

A Study on the Application of Blockchain in Copyright Protection of Crowdsourcing Translation

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ABSTRACT

In today's world, cultural exchanges are becoming more and more frequent, and the translation market is gradually expanding. Due to its long time and high economic cost, traditional translation methods cannot meet the increasing needs of people. Therefore, as a new method, crowdsourcing translation rises and develops continuously in the translation market. While crowdsourcing translation has been well accepted by the public, a series of problems such as copyright issues have also emerged. This paper intends to introduce block-chain technology to explore ways to solve copyright issues in crowdsourcing translation and provide reference for the long-term and healthy development of crowdsourcing translation.

Keywords: Translation, Crowdsourcing translation, Copyright protection, Blockchain

1. INTRODUCTION

As the product of information technology era, crowdsourcing activities have been gradually penetrated into various industries and have become a new trend that constantly adapts to the market. In translation market, crowdsourcing has also developed. Since the limited available language sources cannot meet the great demand of the public, crowdsourcing translation provides a new and effective option for the translation industry. In this way, the heavy burden in translation industry has been greatly relieved. Compared with traditional translation way, it breaks the barrier originally between professional translators and amateur translators and goes deep into the life of the public. As a result, crowdsourcing translation has developed rapidly and steadily. However, while crowdsourcing translation brings advantages, it also brings problems that impinge on healthy development of crowdsourcing translation. Therefore, solving these problems is of vital significance to the long-term development of crowdsourcing translation. This paper will focus mainly on the copyright protection in crowdsourcing translation, expounding the problems and reasons in this aspect. Combined with blockchain technology and its application, this paper will provide a new way for solving problems

of copyright protection in crowdsourcing translation and explores concrete methods on the basis of blockchain technology.

2. THE DEVELOPMENT OF CROWDSOURCING TRANSLATION

2.1 *The Origin and Application of Crowdsourcing Translation*

In 2006, the word “crowdsourcing” was put forward by Jeff Howe in the article titled *The Rise of Crowdsourcing* published of *Wired* magazine. Howe wrote in this essay, “Technological advances in everything from product design software to digital video cameras are breaking down the cost barriers that once separated amateurs from professionals. Hobbyists, part-timers, and dabblers suddenly have a market for their efforts..... The labor isn't always free, but it costs a lot less than paying traditional employees. It's not outsourcing, it's crowdsourcing.” [1]

Since then, application of crowdsourcing translation at home and abroad has sprung up. The famous social website — Facebook, which has been one of the very first companies to successfully introduce crowdsourcing for the translation of its online service, only had English version when

published. However, over 40 million new users have joined Facebook since its translation initiative was launched in early 2008, and then different language versions of the website became available. [2] In China, Yeeyan aims to provide an Internet community platform to seamlessly link copyright owners and readers, and help more willing professional talents to realize personal value, obtain reasonable income and growth opportunities while transcending the time and space barriers of multilingual information transmission. [3] In 2008, Yeeyan initiated a cooperative translation project after the Wenchuan Earthquake. Over 600 voluntary translators translated more than 100,000 words in one week. [4]

2.2 The Advantage of Crowdsourcing Translation

Crowdsourcing integrates language talents and digital resources, embodies the characteristics of community-oriented and centralized information interconnection and mutual sharing. [5] Compared with traditional translation method, this emerging business model not only brings advantages to the businessman — they can enjoy translation services in a very short time with low cost compared to traditional translation way, but also offers more opportunities to amateur translators to choose what they're adept at so as to use their translation strengths.

2.2.1 Low Cost and High Efficiency

Compared with traditional translation, crowdsourcing translation is spoken highly by the public because of its low cost and high efficiency. Traditional translation tasks are often undertaken by professional translators and their remuneration is much higher than that of crowdsourcing translators. In truth, many of crowdsourcing translators are voluntary since translators' motivation is different from person to person. Some join the project just for a sense of achievement, and some for economic reward.

As for the high efficiency, the large group of translators with different background laid a solid foundation for it. Firstly, the post and claim of translation tasks are completed through Internet. Once initiators release the tasks, there is a high probability that the tasks will be claimed as soon as possible. In this way, the time spent finding professional translators is saved. Secondly, traditional translation tasks are finished by single or

several translators. As a result, a large amount of time is needed for them to finish the task. However, crowdsourcing translation tasks are finished by more than ten or tens of translators spontaneously. This cooperative translation model saves much time as well. Thirdly, the process of traditional translation is finished step by step. The editing and proofreading process will not start until the translation process finished. However, the process of crowdsourcing translation can be done spontaneously so that time is made the best use.

