A Study on Feature of Online Platform with Exploiting Blockchain for International Onshore Students

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Abstract— **With the advent of blockchain technology and the associated cryptocurrencies, industries, including an online platform for international students, can transform many life changes. We suggest the blockchain technology feature that is impossible to correct or delete the recorded facts to gain greater efficiency in overseas studying management systems among international onshore students and study onshore agencies and universities. It has dual aims for overseas studying online platforms to increase competency and stimulate adoption of long-term overseas studying counseling, studying design, and overseas studying management for international students to enter the target university. It has generally achieved its first aim. Its issues are hindering the accomplishment of the second. Several solutions have been proposed to improve overseas studying procedures, yet none has considered the revolutionary advancement to prevent fraud and falsification issues. In this paper, we propose an online platform for studying in Korea with exploiting blockchain technology to provide trustworthy information. A key to this research's success is a scalable and distributed blockchain technology, which has been applied as a distributed transaction book and smart contract. Accordingly, we aim to improve the procedure so that international students can design their study abroad plan and choose qualified intermediaries as needed. Blockchain can replace the delivery of paper documents and verify the uploaded original's integrity and the increase of satisfaction of studying abroad by providing an online platform.**

Keywords— **Blockchain; transparency; integrity; overseas studying; platform; international students; study abroad; universities.**

I. INTRODUCTION

The recruitment of international students is an irreversible trend. As the school-age decreases, the number of university students is gradually decreasing, and financial difficulties due to the tuition fee freezing required a breakthrough for universities. Meanwhile, more and more international students are considering going to Korea to study under the Korean wave's influence. International students are regarded as the best human capital resources for attracting talents because they have diverse economic, political, and social/cultural advantages.

Promoting consumption and improving the educational balance is caused by international students can be seen during their stay in Korea. After graduation, they can expect positive effects in the labor markets as excellent talent by using their language and experience. In terms of politics and diplomacy, the advantage is that they can build social networks to connect people and share a cultural experience. Under this background, the Ministry of Education set its goal of attracting 200,000 international students by 2023, and universities are working to strengthen the campus' global capabilities.

The number of international students has increased from about 84,000 people to 142,000 people over the past five years. In the case of following this trend, there will be more than the number of 300,000 international students planning to study in Korea by 2023, exceeding the Ministry of Education's target. Unlike the importance of international students and the development of relevant markets, there is major international students' recruitment and management method. Unregulated intermediaries are making unfair profits between universities and international students, administrative management using paper documents and international students rely on formal staying support instead of self-sustaining. It reduces the satisfaction of studying abroad in Korea and the brand to attract international students.

As a result, it overshadows those mentioned above positively and will only produce critical issues such as drop-out rates and illegal staying. We suggest the online platform feature here, making the best way for international students to study in Korea. The online platform improves the procedures so that international students can design their studying abroad plan and choose a qualified recruitment agency as needed. Blockchain can replace the delivery of paper documents and verify the integration of the uploaded original documents. In addition, it can contribute to the increasing satisfaction of studying abroad by providing a space for users to voluntarily share information and learn the language course. The application of blockchain technology has been strong in the financial sector, but some areas have not been studied yet.
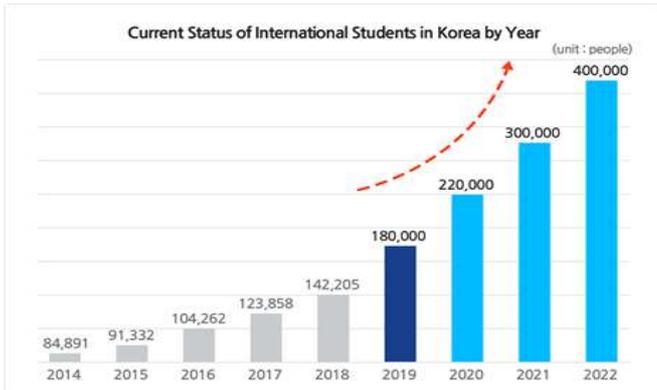

