Research Article

Difficulties and Countermeasures of Game Localization Translation Based on the IoT and Big Data

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With the development of international social facilitation brought about by the technological progress of various social media, games are spread internationally as a key application for entertainment and social interaction. At present, my country has introduced more than tens of thousands of games from abroad. There are cultural differences and grammatical differences between different countries. The introduced game dubbing and NPC subtitles are not completely the same as the meaning of the country of origin of the game. The result of the incomprehensible words usually makes the game player unable to understand part of the game in the game, while affecting the game experience; it also hinders international cultural exchanges and curbs the strategic expansion of game companies. Big data technology is an inevitable product of the rapid development of data science. It uses various data collection, data storage, and data analysis tools to provide data-based decision support for users in need. The data plane provides tool support for translation. IoT technology relies on various sensors and microdevices to collect status information of different things. IoT devices all have a central server. Currently, game companies translate overseas games through teamwork. Using IoT devices, teams can translate status and progress information, stored in the server to support the progress control of game localization translation. This paper firstly conducts a survey on the questionnaires issued by the translation team leaders of multinational game companies, conducts statistical processing on the collected data, analyzes and summarizes the difficulties existing in the current game localization translation, and finally designs a corresponding game based on big data and Internet of Things technology. In localization translation strategy, through follow-up investigations on companies that have adopted the strategy, it is found that the dilemma of game localization translation has been solved.

1. Introduction

Electronic technology originated in 1998, and the concept of e-sports was first proposed in 2003. In 2009, the video game League of Legends was officially launched. Under normal circumstances, the glory period of online games is three to five years. As a MOBA game that has been in operation for ten years, “League of Legends” not only continues to grow in popularity, quickly breaks the rules, and attracts a large number of game users and fans, but also with the continuous improvement of operating capabilities, the game continues to evolve and develop through international competition, middle and lower three complete, and closed industrial chains [1]. How to quickly enter the local market is one of the problems that various industries need to overcome to develop economic interests and develop international markets. This article takes the hero lines in League of Legends as an example to discuss the problems and strategies of localization translation in the game industry, in order to provide a reference for the future localization translation of the game industry and the development of the international market of domestic games. Loanwords have become a very common phenomenon in commercial games. Not only business games, foreign words can be seen everywhere in daily life. This is because globalization is going on, and our country has close exchanges with other countries in the world, which will inevitably lead to exchanges and conflicts. Games from
other countries are produced in such an environment and are gradually used by everyone. League of Legends, a 20-30-minute MOBA (team strategy game) game, has not only successfully gained a large number of users and fans during its 10-year operation but also targeted the market and made a lot of money [2–4]. It has also developed an indefinitely possible industrial chain, exuding greater market potential. Localization plays an important role in developing domestic market and adjusting operation strategy. Through the research on the translation strategy of League of Legends, we can sort out several factors that affect the e-sports industry represented by the translation strategy of League of Legends. Studying the application of the localization translation strategy of League of Legends from the perspective of economics can reveal the benefits of language transfer in terms of product benefits and provide new research ideas and directions for economic development.

2. Theories Related to Game Localization Translation

2.1. Four Value Criteria. Information value is the most basic criterion. If the translator does not understand the content of the game, first, translate it literally according to the English title, and the translated title will deviate from the original content. This is the most serious error in the localization translation of the game. In order to better convey the content of the game, the translated title needs to faithfully convey the information related to the original game content, so as to realize the unified title form of the translation and the original game content. For cultural value, the translation of game titles is not only a conversion between two languages but also an exchange between two cultures. This is one of the most important tasks of the game title. The translation reflects cultural values and promotes cultural exchange. For cultural background [5, 6], the source language is different from the target language, so the translator should fully understand and accurately convey the cultural information and emotion carried by the original title. For aesthetic value, the translation of the game emphasizes getting rid of the shackles of the original words, grasping the ideological and aesthetic content of the work, and carrying out new artistic creations. To realize the aesthetic value, we must first pay attention to the refining of words. William Somerset Maugham said: “Speech has power, sound and shape; only by taking these into account can we write striking sentences.” Therefore, when choosing words, we must strive to have both sound and beauty. For significance, compare the Chinese translations of the following three groups of English titles: it is not difficult to find that the second translation method can give full play to its Chinese characteristics and conform to the theme and artistic conception of the original work. For commercial value, game is an art that combines culture and business. Commercial considerations should be taken into account when translating titles. To achieve commercial value, translators are required to fully grasp cultural characteristics and aesthetic tastes and create titles that audiences like to see and like.

