

Analysis of Patent Threat under the Background of Globalization

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Abstract - Under the background of globalization, protection of intellectual property rights has been further strengthened and patent becomes one of the most important factors related to the survival and development of an organization. In recent years, patent-related events have been continuously outbursted, but relevant discussions are still stay at the surface level. In the present study, we first analyze the patent threat between different organizations, including its formation mechanism, definition, type classification, manifestation and impact factors. From the perspective of technology development, patent threat can be classified into three types: patent gap threat, patent diversity threat and patent R&D threat. Secondly, an empirical study has been carried out on the whole Chinese communication industry. The result shows that Chinese communication industry mainly faces serious patent gap threat caused by the lack of core patents.

Keywords - Patent event, Patent threat, Communication industry

I. INTRODUCTION

In recent years, patent-related events have been continuously outbursted, whose influence is becoming increasingly large and forms of expression are more and more diverse. Under the background of globalization, protection of intellectual property rights has been further strengthened among the world and patent becomes one of the most important factors related to the survival and development of an organization. How to effectively prevent and cope with these increasing patent events is the focus of attention.

After all, the essence of patent event is patent threat between different organizations, i.e., the organizations with technology superiority make use of the game rules of intellectual property rights protection to attack and threaten those in inferior position. For a given organization, which can be any economic entity such as an enterprise or a country, the patent situation outside is directly related to its interest and security, and the threat caused by patent factor is becoming an important part of its external threat.

Up to date, the literature about patent threat is still rare. Many relevant discussions still stay at the surface level and fail to observe the situation of patent threat between different organizations behind the event [1-2]. Based on the case study, this paper intends to make a theoretical analysis of patent threat under the background of globalization. Furthermore, an empirical research on

patent threat has been made. The purpose of this study is to deepen the understanding of patent events and provide a new perspective and theoretical basis for the prevention and reaction to them. The rest is organized as follows. In section 2, we analyze the patent threat between different organizations, including its generation mechanism, type classification, manifestation and impact factors. In section 3, we carry out an empirical research on Chinese communication industry by using real patent data. Finally, section 4 presents the conclusions and possible further research.

II. ANALYSIS OF PATENT THREAT

2.1 Formation mechanism of patent threat

In the context of globalization and knowledge-based economy, the role of technology played in economic development becomes more important. Since technology level controls core competitiveness of an organization [3], the imbalance of technology development will inevitably lead to the imbalance of competitive power between different organizations. The organizations with technology superiority can more easily occupy market initiative, and make serious threat to those in inferior position at the same time.

Patent is property right of technology. With the implementation of *TRIPs* ("Trade-Related Aspects of Intellectual Property Rights Agreement") [4], protection of intellectual property rights among the world has been further strengthened and technology innovation between different enterprises is similar to the game of "Winner Take All", which further exacerbates the intensity of patent competition and the impact of patent threat. For a given organization, its interest and security is directly linked to the patent situation of competitors, and thus, patent threat becomes an important part of its external threat. The formation mechanism of patent threat is shown in figure 1.

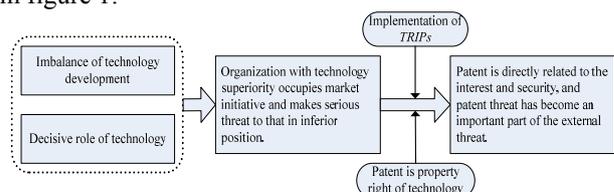


Fig.1 formation mechanism of patent threat

2.2 Definition and connotation of patent threat

As a new concept, patent threat does not have a complete definition up to date. We suggest “Patent Threat” should comprise the following meanings:

(1) Patent threat is a type of posture. Although patent threat takes the form of a variety of patent events, the event itself is not equated with patent threat but only a result caused by patent threat. Taking zipper industry in China as example, the whole Chinese zipper industry faces serious patent threat because the YKK Corporation of Japan posses more than 70 percent Chinese patents related to zipper technology. This threat is a type of posture, rather than a specific event that would take place.

(2) Patent threat is relative and dynamic. Patent threat exists between different organizations, whose situation and impact are measured through comparison of internal and external situation. Thus, it is relative rather than absolute. In addition, since patent right has the characteristics of regionalism and timeliness, patent threat may also change with time, technology development and environment, etc.

(3) The study on patent threat is not only concerned about the impact caused by external patent situation to an organization’s technology development, but emphasize to a larger extent on the impact to overall interest.

(4) The essential cause of patent threat is the imbalance of patent situation. In addition to the difference of patent protection consciousness in different countries, this imbalance is mainly due to the imbalance of technology development.