In addition, it is worth noting that crowdsourcing translation also has advantages in literary translation. As there are many culture-loaded words in literary works, it is difficult for machine translation to translate them accurately and time-consuming for single translator to translate them efficiently. In this condition, crowdsourcing translation is the best choice to meet the large demand of readers as it combines accuracy and efficiency.

2.2.2 Large-scale Cooperation

In traditional translation, the chances are that one or two translators are needed to finish the translation tasks. However, in crowdsourcing translation, there is a large group of translators. In addition to the number of translator, total volume of translation is also doubled. As it is normal for a person to master two languages, the spontaneous work of crowdsourcing translators with different linguistic background makes multi-language version a reality. It used to take several years for a single translator to translate a book in only one language, but now it can be done in a week in several languages by crowdsourcing translation. By this way, a large amount of time, money and manpower are saved. For example, Global Voice, which is a public journalism website, is widely spread by crowdsourcing translation. And now there are news not only in English, Spanish, Portuguese, Russian, French, but also in other minor languages like Aymara, Macedonian and Serbian. [3] On the other hand, translation content of crowdsourcing translation covers many fields including social network, literary work, entertainment and journalism mentioned above. Besides, this model also works in other fields. For an instance, Kiva, a non-profit public investment institution, provides microcredit for the poor. The voluntary translators translate relevant information of applicants and help them obtain opportunity through translation. One more example is the

language learning website—Duolingo. In this website, the sentences used for language learners to practice are that chosen from content of website. In this way, not only learners improve their translation level, but also the website reaches the goal of translating content freely.

2.2.3 *Open Participation*

One of the most obvious characteristics of crowdsourcing translation is the low threshold registration. Whether professional translator or not, as long as one wants to join in, he can register and become a crowdsourcing translator directly or after simple test. In Yeeyan, one can finish registration after completing the basic information. But in Zuodao, one must pass the test in specific times to finish his registration. Because of the low threshold of registration, background of translators--their translation level, native language, professional and social background differs from people to people. Therefore, a translation atmosphere of complementary language ability, industry knowledge, translation standards, social experience and translation practical experience has been formed. [6] Furthermore, translator is free in choosing translation content. They can choose what they're interested in to translate. In the aspect of translation quality, every translator could post comment about other translation so that information can be conveyed bidirectional or multidirectional in order to produce better version of translation.

2.2.4 *Diverse Translators' Identity*

In traditional translation, what translator needs to do is translating. The editing and proofreading work are finished by other professional staff. However, in crowdsourcing translation, the barrier between translation service and translation consumer is also obscured. In the process of translation, translator is not only translator, but also reader of original text and reader of target text. This dual identity bridge the time gap between translator and reader of target text. Besides, the translator is also editor of his own translation. After the translator finishes his tasks and posts the translation on the Internet, other translator could make comments on the translation and offer suggestions. Meanwhile, he can also comment on other's translation. In this condition, the translator is proofreader as well. The diverse identity of translator makes another characteristic of crowdsourcing translation.

3. COPYRIGHT ISSUES OF CROWDSOURCING TRANSLATION

The characteristics of crowdsourcing translation mentioned above have made it develop by leaps and bounds. A large number of companies and industries have resorted crowdsourcing translation to meet their translation demand. As a result, it has been at the forefront of the translation market. However, with its rapid development, it has also arisen much controversy and some drawbacks have been exposed. Problems existed in crowdsourcing translation are mainly contains translation quality, impact on professional translator, translator incentive, copyright issue, etc. Firstly, in the aspect of translation quality, as translation level, social background, translation experience differ from people to people, there definitely is an unevenness of translation quality. Even though background of translator is similar to each other, unevenness of translation style is still existed because original text is cut and each part is translated by different translator. Secondly, in the aspect of impact on professional translator, advent of crowdsourcing translation has caught people's attention as its quickness and low cost. In this condition, some professional translators are replaced by crowdsourcing translators. Therefore, professional translators have to consider how to highlight their strengths and gain a foothold in translation market. Thirdly, in the aspect of translator incentive, as many of crowdsourcing translation is free or low-reward, steady participation of translator is hard to maintain. On the basic of voluntary registration, it is an issues worth to be solved.

