landlord or for new tenants to register personal information and account registration, which involves specific identity information, contact information, address, property status, etc.

2) Announcement information: Manage information about updates and repairs to the system itself, or updates and modifications to platform features and regulations, for easy synchronization with tenants.

3) Transaction packaging: Provide entrance to transaction packaging calculation.

4) Owner certification: requires basic information about the property, property inspection permit, consent for irregular supervision, security certification and other related property certification and other content for different levels of certification of the owner, the higher the certification level, the stronger the property gets recommended by the platform.

3. Back-end management system: displayed on the administrator's homepage

1) Administrator login: Platform administrator login window.

2) Task progress: The system lists the progress of the expiring validation task recruitment according to the degree of urgency. Clicking on them leads to the corresponding verification task module.

3) Validation tasks: Pick up and submit validation tasks issued by other tenants and view the task description.

4.1 Personal information management

The system is mainly divided into three roles: tourists, registered tenants (including tenants and homeowners), and rental platform managers. Visitors can only browse the home page of the rental platform and query the house source information. If they want to use other functions, they need to conduct identity authentication to become a registered tenant. In addition to entering personal information, registered tenants also need to upload their ID card information as tenant digital authentication. After registration is completed, tenants can publish rent-seeking information (tenants), house source information (owners), and historical tenant communication. Finally, the manager has no transaction decision-making power and only plays an auxiliary role in the platform. For example, in the early stage of the platform operation, when the user activity is low, they receive the verification task and act as the comment verifier to ensure the smooth operation of the platform mechanism; Act as an assistant communicator and a contract signing guide in the rental transaction process.

4.2 Housing information management

Upload property information: Upload the property information, which needs to include details such as property name, property address, amenities, rental price, room photos or videos, and the neighborhood of the house (transportation, supermarkets, hospitals and other places related to daily life). Most importantly, provide the property proof information and upload it to the blockchain. The listing information can be saved as a draft after it is filled in until it is confirmed and then selected to be uploaded for storage and can next be selected to begin authentication.

Modify property information: Before the authenticity certification of housing information is completed, homeowners can make additions and modifications to the uploaded listing information. After the certification is completed, if the homeowner then makes changes, the certification credentials will disappear and the authentication of the authenticity of the information will need to be done again. During this period, without the credentials of successful certification, it is impossible to publish the listing information and conduct transactions.

Authentication success credentials: Only after the authenticity certification is completed and the listing information gets an electronic visa, the owner can post the listing information for rent.

Historical rental records search allows you to check the historical rental records of each property, including the transaction time, contract start time, some of the tenant's information, positive reviews, tenant ratings, and the public rental log uploaded by the tenant.

Manage listing information: After the successful authentication of information, the owner can choose to post it for rent, or delete it or change it from rental status to hidden for special reasons.

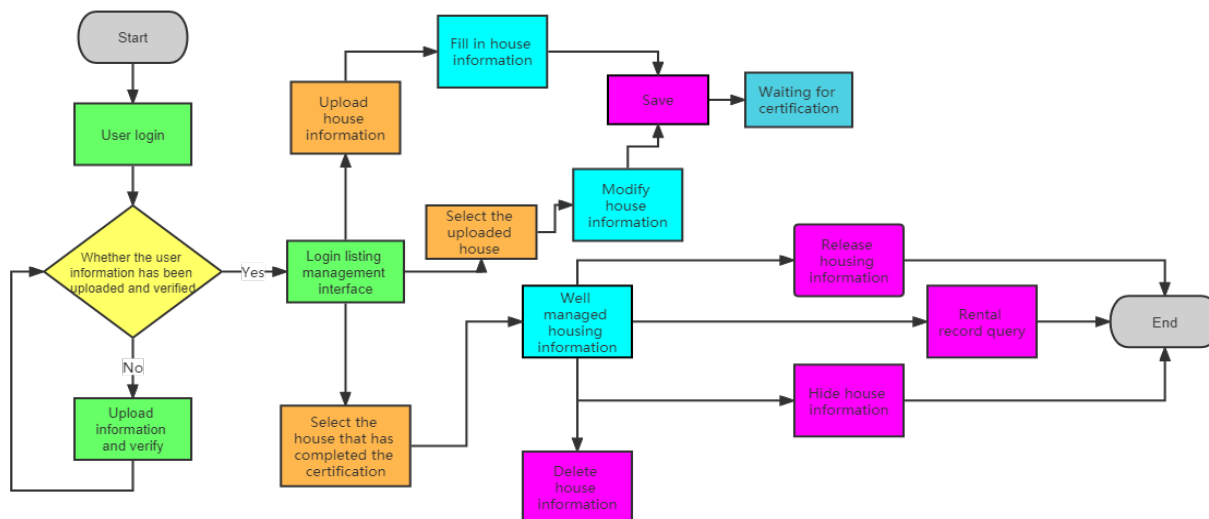


Figure 2. Housing information management process

4.3 Transaction process

The platform guarantees the anonymity of both the owner and the tenant. Through the registration and login of the platform, both parties register their relevant personal information and housing information and synchronize the latest news throughout the process. The information is verified and improved by the management.