Fig. 1 A bar graph with a curved line showing the current status of international students in Korea by year

Fig.1 shows that the online platform for studying abroad information management system is one of them. Currently, various services can provide overseas studying information. Each service is convenient because it can easily register and check overseas studies, but it is evaluated that the reliability of information is low due to false resumes. For that reason, we tried to apply the blockchain to solve offline-based, inefficient overseas studying procedures. When blockchain technology has been applied in the past, it is desirable to apply the data to an environment where data should not be tampered

with or falsified with low incidence. Moreover, it is easy to apply if the target data occurs between different positions and the relationship can be defined. It is also generated for overseas studying information management by originating from international students, and it is judged that it is suitable to apply blockchain technology.

This paper proposes an integrated platform that can share international students' applications, universities admission, and overseas studying academy with trustworthy blockchain technology. For this reason, the platform could contribute to a mutual surveillance system to prevent false resumes in the uncertain overseas studying market.

So, this study suggests ways to increase the overseas studying market's reliability by preventing false information. The paper is organized as follows; Section1 provides the problem recognition offline based overseas studying the market. Section2 presents the related work, and Section3 shows deployment methodology in designing the new model. Finally, Section4 provides the application's conclusion and future work plan [1], [2].

II. MATERIAL AND METHOD

The goal is to increase the efficiency of recruiting international students and develop the ecosystem so that participants can enjoy equal benefits.

A. Unregulated Intermediary

International students prepare to study in Korea search for local intermediaries' bodies first. It is to obtain the necessary information and identify documents to submit them. However, students cannot assess which intermediaries' bodies are reliable because of asymmetric information, which forms dependent relationships. As a result, they will be designed to enter the university in a direction that maximizes intermediaries' interests rather than meeting the conditions they want. High fees and costs incurred in this process are transferred to others/organizations. These matters increase the burden on students and decrease the satisfaction of studying abroad, as shown in Fig. 2.

Fig. 2 A doughnut graph with colorful allocation showing percentage of international students from major countries

According to the university's alert announcement data, the number of international students who dropped out of the 'university was 2,753 in 2016, 3,593 in 2017, and 4,742 in 2018. The number of students who are dropping out is increasing rapidly every year. It is difficult to manage the drop-out situation, and of course, they become illegal immigrants. As such, an unregulated intermediary has gone astray. Due to the non-transparent working structure, it is inadequate and ineffective, and as a result, it leads to a deadline in the reputation of the university and the national brand.

B. Forgery of Certificates

Because of fake documents, there is a hole laxity in foreigners' immigration management and financial capture. A process is required to prove and confirm qualifications, but there is a possibility of fraud. There are frequent cases with an intermediary disguised as studying abroad for the purpose of illegal employment and attempting to study abroad by forging insufficient qualifications. There is an attempt to solve through strengthening regulations, but there is a clear limitation, such as checking the documents with eyes rather than technical methods at the stage of reviewing them.

TABLE I
IEQAS CERTIFICATION INDEX

Classification	Criteria	Standard	University	Community College	Graduate College
Compulsory Criteria	Illegal	Less than 2~4%	Must meet at least 1 criterion		
Key Conditional Criteria	International student's tuition burden ratio	More than 80%	Must meet at least 3 criteria among 4 criteria	Must meet at least 3 criteria among 4 criteria	Must meet at least 2 criteria among 3 criteria
	Health insurance purchase rate	More than 85%			
	Linguistic ability (Kor, Eng)	More than 30%			
	Rates of dormitories provided to freshmen	More than 25%			
Criteria of the International Support Index (Qualitative)	International vision and characterization (20)	More than 70 points(average)			
	Support for international student's life adaptation (40)				
	Support for international student's study (20)				
	Academic achievement of international student (20)				

Table.1 shows IEQAS (International Education Quality Assurance System) to select and certify universities' internationalization capacity. Less than 100 students: less than 4%, More than 100 students and less than 500 students: Less than 3%, More than 500 students: less than 2% the statistical data that assessed by the Ministry of Justice of from July 1st on 2017 to June 30th, in 2018. According to the Ministry of Education, if student wastage rate of compulsory criteria is the only criteria met, the illegal immigration rate must be below 10%.