In summary, patent threat can be defined as a relative and dynamic external threat originated from the imbalance of technology development in the era of knowledge-based economy, which is in the name of patent protection.

2.3 Type classification of patent threat and its manifestation

Patent threat is originated from the imbalance of technology development. Therefore, its type classification can be analyzed from the view of unbalanced type of technology situation.

The imbalance of technology development is first shown in spatial distribution, in which all organizations do not posses a given technology. Due to the national characteristic of technology, the imbalance of technology development is also reflected in technology diversity, i.e., the technologies with same functions have different compatibility, size, and so on. Besides these two types of static situation, the imbalance of technology development also includes a dynamic situation, which is the differences of direction and strength of technology R&D. In summary, the imbalance of technology development can be classified into three types: gap of technology level, diversity of technology content and difference of technology R&D. The first two types describe static situation of technology distribution, while the third describes the dynamic situation of future technology. The

unbalanced type of technology development is shown in figure 2.

Since patent is property right of technology, different unbalanced type of technology development respectively would result in different type of patent threat. According to the type classification analyzed above, patent threat between different organizations can be classified into three types: patent gap threat, patent diversity threat and patent R&D threat, as shown in Fig.3. These types of patent threat and its manifestations will be described through some case studies in the following.

Patent gap threat is stemmed from the gap of technology level, the essence of which is that the organizations owning patent make serious threat to those without. The patent events caused by this kind of threat are very common. In sum, patent gap threat has two main manifestations: (1) in order to control the market, the organizations with patent advantage raise the market access threshold by building technical standards, technical barriers and so on; (2) in order to grab huge profits and crowd out competitors, the organizations owning patent take the actions such as patent litigation and building patent pool [5]. The patent infringement case of KODAK camera ended in 1990 is a typical case. KODAK Company was forced to pay 925 million U.S. dollars and the ultimate loss was up to 3 billion U.S. dollars.

Patent diversity threat is the external threat originated from the diversity of patent technology content, which is always related to technical standard. When one patent technology becomes the de facto standard of market, other competing and incompatible patent technologies in the same technology system will be isolated and difficult to enter the target market. For example, the *BETA* format of video recorder supported by SONY was defeated by the *VHS* format of JVC in 1980’s. Not only a lot of royalties but also the dominant position in the market did SONY lost. In recent years, both the contest of next generation format standard of DVD and the controversy of document format are typical cases of this kind of threat. Patent diversity threat is directly related to the profits of those organizations involved.

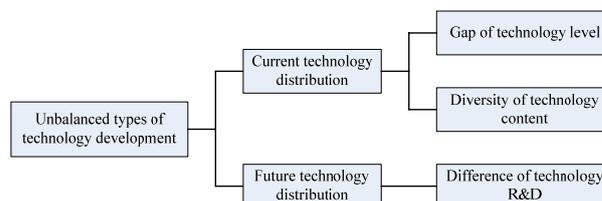


Fig.2 unbalanced types of technology development

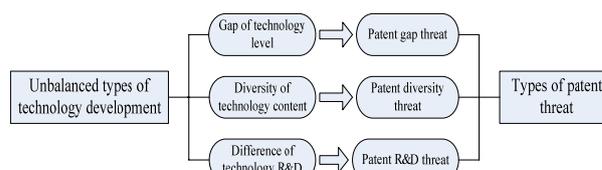


Fig.3 type classification of patent threat

Patent R&D threat emphasizes the external threat originated from the differences of technology R&D direction and strength. Corresponding to the division of technology R&D model, patent R&D threat has two main manifestations: (1) the organization with strong technology R&D capability preemptively develops new technology and obtains the exclusive right of technology by means of patent protection, and furthermore achieves the ownership of market monopoly. Thus, it is very important for an organization to understand its competitor's technology R&D situation when both are developing a same technology. (2) When a fundamental innovation of technology development occurs, the organization which fails to grasp opportunities for developing new technology will be subjected to subversive shock, whereas the one which seizes the opportunity may break old market pattern and monopolize the market [6]. For example, conventional watch was replaced by quartz watch with longer lifetime and higher accuracy in 1970's. The watch industry in Japan achieved a great breakthrough and quickly occupied the world market, while Swiss watch industry paid a heavy price for its slow reaction to technology innovation.

It should be noted that the purpose of type classification of patent threat is to better understand patent events. The boundary between different types of patent threat is not very clear and it can be changeable over time. Taking the quartz watch event as an example, it was patent R&D threat to Swiss watch industry in 1970's. However, Japanese watch industry with patent advantage makes patent gap threat to the watch industries of other countries in the present watch market.