2.2. Three Methods. Transliteration is a method of translation that uses one language to read and write the pronunciation of words or phrases in another language. It is rarely used for game translation, but it is indispensable. The names of people and places referred to in the title of the game, if any, should be transliterated to be familiar to the audience or of significant historical and cultural significance. This transliteration preserves the rhythm of the original title, attracting exotic audiences with rich content. Literal translation is to preserve the content and form of the original title as much as possible according to the characteristics of the source language and the target language [7]. This is the easiest and most efficient method when the source and target languages perform the same function. In free translation, due to cultural differences between China and foreign countries, overemphasis on form will lead to lack of connotation. In order to let game consumers thoroughly understand the deep meaning of the equivalence of the original title and to achieve the equivalence of the original title and the target title, free translation must be used in terms of information and aesthetics.

2.2.1. Investigation and Analysis of Factors Affecting Game Localization Translation. In order to investigate the current situation of game localization translation, the author distributed corresponding online questionnaires to different game companies and game consumers and collected 2,000 valid questionnaires. Through analysis of the questionnaires, it was found that there are four main factors affecting game localization translation and direction.

2.2.2. Linguistic Factors. Linguistic factors have a direct and critical impact on the translation process. Linguistic factors include phonetic factors, lexical factors, and sentence pattern factors.

English is a language of intonation, and there are many kinds of rhymes in English poetry: alliteration, interline rhyme, line ending rhyme, etc. There are many ways to rhyme. There are vowel-consonant rhyme and full rhyme and half rhyme (depending on the number of syllables that rhyme). Chinese is a tonal language. Chinese ancient poetry can be flat or oblique. Also, distinguish between ascending rhyme, descending rhyme, and advancing rhyme [8, 9].

Generally speaking, different tones are not allowed to rhyme. Since many of the characters in the game have gods or legends in their backstories, it is inevitable that certain lines from the Bible will be translated, taking into account linguistic elements in different languages, as follows:

(1) “An eye for an eye”—The Righteous (Kyle)

Machine translation: one eye for the other. National costume translation: an eye for an eye, a tooth for a tooth! This sentence comes from the Bible—Exodus: Old Testament, and also in Matthew’s gospel: an eye for an eye, a leg for a leg. In order to avoid excessive retribution, the role of Judge Angel Kyle in the background story is God’s judge; she believes that as God’s judge, good and evil should be her principle, and this idiom evolved into an inseparable
Chinese idiom that often goes together appear. This is an eye for an eye, an eye for an eye, not simply an eye for an eye, and it satisfies the rhyme requirement of a heavier pronunciation of the whole sentence; each half seems to emphasize the other, more like a decree or a sentence. Godly majesty. Two sentences, or two parts of a sentence, which appear to each say two things, actually respond to each other, expound on each other, complement each other, and say one thing. Express the meaning of a complete sentence in a staggered, penetrating, complementary manner. This figure of speech is called intertextuality in Chinese.

(2) “Ashes return to ashes, and earth returns to earth”—Evelyn Outside the Window

MT: ash for ashes, dirt for dirt. Translation of national clothes: dust, dust returns to earth.

Evelyn’s quote from Genesis 3.19 is ashes to ashes and ashes to ashes. In the sure and sure hope of resurrection to eternal life. You are you and you will go back to where you came from [10]. In the game, in order to realize the simplicity of the characters’ lines in the characters and at the same time to reflect Evelyn, a woman who is tough and does not speak much because of her background as an assassin, the Chinese Bible version is directly used here, ashes to ashes, ashes to ashes, original translation: the dust returns to the dust, the earth returns to the earth. The reference materials for the game localization process are shown in Table 1.