C. Fragmented Management of International Student Document

There are many documents to be managed by international students, but these are scattered in various places per organization and cause inconvenience. International students should have submitted information such as graduation certificates, report cards, enrolment certificates, foreign registration certificates, certificates of license and permissions letters whenever they are on leave jobs, and changes of employment status or residence status. International students must visit the agency or sites to apply for the relevant documents which prove their current working and residence status.

The cost of inefficiency is estimated at a 7.35billion KRW (Korea Won) from these procedures. Furthermore, there is no system to conduct the management system for international students systematically. According to the National Institute of International Education, a Ministry of Education,

"International Students Settlement Support 2018 for Life in Korea." They would stay in Korea. More than 50% of international students after completing their overseas studies in Korea. The main purpose is to get a job in Korea or take higher education.

The absence of a verification system to reference background checking for international students that can refer to each institution makes it difficult to evaluate the workforce accurately. As a result, it leads to information asymmetry, inefficiency, and economic loss.

D. Absence of Community

When we travel abroad or stay overseas, we get the necessary information through acquaintances or Internet communities. Although local or national institutions can help, we prefer more familiar and accessible information. Information that is spontaneously generated and shared among the resident community will bring a very satisfactory experience abroad.

On the other hand, international students studying in Korea are hard to acquire information for their lives. This is because there is no platform for the international student network and the absence of the information-sharing platform capabilities, which are selected and verified. There are not many international students' sources to find from help for language study, housing, finance, medical care, and cultural difference.

The dissatisfaction of international students is due to the lack of such insufficient information. In the case of international students, transfer to other universities or colleges

is also not smooth local. One of the international students from Uzbekistan has studied for two years in Korea. However, it has some experience to arise inconvenience due to absence the community activity.

III. RESULT AND DISCUSSION

The Online Platform of international students studying in Korea is a value transmission means used in private blockchain and is a basic unit that works by a smart contract. Let us the symbol of the token for the online platform as DRM. DRM token was created on the decentralized blockchain

platform, and the owner of the token has full authority, so a third party cannot be edited or deleted arbitrarily.

A. Token Flowchart and Workflow

Fig 3 token flow chart shows the economic system of online platform participants using blockchain. While Fig. 4 shows DRM tokens can be obtained by contributing to the growth of the private blockchain ecosystem and receiving compensation, the user pays tokens and can use the service or goods of the project when using an online platform with blockchain.

Fig. 3 DRM token flow chart
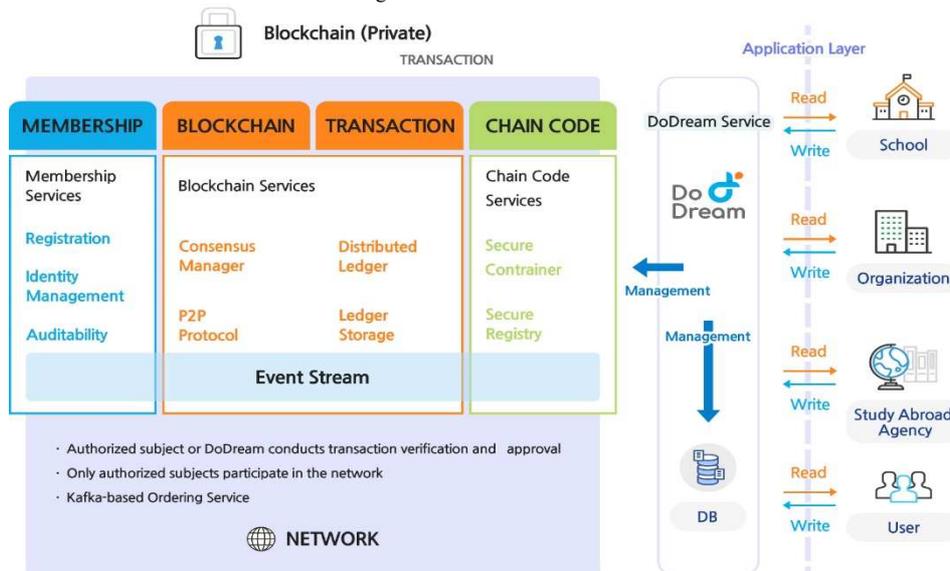
Fig. 4 Workflow with a private blockchain