2.4 Impact factor of patent threat

Although this paper emphasizes the external threat caused by patent factor, other factors, like political, economic and social factors, can also heavily affect the ultimate result. As shown in figure 4, the impact factor of technology threat will be analyzed from the technology, market and environment dimensions.

In addition to patent gap threat, patent diversity threat and patent R&D threat, the factors in technology dimension include some characteristics of technology development, such as technology maturity. The three types of patent threat only describe the imbalance situation of patent, but technology development has its own characteristics and development regularity, which are also related to the degree of an organization's external patent threat. Taking technology maturity as an example, a given technology in decline stage would not cause fatal threat to an organization, even if its patent strength is far behind its competitors. The main factors of technology characteristics related to patent threat include technology maturity, speed of technology update and technology complexity, etc.

The factors of market dimension include some market-related factors. Since the final purpose of patent event is to pursue the market profit, industry market condition has close relationship to the size of patent threat. The level of

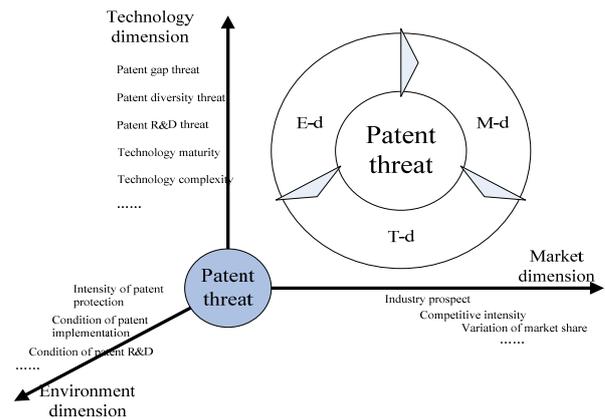


Fig.4 3D model of impact factor of patent threat

competitive intensity and patent threat will certainly be higher for the industry with promising prospect and huge profit. Similarly, the factors of an organization's external macro environment are also related to patent threat, such as the intensity of patent protection and the condition of patent implementation. The same gap of patent strength can make more serious threat in an environment with great intensity of intellectual property rights protection. When the state's profit is involved in the patent threat body, the political environment can not be ignored.

III. EMPIRICAL RESEARCH

Over the past decade, communication technology develops rapidly worldwide. Taking the whole Chinese communication industry as research object, we will investigate its external patent threat through the analysis of the Chinese and U.S. patent in communication technology field. Considering regionalism of patent, we analyze the threat situation of Chinese communication industry in domestic market by using Chinese patent data, while investigate the threat situation in world market on the basis of U.S. patent data.

The data for this study is collected from State Intellectual Property Office of the People's Republic of China database (www.sipo.gov.cn) and United States Patent and Trademark Office database (www.uspto.gov). Until Sep. 2007, there are 3457 Chinese invention patents and 3677 U.S. issued patents in communication technology field.

3.1 Patent situation of Chinese communication industry in domestic market

(1) Patent application and issued situation over calendar years

Taking patents whose applicants come from Chinese mainland as a whole, we compare it with other Chinese patents to investigate its patent situation. The trends of patent activity are displayed in Fig.5 and Fig.6. From the figures, it can be seen that the patent number of Chinese communication industry is close even exceeds that of other countries/regions, although patent activity of which started relatively later.

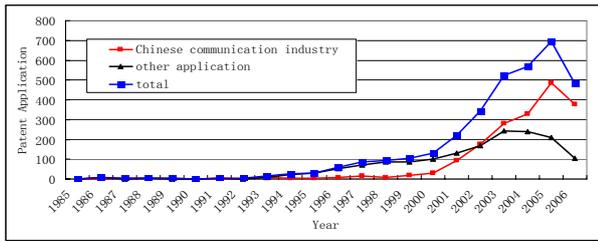


Fig.5 trends of Chinese patent application over calendar years

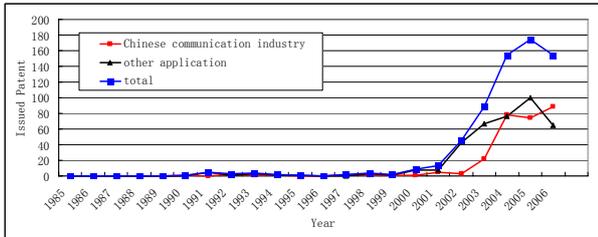


Fig.6 trends of Chinese issued patent over calendar years

(2) Distribution of core patent

Since maintaining patent right needs to pay a considerable amount of fee, we can identify core patent by the number of maintenance year of patent right from the economical view [7]. As to the maintenance year of Chinese patents, we found that there are 36 patents with a life-span over 12 years, but only one patent's applicants come from Chinese mainland. This suggests that Chinese communication industry is seriously short of core patent, although its number of patent is large.