2.2.3. Environmental Factors. Language and culture are inseparable, and social and cultural background knowledge determines the deep semantics of language. Cultural context refers to the cultural, historical, and social context of the source and target languages. Due to different historical development processes, different geographical locations, and different social development stages in the same period, different national and cultural backgrounds lead to different perceptions of people’s perceptions of things. Therefore, with their values, customs, traditions, literature, and religious beliefs, words with different cultural meanings were produced. The translation of words and sentences depends on its own language and cultural environment, including geographical environment, customs, social history, literary allusions, religious beliefs, and many other factors. Translation skills can hardly compensate for cultural complexity [11, 12]. Therefore, it is necessary to have a comprehensive and thorough understanding of the source language and target language culture. The questionnaire data of vocabulary translation and cultural fit are shown in Table 2.

2.2.4. Globalization. Reconstructing translation-triggered contexts from a local perspective can stimulate the potential of the target culture to foreign knowledge systems. The localization of translation comparison and optimization strategy is to express the meaning of other languages as much as possible, without giving up the mother tongue when expressing power, and only the correct translation can reflect the potential of the mother tongue [13]. In order to avoid the spread of mixed culture, the localization translation strategy should take the cultural value orientation as a reference, rewrite the source language text through cultural participation, and reduce the disgusting cultural phenomenon in the source language text. In the right circumstances, such subtle cultural changes can facilitate localized reconstruction and facilitate global and local interactions, primarily through negotiation and reconciliation of cultural differences and by deescalating cultural tensions, through their own national globalization, making its own contribution. The use of new technologies in translation is shown in Table 3.

2.2.5. Personal Factors. The complexity of translation and the particularity of the translator determine the uncertainty of the translation process. At the same time, the translation team is also very important. The current translation team collaboration rate is shown in Table 4.

A translator is a real, emotional, productive, and creative being. Therefore, an individual’s knowledge reserve, translation strategy selection, and understanding of source and target languages are translated into a variety of individual translation styles. The translation strategies in League of Legends’ character lines are applied. The accuracy of vocabulary translation is shown in Table 5.

3. Problems Existing in Game Localization Translation

3.1. The Problem of Vocabulary Translation. Vocabulary is the basic unit of game language and contains rich cultural connotations. In game localization translation, the use of game vocabulary must pay attention to the context. Without paying attention to the context, the translation or substitution of words will make it difficult for the public to understand.

In the process of game localization translation, there will be some obscure words. The translation is long, rigid, and difficult to understand. Not all game consumers can understand it, which is obviously contrary to the original intention of game localization translation and is not conducive to causing game consumer interest.

The translation of game localization often lacks a beautiful feeling, and the accuracy of the original expression is lacking. The imprint of translation is relatively heavy, and it is very common to mechanically directly quote the original language in game localization translation, which makes the expression of the translation a bit too far-fetched and lacks the feeling of beauty. There is a huge commercial interest in game translation [14–16]. Therefore, the translation of the game should be elegant and gorgeous, and the accuracy of the original expression should be the same, which will

| Game type       | Material reference |
|-----------------|--------------------|
| League of Legends | 0.26               |
| PUBG            | 0.38               |
| CrossFire       | 0.36               |
Table 2: Vocabulary translation and cultural fit.

| Game type  | Vocabulary translation and cultural fit |
|------------|----------------------------------------|
| League of Legends | 0.28                                    |
| PUBG       | 0.35                                    |
| CrossFire  | 0.37                                    |

Table 3: Use of new technologies in translation.

| Game type       | New technology in translation          |
|-----------------|----------------------------------------|
| League of Legends | Simultaneous interpretation equipment  |
| PUBG            | Human translation                      |
| CrossFire       | Google Translate                       |

Table 4: Team translation collaboration efficiency.

| Team | Translation collaboration efficiency |
|------|-------------------------------------|
| A    | 0.29                                |
| B    | 0.48                                |
| C    | 0.23                                |

Table 5: Vocabulary translation accuracy.

| Game type     | Translation accuracy |
|---------------|----------------------|
| League of Legends | 0.31                  |
| PUBG          | 0.33                  |
| CrossFire     | 0.36                  |

enhance the communication effect of the game. The translation of the game translation is equally good and bad.

3.2. The Problem of Cultural Differences. In the sequence of historical development, culture first appeared, and then, language emerged. Because different countries have different cultures, this requires translators to have strong cultural communication skills. Translators should be aware of the cultural differences between their own country and other countries to avoid disagreements and misunderstandings. In the process of localization of translation games, because both countries have a long history, the two countries have regions with customs and historical allusions [17].