Activities such as sharing experiences, information registration, history verification, and question-answering to help other participants acquire information is encouraged through rewards. Participants can use other services provided through an online platform with blockchain as DRM (Do Dream) token or sell them to buyers and pay them. In the case of international students. DRM (Do Dream) tokens can be used to exchange values in situations such as used goods trading and academic data sharing under both sides' agreements.

International students of various nationalities will conduct personal transactions without remittance or exchange fees. If participants want to match between others, inquire user details,

and promote for a specific purpose, they should pay DRM (Do Dream) token. Participants can receive proven information and secure a transparent reputation of the party by providing the token's payment details. The more ecosystem and data of the DRM (Do Dream) chain are abundant, the more demand for DRM tokens can be generated to users of services and goods. Therefore, users and relevant parties who receive the DRM (Do Dream) token as compensation have the factors to activate the ecosystem [21] voluntarily.

B. Network with node and channel

The below-mentioned Fig. 5 workflow represents the storage and flow of data.
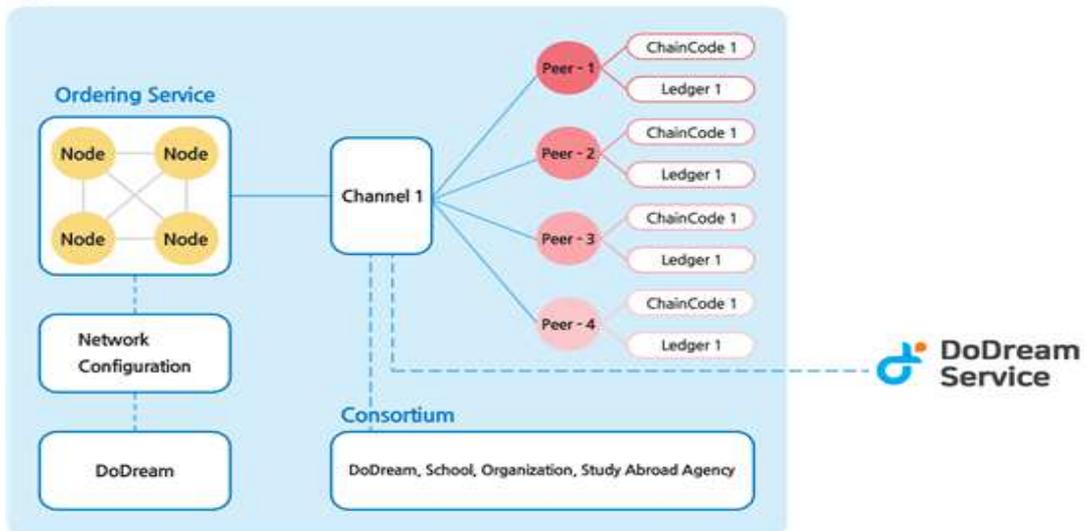
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Fig. 5 Network with node and channel

Only the authorized user generates a node, which can prevent unknown objects from reading data based on a private blockchain. The mode in which data are stored in the blockchain creates an ordered block to the pre-order service and distributes it to all the channel peers. All peers check whether the incoming block meets the warranty policy and the order status. Finally, each peer updates the order status by attaching the block to the channel chain [4]-[6].

C. Features and functions of blockchain

Hyperledger Fabric is one such permission blockchain platform and one of the Hyperledger projects hosted by the Linux Foundation. Hyperledger Fabric takes the form of a licensed private blockchain. Unlike the existing public blockchain that anyone can freely participate, in Hyperledger Fabric, only users authorized by the authentication management system can participate in the blockchain network.