As crowdsourcing translation involves multiple participants, it will influence long-term development of it if these problems cannot be well solved.

3.1 *Copyright Issues*

Copyright issue, which is also the topic of this paper, has caught public's attention. Copyright assets are an important product of today's society. Li Xuan noticed the copyright issues in crowdsourcing translation. [7] She considers that crowdsourcing translation has a strong spontaneity grew from grassroots from the very beginning. Translators often select materials based on personal interests and rarely consider copyright issues. However, if the crowdsourcing translation platform

is to operate in a market-oriented manner, copyright issues cannot be ignored.

In the aspect of copyright protection in crowdsourcing translation, both original authors and translators may be infringed. On the one hand, the original author's copyright may be infringed. On October, 2010, an English column article published in Wall Street Journal by Yuan Li — the editor-in-chief of the Chinese website of Wall Street Journal, was translated and published by a translator of Yeeyan without authorization. As a result, this behavior was strongly protested by Yuan Li. Later, Yeeyan apologized publicly and asked the translator to delete the translation.

On the other hand, for some paid crowdsourcing translation platform, translators' copyright may also be infringed. Firstly, user's trial translation is not available to the public and user who doesn't pass the trial translation will not get feedback. As a result, the chances are that user's trial translation may be occupied by the platform for free. [8] Taking Yeeyan as an example, translators won't be available to the feedback. What's more, determining the final translators and the person in charge of translation project takes a very long time and the translator may even forget that they have submitted the trial translation. Besides, as users have no way to master relevant information about the amount of tasks, there stands a chance that the trial translation they finish is the whole original text. And finally they cannot get their reward. Therefore, some crowdsourcing translation platforms may obtain a translation for free through this way. Secondly, it is even possible that translators cannot get deserved reward due to certain rules. On Zuodao translation platform, there is a regulation that only when translator earns more than 500 yuan can he withdraw. If he can't accumulate 500 yuan in specified time, then previous income will be cleared. What's worse, the initial income is very low, ranging from 0.01 to 0.09 yuan. Coupled with the uneven level of translators, it's unreasonable that sometimes some high-quality translations will be tampered to worse and lead to deduction. This regulation clearly violates the rights of the translator. Thirdly, it's difficult for translators to collect responding evidence to protect their rights as they are in weak position. And some people choose not to defend their rights because of the small amount involved, which gives some platforms an opportunity to take advantage of to infringe their rights. All these issues reflect infringement in crowdsourcing translation.

3.2 The Reason Why Copyright Issues Existed

The reasons why this issue exists can come down to as follows. Firstly, although there are relevant laws on digital copyright protection such as *Copyright Law of the People's Republic of China*, *Regulations on the Protection of Information Network Dissemination Right*, etc., crowdsourcing translation is still in the exploratory stage and cannot be well integrated with the law as an emerging industry. Secondly, the digital and information technology make infringement zero-threshold. It almost costs nothing for the merchant technically and financially, and they just click to obtain free translation. Thirdly, people's awareness of copyright protection is relatively low. For merchant, it's extremely convenient to obtain free or low-cost translation and gain business benefits. Low cost and high return make them ignore the significance of copyright protection. For translator, on the one hand, it is not only difficult to collect evidence, but also unworthy of a large amount of money to get their deserved remuneration. On the other hand, the chances are that translators often think that their interests have not been substantially damaged and they don't consider their copyrights have been violated. These thoughts and behaviors further promote the occurrence of infringements, resulting in a vicious circle. Therefore, it's significant to address the copyright issue and facilitate the long-term development of crowdsourcing translation.

For this issue, some scholars called on that the translation platform should negotiate payment way with translators and strictly enforce copyright concerning laws and regulations. However, as there are a large amount of source text and translation, these measures seem that they cannot solve these problems substantially. Even if crowdsourcing translation platform and translators adopt these measures, relevant information may be tampered in the process of transaction. What's more, there are no hard rules to force translators to do so, it is still difficulty to carry out these measures and protect original author and translator's right. In this condition, people begin to resort to digital technology, that is to say, establishing a crowdsourcing translation platform based on digital technology.