Different historical backgrounds have led to some incomprehensible expressions in the translation process of the two game languages. This is especially true of customs, which affect and restrict the accuracy of game localization translation.

3.3. There Is No Reference Material. Since the translation of traditional games does not have high value, the current game localization translations are often new types of game translations, and the understanding and translation of new things often have higher requirements for translators.

Moreover, even if the translator has high professional quality, the translation accuracy rate is not high, because the translation is an innovative operation, and it may be possible to translate without reference documents or guidance programs [18].

There will be many translation errors, and the novelty of the game industry itself also determines the particularity of its translation. The current multinational game companies also lack corresponding technological tools to achieve localized game translation. Solve the problem of no reference material.

3.4. Inefficient Teamwork. Translating large-scale games often requires the cooperation of multiple roles to complete the task. Game translation involves subtitles, roles, dubbing, code comment processing, and other content. Only with the cooperation of multiple directions can the complete translation of the game be completed.

Some multinational game companies arrange teams to process game translation in sequence, and some multinational game companies start the entire translation team at the same time for translation. However, there are various team problems in the current translation, such as the mismatch between characters and dubbing translations and some game characters. The background is cute, but the feeling of dubbing and translation is other types. Excessive contrast between these will affect the game consumers’ sense of game experience, reduce the translation progress of the translation team, and lengthen the time for the game to go online. Usually, games have a heat period, and if the heat ends during the translation period, it will be a big loss for multinational game companies.

4. Countermeasures for Game Localization
   Translation Based on Big Data and Internet of Things Technology

4.1. Game Localization Vocabulary Translation Strategy Based on Big Data Technology. The purpose of game localization is to attract the attention of consumers. The use of easy-to-understand language in the translation of game localization can help consumers understand the products promoted by the game, shorten the distance between consumers and game owners, and arouse consumers and products. Empathy in turn helps to increase product sales and increase the revenue of game developers. The data collection-related tools in big data technology can collect the dictionary of the country of origin of the game and at the same time crawl the latest usage data of the vocabulary in the game localization translation in social media and understand the vocabulary in the game localization translation after comprehensive analysis. Different meanings represented in different scenarios. Combined with its dictionary and network meaning, a comprehensive analysis of the meaning of the vocabulary will more accurately describe the vocabulary of the NPC in the game, allowing game consumers to experience the best game experience. In response to the translation problem caused by cultural differences, game companies can recruit big data technology professionals and have a good understanding of the country of origin of the game. The big data formula algorithms involved in
this questionnaire are shown in (1a)–(1d).

\[
\text{Translate} = \frac{\sum (T_i - \bar{X}) (Y_i - \bar{Y})}{\sqrt{\sum \text{BigData}_i - \text{IOT}}^2 \sum \text{BIGDATA}_i - \bar{Y})^2},
\]

(1a)

\[
\text{var} \left( \sum_{i=1}^n \text{Translate}_i \right) = \sum_{i=1}^n \text{var}(V_i) + 2 \sum_{i < j} \text{cov}(\text{BigData}_i, \text{IOT}_j),
\]

(1b)

\[
\mathcal{R}(\text{Trans}) = \frac{E(t_i = t_{ij}, \text{Game} = \text{staff}_j) r}{E(Q = q_j)} j,
\]

(1c)

\[
\text{Game Trans} = \sum (E_i - \bar{Y})^2 = \beta^T X^T y - \frac{1}{n} (E^T uu^T y).
\]

(1d)

Among them, \( T, X, \) and \( Y \) represent different types of games; var represents functional variables; cov represents variance; \( E \) represents expectation; Game Trans represents the result of localized translation of the game; and \( u \) and \( y \) involved represent the translation of the game, respectively, engagement and team participation rates.

The historical development and cultural development are analyzed, and the relationship between the localization translation of the game and the historical culture is obtained, so that the cultural data of the country of origin of the game and the cultural data of the local country can be accurately translated. Through interviews with the heads of related companies in multinational game cooperation, it is found that the accuracy of the vocabulary and cultural matching of game localization translation has been greatly improved after combining with big data technology. The specific situation is shown in Figure 1.