3.2 Paten situation of Chinese communication industry in world market

(1) Contrast of patent strength

The number of U.S. issued patent has been taken as an important index to measure a country's patent strength [8]. The top ten countries/regions with high patent number in communication technology field are shown in Fig.7. It can be seen from the figure that the predominance of U.S. patent strength is very conspicuous, followed by Japan and South Korea. Statistic data reveals that there are only 2 U.S. issued patents coming from Chinese mainland. The result indicates that the patent strength of Chinese communication industry is still very low in the world market, and its core technologies are mainly dependent on developed countries.

(2) Distribution of core patent

The more a patent is cited, the higher value it has [9]. In the communication technology field, there are 9 U.S. patents cited more than 10 times and all come from the United States. This result further confirms the predominance of U.S. patent strength. It is essential for Chinese communication companies to investigate the patent legal status of the used technology in order to avoid unnecessary litigation and dispute, especially for the export enterprises.

(3) Contrast of patent R&D direction

As IPC (《International Patent Classification》) is a universal classification system of patent, we can investigate the technology R&D direction of an organization through analyzing its patent's IPC content. Table I shows the top ten main IPC of patent, in which there are 3 groups of patent in communication technology field. The first group includes Chinese patents whose applicants come from Chinese mainland. The second includes other Chinese patents except those of group one. The third includes all U.S. patents. From the table I, it can be seen that the main IPC of these groups is almost the same except the small difference in ranking. The result indicates that the technology R&D direction of Chinese communication industry is consistent with other countries/regions.

3.3 Analysis of patent threat

According to the analyses above, it can be seen: (1) In the domestic market, although the patent number of Chinese communication industry is close even exceeds that of the external, the situation of lacking core patent is very serious; (2) In the international market, U.S. patent strength has obvious advantage, whereas that of Chinese communication industry is still very weak; (3) The technology R&D direction of Chinese communication industry is consistent with the foreign countries. Thus, we can suggest that Chinese industry communication is mainly facing serious patent gap threat caused by the lack of core patent, the possibility of occurrence of patent dispute is very high, and the manifestation of patent event may includes patent barrier, patent pool, etc.

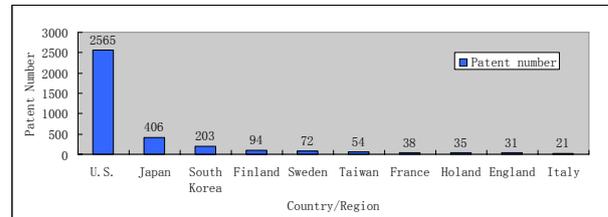


Fig.7 top ten countries/regions in the number of issued patent

TABLE I
COMPARION OF TOP TEN MAIN IPC

No.	CPD ^a		CPA ^b		U.S. Patent	
	Main IPC	Num.	Main IPC	Num.	Main IPC	Num.
1	H04L	544	H04B	405	H04B	745
2	H04B	335	H04L	347	H04L	729
3	H04Q	273	H04Q	212	H04Q	375
4	H04J	90	G06F	80	H04J	213
5	H04M	88	H01Q	61	G06F	183
6	G02B	77	H04M	59	G02B	179
7	G06F	56	H04J	58	H01Q	140
8	G06K	55	G06K	40	H04M	109
9	H04N	48	G02B	37	G01S	74
10	G02F	30	H04N	21	H04N	70

^a. Chinese patent whose applicants come from Chinese mainland.

^b. Chinese patent whose applicants come from non-Chinese mainland.

IV. CONCLUSION

Under the background of globalization, patent is one of the most important factors related to the survival and development of an organization, and patent threat has become an important part of external threat. Firstly, this paper theoretically analyzes patent threat between different organizations, including its formation mechanism, definition, type classification, manifestation and impact factors. Patent threat is a relative and dynamic external threat, which is stemmed from the imbalance of technology development in the era of knowledge-based economy in the name of patent protection. The type of patent threat can be divided into patent gap threat, patent diversity threat and patent R&D threat. A three-dimensional model of impact factor has been developed. Secondly, an empirical research has been carried out on the whole Chinese communication industry. The result shows Chinese industry communication is mainly facing serious patent gap threat caused by the lack of core patent.

The study on patent threat will deepen the understanding of patent events and provide a new perspective and theoretical basis for the prevention and cope with them. The emphasis of next step work includes calculation method of patent threat and model of patent early-warning system.

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