In today's information era, the combination of culture industry and digital technology is on the rise. With the development of information technology, blockchain has become an important tool for value

delivery in language communication and inheritance. [9] Blockchain technology has been developed rapidly in recent years and has been blend with various industries such as culture industry, financial industry and so on. In light of some of its characteristics such as decentralization, immutability and other, blockchain technology provides a new way to solve the problems of crowdsourcing translation. This paper is focuses on translator's copyright protection on paid crowdsourcing translation platforms. As some scholars have put forward solutions from various aspects, this paper will try to provide a solution with support of blockchain technology.

4. BRIEF INTRODUCTION TO BLOCKCHAIN

4.1 Development of Blockchain

Blockchain is an import concept in Bitcoin, which is essentially a decentralized database. Meanwhile, as the underlying technology of Bitcoin, it is a series of data blocks associated with each other by cryptographic methods. Each data block contains a batch of Bitcoin network transaction information, used to verify the validity of its information and generate next block.

In 2008, Satoshi Nakamoto put forward the concept of Bitcoin, which is an electronic cash system. [10] The proposal of Bitcoin was followed by the advent of blockchain and boom of various cryptocurrency like Litecoin and Dogecoin. This is the first stage of blockchain. In the second stage, people started to bring smart contracts to blockchain. Szabo introduced the concept of "Smart Contracts", which combine computer protocols with user interfaces to execute the terms of a contract. Then blockchain technology was applied to financial industry, which was a transformation from theory to practice. In the third stage, more and more real industries like artificial intelligence which are based on Internet have been coupled with blockchain. This is a stage in which blockchain developed from financial industry to entity service and it also lays foundation for the combine of blockchain and translation industry.

4.2 Framework and Characteristics of Blockchain

When it comes to the framework of blockchain, there are six layers in blockchain: data layer, network layer, consensus layer, actuator layer,

contract layer and application layer. Data layer is a distributed database maintained by all the nodes in blockchain in which some encrypted algorithm is adopted. Network layer is a large peer-to-peer network composed of all nodes. In network layer, once new block is generated, it will be added to the blockchain after authentication mechanism through transmission mechanism and its information will be recorded in other node. Consensus layer consists of consensus mechanism algorithm such as PoW (Proof of Work) and PoS (Proof of Stake). In this layer, data validity is guaranteed. In actuator layer, nodes obtain their right to record the transaction and reward through "mining". In contract layer, "smart contract" is introduced. Once the terms in it is met, the contract will be carried out automatically bypass central organization. Application layer is practical situation when blockchain applied to various settings.

As for characteristics of blockchain, it includes distributed storage, decentralization, transparency, immutability and so on. Firstly, it features on distributed storage. In blockchain, the whole data is split and stored in different nodes. Each node is available to the whole database and transaction history but they cannot revamp them. This storage method improves reliability of information. Secondly, it features on decentralization. There is no centralized node in blockchain since distributed storage is adopted. Each node is equal to other in right and obligation. Both parties can conduct transactions directly without bypassing the central node. Thirdly, it features on transparency. All data is available to every node without private information. When transaction is finished, relevant information will be conveyed to each node, which ensures transparency of blockchain. Fourthly, it features on immutability. Once the information is verified and added to the blockchain, it is stored permanently. Modifications to the database on a single node are invalid unless more than 51% of the nodes in the system can be controlled at the same time. Therefore, the data stability and reliability of the blockchain are extremely high.

4.3 Copyright Protection Based on Blockchain

Based on the advantages of blockchain, there are already examples of applying blockchain to protect copyright. In May 2017, the first "blockchain+copyright" content transaction and protection platform — Yuanben was launched. Once individuals, enterprises and institutions post

the original content on the platform, it will have a digital “DNA identification”, which includes the author, ownership, publishing time and the integrity of the content itself. After the original content has been identified, the author could choose commercial paid reprint or free sharing agreement on the platform. All content logged into the platform will be protected on the basis of blockchain technology, and all data cannot be tampered with or damaged.

Not come singly but in pairs, in September 2018, Shenzhen Cultural Property Exchange and Ministry of Information Technology and Industrial Development of State Information Center jointly established the “Cultural Artwork Copyright Blockchain Application Base”, and joined hands with the National Engineering Laboratory of Big Data System to build the “Blockchain Application Center of National Engineering Laboratory for Big Data in Shenzhen Cultural Property Exchange.” Taking this as the main part, the first and only national-level platform for legal cultural blockchain applications in China —Wenbantong was established. [11] Wenbantong uses blockchain technology to record the confirmation, price, authenticity, and confidence of cultural assets, and realizes full-node storage of cultural assets through smart contracts of blockchain to ensure the orderly, irreversible, immutable flow of cultural assets. All these successful examples provide reference for the large-scale application of blockchain in protecting copyright of crowdsourcing translation.