Thus, nodes participating in the fabric network can be seen as trusted nodes already authorized by the system and do not require complex consensus algorithms to verify malicious nodes used in the public blockchain. This section presents the deployment methodology of the proposed Hyperledger Fabric configuration the detailed methodology of the career management system to overcome career information integrity. As mentioned in Fig.4, the internal network consists of five logical virtual environment personal computers, consisting of three virtual personal computers. Each of the five virtual environments pcs has one node, and the virtual pc also runs a web server that clients can access [16]-[20]. Fig.6 shows the Hyperledger Fabric configuration based on a private blockchain
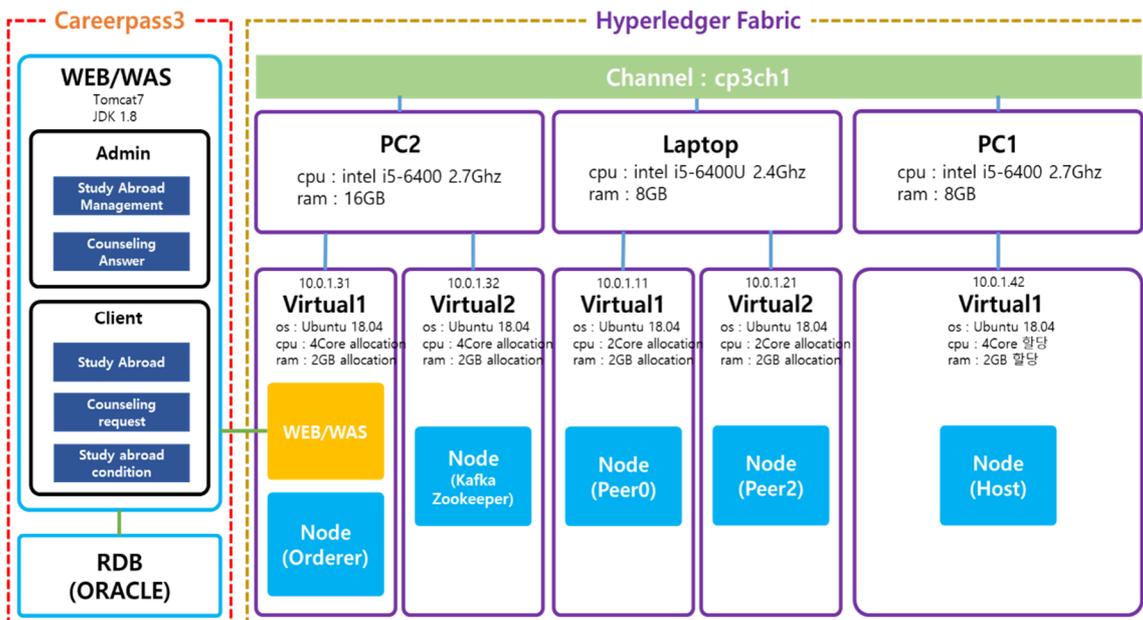

Fig. 6 Hyperledger Fabric

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Fig. 7 Chain code source

Fig.7 shows the store data in blocks through 'create the book.' The data to be saved is set according to the predefined structure type called bookcase> book> page in turn [20]. Fig.8 shows in a structure called 'peer log, ' key-value and record value are saved. The record shows two structures, book, and page, defined in the data [20].
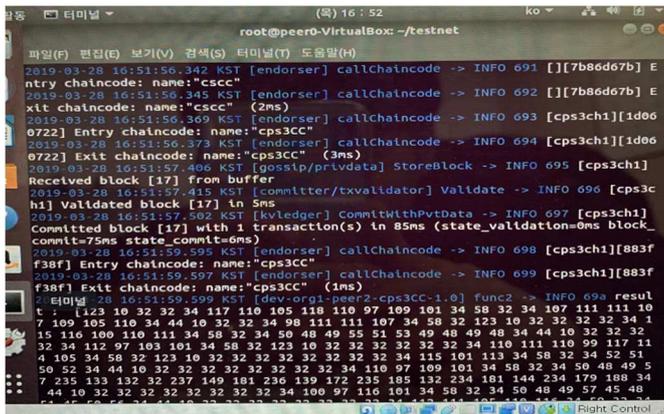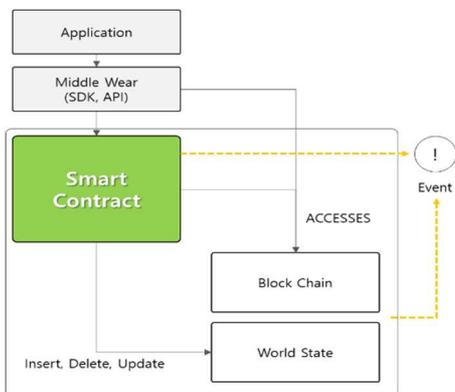