In the owner-based process, the owner signs a series of contracts and permissions, including a listing verification permit, a consent form for occasional monitoring by the platform, and a permit for anonymous public comments by tenants. The listing verification license ensures the security and legitimacy of the listing by assigning the platform management to interface with the owner himself, conduct on-site inspection, check the information registered by the owner, and conduct security risk screening and privacy threat screening. Only owners and properties under their names that pass the property verification are able to conduct transactions and are displayed on the platform's homepage for consumers to choose from. If a listing fails the inspection at the certification stage, it is necessary to improve and overhaul the listing and resubmit the listing verification application. Finally, the owner can choose whether to allow special requests from individual tenants such as bargaining or short term rentals, and if the owner agrees, the platform will provide a chat box to facilitate direct communication between the two parties.

In the tenant-based process, after a tenant registers and logs in, he or she first completes the personal information page, including rental preferences, and then begins to select and contact properties. During this process, when a tenant selects a property and requests further information and contact, the platform administrator will start direct communication until both parties finalize the transaction.

The operation of this rental platform first receives the property information provided by the owner and uploads it to the chain, and synchronizes the information directly to the tenant's account via blockchain, so that the tenant can receive first-hand information directly, eliminating the risk of information distortion and tampering. After selecting the property and communicating with the owner through the administrator, or both parties directly, the rental transaction process is then carried out through the administrator, and the rental parties are finally contacted and guided to sign the contract.

4.4 Conversation Message Management

When a tenant wants to know more about a property, he or she can send a message to the owner through the system's dialogue platform to communicate with the owner. In addition, interested tenants can also initiate questions to historical tenants to inquire about their rental experience and property queries. If a historical tenant completes three round-trips of effective communication with a new tenant, we will incentivize the historical tenant with benefits such as a half deposit or reduced rent for the next rental session.

4.5 Token Design

In a rental platform blockchain system, transactions in which tenants pay rent bills to owners are allowed, and it is allowed for the platform to charge micro token fees to owners and tenants to keep the platform running based on the contract. It is permissible for the platform to give a quantum of tokens to tenants based on the incentive mechanism. Token transactions between tenants are not permitted on the platform. Token transactions between tenants and landlords are not allowed, except for token transactions for rent bills (other expenses such as utilities are included in the rent bill). To prevent a situation of coin speculation, token trading is prohibited, except for the purpose of renting a room and a certain amount of tokens deducted from the transaction process to maintain the platform are allowed.

After the landlord initiates the contract signing and confirmation to the tenant, the rent billing transaction can be initiated and the tenant gives payment within a specified time. This is the primary token transaction for the platform. The system internally issues tokens BRH (Blockchain Rental House) with a 1:1 exchange ratio to real-world RMB.

To ensure the rights of both parties in the rental house, when one party breaks the contract or there is fraud with untrue personal information, the other party can react and apply to the platform, thus freezing the assets and account transactions of the party in question.

4.6 Smart Contracts

Due to the openness, camper ability, and cost-effectiveness of smart contracts, the blockchain house information system will create four smart contracts, including blockchain house information, tenant information, contact information, and information management.

Housing Information Contract: The housing information is mainly used to store the basic housing data uploaded by the tenants, including the information certificates of the housing area, rent, housing type, transportation, orientation, decoration, etc. Once the house information is uploaded, it cannot be modified.

Information Storage Contract: The information storage contract is mainly responsible for recording the personal information of the owner and the tenant and providing a channel for communication. With the help of this contract record, the tenant can store his personal occupancy information and conduct contactless interaction with the homeowner to initiate a house viewing application to the homeowner. The homeowner can also access the personal credit data of the tenant through the system and respond to it at the same time.

Contract Information Contract: When the real estate agent and the tenant reach the signing intention, the contract information contract records the communication history of both parties and automatically generates a housing contract for both parties. After signing the contract, the owner and tenant have the right to view and store. At the same time, the contract is stored in the database and cannot be tampered with.

Information Management Contract: The contract gives the blockchain rental information platform and platform developers the right to call tenant information. At the same time, the contract also abides by confidentiality constraints. The researchers' confidential tenants have not taken the initiative to set up public information.

5. Evaluation and Improvement

Advantages:

- a) The thesis has been chosen from a relatively unique perspective and have some practical value.
- b) The research content is based on the reality that college students in first- and second-tier cities have difficulties in renting apartments, and has operability. The chosen topic focuses on social hotspot issues, with a clear expression of views and a rigorous logical structure.
- c) The research content of the article is focused on the design of the incentive mechanism of the blockchain rental platform and is supported by a theoretical model.

Disadvantages:

- a) The process of how the review validators were selected was not explored in depth in the punishment mechanism module of the incentive mechanism.
- b) The study has focused only on university students in first- and second-tier cities in China and has not been extended to the remaining urban areas of China.

6. Summary

In recent years, the number of cases of economic disputes and legal disputes among college students due to the problem of renting houses has increased year by year. Therefore, we investigated the needs and suggestions of college students for the rental platform and designed to apply the blockchain technology to the rental platform specifically for college students. By signing the smart contract and applying the features of blockchain, such as no forgery, nonfiction, and nontempering, it solves the factors that are not conducive to the continuous progress of the rental contract, such as the falsification of the housing source information, the disappearance of the owner and the breach of the contract halfway.

In order to realize and test the college students' house rental platform based on blockchain technology, the reward, coin mechanism, and reputation management punishment mechanism are used. Homeowners mine, tenants' comments, and the system issue coins to encourage homeowners and tenants to upload real housing information and personal feelings. Although this platform has strengthened the security of student rental, it should also improve the verification of tenant information in a complex trading environment, and pay attention to the expansion of target tenants while protecting students' rights and interests.

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