5. APPLICATION OF BLOCKCHAIN IN COPYRIGHT PROTECTION OF CROWDSOURCING TRANSLATION

Digital copyright protection is a key factor restricting the development of digital copyright industry. Song Shizhen [12] pointed out that, copyright is the severest issue faced by crowdsourcing translation website, which concerns its long-term and healthy development. Given the distinct characteristics of blockchain, it’s worthy of combining blockchain and crowdsourcing translation in order to explore a new way to copyright protection.

5.1 Possibility of Application

Compared with traditional translation way which mainly depends on mono-directional production, crowdsourcing translation is a

multidirectional translation way which needs to organize a translator community, post translation tasks and collect translation based on Internet. The dependence of crowdsourcing translation platform on Internet provides possibility to combine crowdsourcing translation with Internet technology. With rapid development of Internet technology, as an advanced Internet technology in today’s world, blockchain has come into people’s view and penetrated into many fields of life. It is practical and convenient to solve problem concerning copyright of crowdsourcing translation through blockchain technology.

Nowadays, as an emerging industry, crowdsourcing translation has gained an upper hand in translation market. Its rapid development has caught more and more attention of the public. Hao Junjie [13] pointed out that, publishing is one of the main ways of information production and dissemination in modern society. It is logical for the crowdsourcing translation platform to seek to publish its translation products when it develops to a certain stage. However, while the crowdsourcing translation platform is seeking more opportunities to develop and meet people’s demand, the copyright issue has been emerged and influenced its healthy and long-term development. In this condition, some characteristics of blockchain can be used to solve the copyright issue faced by crowdsourcing translation. For example, timestamp could ensure copyright confirmation, and distributed ledger could ensure the transparency of copyright transactions. All these will be expounded in detail in the following part.

If the copyright issue of crowdsourcing translation could be solved well, more convenience will be brought to the public and the order of translation market can be maintained. In this way, healthy development of crowdsourcing translation can be ensured. One successful example in crowdsourcing translation is translation memory sharing project of OHT(One Hour Translation). It uses the translation memory content scattered in various language service providers and translators to provide corpus for machine translation. At the same time, intellectual property rights and corresponding remuneration of the corpus provider will be ensured. [14]

5.2 Specific Measures of Application of Blockchain

5.2.1 *Distributed Storage: Easier Copyright Registration*

According to the Trial Measures for Voluntary Registration of Works, works in China are subject to voluntary registration. However, whether a work is registered or not, its owner possesses the copyright in accordance with the law. Compared with no registration, the work registration certificate can be used as a preliminary proof to clarify the copyright ownership when a copyright dispute occurs, and can be used as evidence in judicial rights protection. So, copyright registration is of significance for work producer. However, it is laborious and time-consuming in traditional copyright registration process. Not only a lot of credentials and high fee are needed, but also the process of auditing is extremely time-consuming. It may take one to three months from submitting credentials to obtaining certificates, and it may take 30 days to register even though with China Digital Rights Center. The chances are that one has been infringed before the copyright certification is completed. [15] What's worse, in crowdsourcing translation, what one person produces is a small part of the whole translation, which also levels the difficulty of confirming copyright. Faced by this problem, distributed storage of blockchain provides a new perspective to register copyright.

Distributed storage, which means each node in block-chain, holds a portion of the whole data equally and transparently and it can access the entire database and its complete history. Once there is a new transaction occurs on the blockchain, the nodes on the block-chain, also called "miners", will fight for the right to record the transaction. Therefore, translator who has been registered in crowdsourcing platform could register copyright at any time. As long as he posts his translation on the platform, relevant information including translation, origin of the translation, translator, time, etc. will be recorded in the blockchain by the node in a very short time. The way how this information is recorded will be expounded in following text. What's more, compared with traditional copyright registration fee of up to thousands of yuan, the copyright registration cost based on the block is at least 0.4 yuan. [16] This also reduced cost to a great extent, which brings convenience to right holder.