Fig. 8 Peer log

Fig. 9 Smart contract

Fig.9 shows a critical concept of blockchain as a smart contract. The blockchain concept is similar to P2P. Like P2P, blockchain-based transaction management can achieve the following effects. First, consensus-based means all services are processed on a network-based basis. Second, the distributed processing means of data is distributed across the network to increase availability. Third, fault tolerance means if an integrity problem occurs in one of the distributed data, it can be recovered from other data. Fourth, resource sharing means it can share data storage and computing resources. Fifth, data reliability means it is difficult to change data unless all the distributed data is falsified. Sixth, traceability means when data is changed, the configuration of history as blockchain enables tracking of the point of change and information. Fig.9 smart contract shows p2p blockchain-based transaction management process.
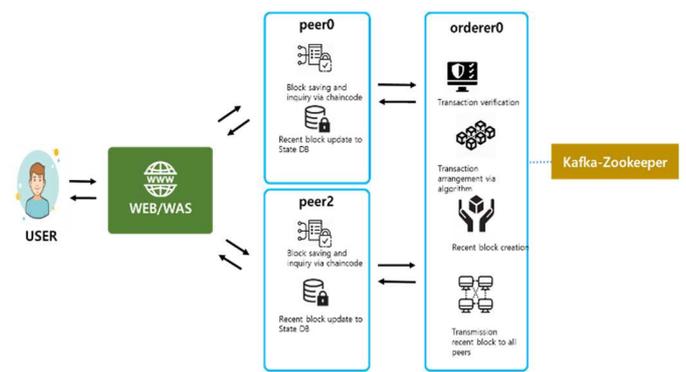
Fig. 10 Transaction Process Flow

Fig.10 shows the overall transaction flow when a user initiates a transaction called block data lookup through a website. The website requests a transaction from peer0 or peer2. Peer0 or peer2 processes transactions received by the chain code logic distributed internally. All transactions that occur for processing are sent to the orderer, which validates all received transactions. Using the Kafka algorithm, we

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create the latest block sorted into one, store the sorted transactions, and send it to all peers. The peers update the latest block information from the orderer to their state database and deliver the requested transaction to the client web server [1]-[3].

D. Participant-International Students

International students are the key users of the DRM (Do Dream) Platform, and DRM (Do Dream) Platform is a from A to Z platform of studying abroad to international students. International students can do the following activities.

1) When preparing for studying abroad in the local area, the user can design the study. They can enter the study abroad course, region, major, tuition fee, and admission time directly and find the study abroad course without limited information.

2) It is possible to connect in the community, covering the state of students preparing the study, international students, and graduates. By sharing the necessary advice for study and useful information for Korea's stay, they can get material and psychological help.

3) By managing all the documents and history related to academics and the right to view the information themselves, they can motivate growth and access to more opportunities. All international students' activities help the platform's growth, and a series of activities should be compensated.

As participants, international students can be rewarded with points or tokens, and compensation can be used for the platform's learning service, support for studying abroad applications, and pay fees. This can help students study and stay, reducing the economic burden.