The purpose of the game is to attract the attention of consumers, make them interested in the product, and successfully make consumers buy the product. Therefore, for example, in the translation process of Russian game language, we must pay attention to the simplicity of the language. If you use words that are too difficult to understand, consumers will lose interest in the game, resulting in consumers not buying this product, so that the income of the game owner will not increase. Therefore, the translation of game localization cannot use words that are too difficult to understand and must pay attention to the simplicity of vocabulary. This is mainly manifested in the method of using abbreviated words and easy-to-understand words.

Big data technology can traverse the dictionaries of both the country of origin of the game and the country of demand for game localization, analyze the best translation method for each sentence, realize the simplest translation of vocabulary, use abbreviated and short vocabulary, and finally improve the game.

Through interviews with the heads of related enterprises in multinational game cooperation, it is found that the combination of big data technology can greatly improve the succinctness and readability of their game localization translation vocabulary. The specific situation is shown in Figure 2.

4.2. Strategy for Collecting Reference Materials for Game Localization Translation Based on Big Data Technology. In view of the fact that there are few translation reference materials in the current game localization translation process, big data technology can collect a large amount of game type data, store the data before and after the localization translation in the database, and then use the answer data. The two databases are compared and analyzed, and the rules before and after localization translation are found, and the rules are spelled together, and the fragmented translation skill materials are provided to translators who do not
have translation materials to refer to, so as to realize the splicing of similar game clips existing in history. Thus, the best translation combination can be obtained.

Through interviews with the heads of relevant enterprises in multinational game cooperation, it is found that the storage rate of reference materials for localized translation of their games has been greatly improved after combining big data technology. The specific situation is shown in Figure 3.

4.3. Translation Strategy of Game Localization Team Based on IoT Technology. There are various sensor devices and RFID tags in the Internet of Things technology. For the communication and cooperation problems in the translation process, the Internet of Things provides sensor devices that can be carried around. With these sensor devices, team members can quickly exchange game information.

Players can also use the information collected by the device to correct some translation errors in the process of game localization translation. Through the cooperation investigation and analysis, it is found that after combining the Internet of Things technology, the change of the cooperation rate of the game localization translation team is shown in Figure 4.

The division of labor between dubbing translation and character information translation can use IoT sensor information to distinguish the situation of each other, correct the correctness of the relevant translation in time, and ensure the matching degree of character information and dubbing. Through interviews with the heads of relevant enterprises in multinational game cooperation, it is found that the combination of Internet of Things technology has greatly improved the game consumer experience.

5. Conclusion

The accurate translation of game localization is a key element in promoting game products. In the global environment, game internationalization plays an extremely important social role. As an important part of game internationalization, game localization translation has obvious cultural characteristics. The use of vocabulary in the game reflects the national customs, cultural background, customs, etc. of the country of origin of the game. Due to the accelerated development of economic globalization, my country has introduced a large number of foreign game products under the new system of open economy supported by the government, and domestic products have also flowed into overseas markets in large quantities. International games have shown a trend of diversified development. Games of foreign origin often appear in people’s lives, so the localized translation of games can help multinational game companies go abroad to develop international markets and can also reduce the social distance between Chinese citizens and international netizens. Only successful local translation of games will capture the psychology of game consumers, allow game consumers to purchase corresponding game products, and increase the sales of game products, and game companies will benefit. In order to achieve this goal, translators need to abide by the translation principles of game localization, use translation skills based on big data and Internet of Things technology, and pay attention to the problems that arise in the process of game localization translation. Only in this way, game localization translation can help enterprises and make enterprises stand firm in the international game business.

The game itself has a limited lifespan, generally no more than five years, but League of Legends has been around for 10 years, and not only the official organization, the game planning team works well, not to mention the translation team of game fusion into the local culture and atmosphere. From the history of League of Legends, we can learn not only about localization strategies but also how different types of products should be translated. League of Legends may not
be a viable project, but translators can apply the strategies they learn from League of Legends to local translators in other e-sports and other industries. This paper studies the application of localized translation based on big data and the Internet of Things and provides some suggestions for the localized translation of game lines and the cultural integration of video games in different countries, hoping to help Chinese and foreign game operators choose appropriate localized translation strategies and provide some insights for the application of examples in the field of translation.

**Data Availability**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

**Conflicts of Interest**

It is declared by the author that this article is free of conflict of interest.

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