5.2.2 *Asymmetric Encryption Technology: Privacy Protection*

Unlike symmetric technology, blockchain adopts asymmetric encryption. That is to say, encryption and decryption use different keys. The password for encryption is the public key available to the whole network, and the password for decryption is the owner's private key. When transaction occurs, after the translator finishes the translation, he encrypts the translation with the public key and then sends it to the task poster, and then the poster decrypts it with his private key. And finally, the translator can be paid directly through the blockchain platform, which not only avoids possible divulgence of their translation, but also there is no third platform has opportunity to acquire their translation for free.

5.2.3 *Hash and Timestamp: Intelligent Rights Confirmation*

Hash, which is a mathematical function, is to convert an input of any length into a fixed-length output through a hash algorithm. In blockchain, hash features as its uniqueness and unidirectional property. Unidirectional, which means hash can only be coded but cannot be decoded. That is to say, it is easy to acquire a hash value but almost impossible to acquire the original information according to the hash value. Once translator posts translation on the crowdsourcing translation platform, unique hash value will be produced. The process — translator delivers a translation to receiver will be recorded in the blockchain in the form of hash value.

A timestamp, usually a sequence of characters that uniquely identifies a certain moment, is a sign for time-marking which refers to the total number of seconds or total number of milliseconds from Greenwich Time 1st, January, 1970 00:00:00 (Beijing Time, 1st, January, 1970 08:00:00) to the time when transaction occurs. The timestamp will be stored in blockchain and can be traced by all nodes in blockchain at any time. As copyright registration is possible on blockchain-based crowdsourcing translation platforms, each translation containing certain translator's translation will leave his unique hash value and timestamp by adopting this method.

The processes all mentioned above are occurs in the data layer. Then this information will be recorded in the whole chain in a very short time which occurs in the network layer. In the network layer, peer-to-peer transference is adopted. Once one node in the blockchain receives the information, another node will check the authenticity of it and

restore it one by one. Thus the process of delivering translation is recorded in the blockchain, which will be beneficial for possible subsequent rights protection. Consequently, copyright of translator is recorded and can be traced easily.

5.2.4 *Smart Contract: Intelligent Distribution of Remuneration*

In the process of distribution of traditional cultural royalties, the centralized institutional platform or channel holds the right of discourse in interest distribution. Taking the published books as an example, most of the interests are obtained by the intermediate links. The income obtained by the author is squeezed to only 7%-15%. [11] This situation is more serious on some crowdsourcing translation platform. On the aforementioned website Zuodao, it is unreasonable to clear previous income if the translator can't finish tasks in certain time. In this situation, smart contract can be used to avoid unreasonable interest distribution.

In contract layer, the most important is "smart contract." Smart contract is essentially a self-executing digital contract in a secure environment with no intervention and verified through network peers. The main reason for difficult to realize smart contract before is that it's hard to find a secure environment which is decentralized, unalterable and programmable. The advent of blockchain technology could solve this problem perfectly. [17]

Smart contract introduces peer-to-peer transactions. Like traditional contracts, have specific terms and they will be executed automatically if the conditions are met. On the blockchain-based crowdsourcing translation platform, an automatic evaluation mechanism for translation will be established. The translation demander will firstly put the prepaid remuneration on the blockchain and wait for the translator to submit the translation. If the terms are met, the remuneration will be automatically distributed to the translator. In this way, remuneration can reach to translators rather than bypass the centralized platform, through which translators' rights are protected. Besides, there are often hundreds or thousands of nodes supporting the blockchain network. The failure of some nodes will not cause the smart contract to stop. Theoretically, it is close to permanent operation just like a paper contract.

5.2.5 *Consensus Mechanism: Immutable Transaction Process*

According to Swanson, [18] a consensus mechanism is the process in which a majority (or in some cases all) of network validators come to agreement on the stage of a ledger. It is a set of rules and procedures that allows maintaining coherent set of facts between multiple participating nodes. Once the information is verified and added to the blockchain, it is stored permanently. Any modification to the database on a single node is invalid unless more than 51% of the nodes in the system can be controlled at the same time. As nodes are connected in sequence in blockchain, if the hash value and timestamp of the former block remains unknown, the next block cannot be connected. Therefore, if someone would like to tamper the information on the blockchain, he must tamper the information on certain block and block after that. What's more, this information is recorded in all nodes around the world rather than in one node, modification is almost impossible.