E. Participant-Study Abroad Agency

The study abroad agency is an organization that consults international students and helps prepare them for studying abroad. Both international students and Korean universities should maintain a good reputation, and it will become competitive soon. International students' grades, moderate departure rate, and illegal staying rate abroad through the study abroad agency are important indicators for studying abroad and universities. The study abroad agency can unify administrative work related to the application for admission by using DRM (Do Dream) to ensure the details' integrity. The agencies that have selected the proven international students and have accumulated trust will become key partners for a long time. It can be classified from the broker/intermediary body aiming only to maximize short-term profits. Furthermore, it can be promoted to local students considering studying abroad.

F. Participant-University

The Ministry of Education implements the International Education Quality Assurance System (IEQAS: International Education Quality Assurance System) to select and certify universities qualified for internationalization capacity. The university that has received the certification can simplify visa issuance by the standard admission permits for international students who want to go to school and get public benefits such as participating in overseas Korean study fairs and media reports. Moreover, it is a powerful motivation to select international students autonomously without limiting the quota number of students [10].

G. Participant-Employer

The employment of international students varies according to the period of stay and the visa issued. Students who have received a study abroad (D-2) visa or short-term language training (D-4) visa can get a part-time job (part-time job) within 20 hours after six months of entering the country with permission from the person in charge. Students who have been licensed can work in the range of interpreters, translations, restaurant assistants, and general office assistants. The international students about to graduate can work all day by changing to an employment visa (E-1~E-7) or a job-seeking qualification visa (D-10). Depending on the nature of the business, some employers want to hire international students. As in the case of Koreans, employers need certificates to verify the employee's credentials, and employers want to make sure employees have legitimate qualifications.

Employers can check the history of international students collected and verified at DoDream Chain, and if necessary, it can post application announcements and receive more applications from international students. There is a high demand to recruit international students in the community. The areas other than the metropolitan are developing simultaneously as population decline, and aging and labor shortage are getting smaller and smaller. To supplement this, local governments and employers actively link with local universities. This industrial structure, the change of the labor population by region, creates a virtuous cycle structure that international students who want to manage their portfolio and store the information transparently and employers can find abundant and reliable applicants at Do Dream Chain.

H. Study Abroad Platform

The first stage of the study abroad platform focuses on customized services aimed at international students. First, it ensures awareness of the platform by increasing users' number and creates publicity synergy for Korean universities and local study abroad agencies. It is currently a valuable service and includes the following detailed services. Fig.11 shows the study abroad platform for international students' customized service in Korea. Fig.12 shows platform per function; it is a personalized study abroad design. A total of 60 universities are informed and designed according to the conditions and circumstances of international students.