By adopting this mechanism, copyright can be protected well in the process of transaction. The more nodes in blockchain, the less the chance data will be tampered. As there are many translators in crowdsourcing translation platform, it is almost impossible to control more than 51% of translators at the same time. The consensus mechanism avoids the situation where copyright may be tampered, then ensures the reliability of the transaction process.

5.3 *Challenges*

As an emerging industry, blockchain technology certainly brings develop opportunities to many fields. Meanwhile, it also brings challenges and difficulties needed to be solved.

Firstly, blockchain technology is still in development stage and law concerning blockchain needed to be improved. Although there exists some relevant regulations like Blockchain Data Format Specification, Regulations on the Management of Blockchain Information Services and other, blockchain is sometimes attacked and users' privacy may be leaked. What's more, a completely decentralized copyright management mode is impossible for any sovereign country to implement. As copyright works often contain and transmit cultural values and spiritual core, and are closely related to ideology, centralized supervision and examination is an indispensable means for a country to guide spiritual culture and control ideology. [19] What's more, crowdsourcing translation is also in the development stage in the

translation market, more research is needed to realize the goal of combine crowdsourcing translation and blockchain. This current blank needs to be continuously improved.

Secondly, public acceptance of blockchain is also an issue. Like any other new things, people always cast doubt on them. Blockchain technology is no exception. As blockchain has not yet penetrated into lives of the public, so most people are still relatively unfamiliar with it. There stands a chance that people always think that blockchain is a technology used by professionals. Furthermore, most translators are likely unfamiliar with the digital technology field since they have learned liberal arts for many years. Time and effort are needed to popularize the blockchain and the concrete method for the combination of blockchain and crowdsourcing translation to translators.

Thirdly, there is a definite talent shortage. In 2016, the Central University of Finance and Economics firstly set up the blockchain major. At the same time, it jointly launched the blockchain cooperation project with 21Vianet and set up the first school-enterprise joint laboratory based on blockchain in China. Nowadays, the relevant academic research on blockchain is still less, and the relevant professional and technical personnel still need to be trained. On the other hand, as cultural industry, the combination of crowdsourcing translation and blockchain requires versatile talents of cultural industry and digital technology. Therefore, strengthening the training of professional talents is something important to do at present.

6. CONCLUSION

This paper integrates relevant theories of translation industry and digital technology and aims to solve the problems such as complicated copyright confirmation procedures and low-cost infringement in crowdsourcing translation on the basis of certain characteristic of blockchain, which will be beneficial for the long-term development of crowdsourcing translation.

This study is in conformity with the trend of the technology development in information era, which can provide reference for copyright protection in other culture industries and is significant for the application of blockchain.

With the increasing demand of translation, crowdsourcing translation has gained popularity among the public. However, existing issue indicates

that crowdsourcing translation indeed has advantages, but it also requires some support and improvement to make it develop healthily and steadily. In this condition, blockchain technology provides a new perspective to benefit its development. In the combination of crowdsourcing translation and blockchain, opportunity and challenge co-exist.

As for opportunities, characteristics of blockchain can be well used to solve the problems of crowdsourcing translation platform. Firstly, distributed storage of blockchain can achieve automatic copyright registration by which any translator can register so that their legal rights are protected. Secondly, hash and timestamp can be used to confirm intelligent rights, which is more convenient and time-saving than traditional right confirmation. Thirdly, consensus mechanism ensures reliability of transaction process. Fourthly, smart contract is beneficial for the distribution of remuneration which avoids lack of reward for translators. However, challenges existing in the combination such as the blank in law, acceptance of public and talent shortage still need professionals to do further research and practice in order to realize effective combination of the two.

Crowdsourcing translation including its mechanism, advantages and problems are introduced in this paper. Though expanding on various problems existing in crowdsourcing translation, this paper focuses on the copyright issue of it. Then blockchain technology is introduced to solve the problem respectively. However, there is insufficiency in it. On the one hand, this paper provides a rough direction to apply blockchain to crowdsourcing translation but offers no concrete measures. On the other hand, it is mainly focus on theory explanation without practical operation. Therefore, further practice is needed to verify the feasibility of the theory mentioned in the paper.

For future research, other characteristics of blockchain which can be used in solving the problem of crowdsourcing translation can be continuously explored. Besides, more studies can be focus on concrete measures of combination of blockchain and crowdsourcing translation from the perspective of technology level. This paper may attract more people to study the combination of the two and forge ahead the development of it.

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