By helping students prepare for studying abroad to collect fragmented information and check it easily and quickly, damage from unregulated intermediaries can be prevented, and commission costs can be reduced. And if the student needs it, it also guides the student to consult with a well-rated study abroad institution. Dream Design, which can directly design the study abroad course, plays a key role at the preparation stage [11]-[13].
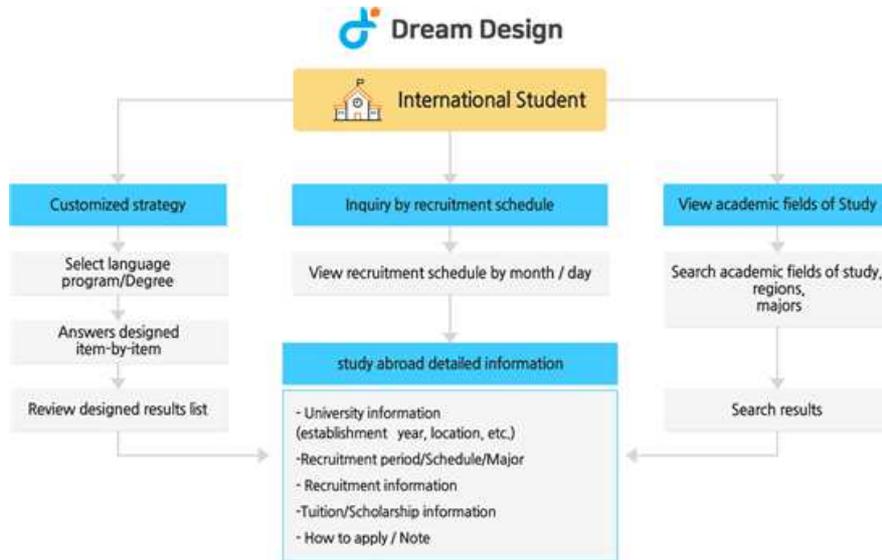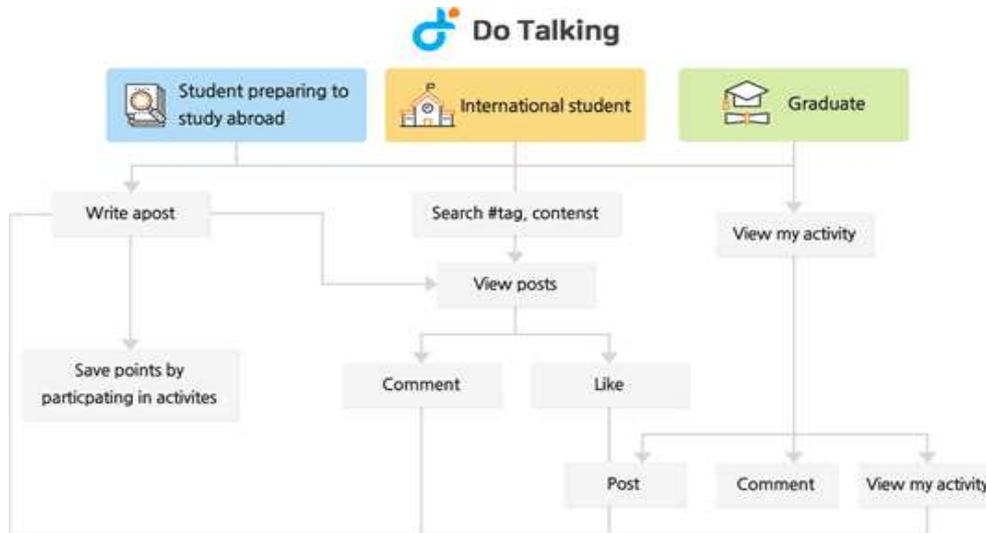
Fig. 11 Design of study abroad platform

Fig. 12 Design of study abroad platform per function

IV. CONCLUSIONS

The paper of study abroad does dream of simplifying the process from registration of documents to remittance of tuition fees and all international students' expenses and management after admission. First, it improves the procedure for students to proceed with their customized study abroad strategy. It can only be done through intermediary study abroad consultancy agencies; they participate as partners that can provide O2O (Offline to online) consulting services to ensure an online expanded customer base from offline local-based sales and on-demand services. In the second stage of the study abroad platform, each DRM participant (DRM means abbreviation form of DoDream) Chain can benefit from the service. The university can predict drop-out and use pre-management services.

It is possible to determine which students are more likely to drop out by checking the existing data and finding the drop-out factors. Students who are represented as alert groups in the relevant factors can take the pre-management such as counseling and support, and at the entrance stage, they can

block fake studying abroad. International students can get more utility by enhancing the functions provided in the first stage of study abroad with the online platform. A typical example is the practice test for the TOPIK (Test of Proficiency in Korean, TOPIK), the expansion of questions by type and difficulty level, and the provision of e-learning content for conversation practice.

Finally, blockchain-based data management and function using wallets are applied. It is linked with MetaMask, an extension program of the web browser, to make direct transactions in the online platform service and receive and pay DRM (Do Dream) tokens. Blockchain-based data integrity verification and compensation mechanisms work well. However, if other wallets are considered more user-friendly and efficient, they can be further linked or replaced.

This paper presents international students' online platform for studying in Korea using blockchain technology for verification, trustworthiness, and increased availability. This system can save time and money by allowing companies to filter out their applicants' false resumes and fake diplomas. We can expect to introduce a reliable, transparent, and fair

verification system. Future work will physically test the verification and validation with target performance indicators such as TPS, Resource Consumption Rate, Detection Rate, and study satisfaction via study performance analysis [7]-[9].

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