EMPLOYING PATENT ANALYSIS TO IDENTIFY PROMISING TECHNOLOGY VENTURE COMPANIES

Ryusuke Ishiguro
Intellectual Property Dept. Technology & Innovation Studies Div.
Mitsui & Co. Global Strategic Studies Institute

SUMMARY

- When companies looking to acquire new technologies choose promising technology venture companies in which to invest, it is important for them to pay attention to the patents held by the candidate companies. In the past, the emphasis was placed on patent quantity, but in recent years, indicators suggesting the quality of patents have been established, and they are increasingly being taken into account when analyzing patents. In calculating patent quality, the frequency of citations by other companies is an important factor.
- An analysis focused on the digital health sector revealed a correlativity between the quality of patents held by certain technology venture companies and the level of funding raised by the companies. It appears that patent quality is a new perspective that can be incorporated when selecting companies for investment.
- Even after initiating collaboration through investment, it is also important for companies to continuously review their patent portfolio and formulate patent strategy in response to the ever-changing market environment and patent status.

THE IMPORTANCE OF PATENT QUALITY

Taking quality into account when evaluating patent competitiveness

The number of global venture capital investments has been on a downward trend since the middle of 2019, and while this trend accelerated from the beginning of 2020 due to the impact of the COVID-19 pandemic, in monetary terms, investment has continued to recover after bottoming out in the first quarter of 2020, and the percentage of late-stage investments, which usually involve large sums per round (Series C/D and later), is increasing.

Many technology venture companies are looking to use the funds thus obtained to accelerate technological development, while companies that want to incorporate new technologies possessed by other companies are seeking to spur business development through collaboration based on investment in promising technology venture companies. However, since it is very difficult to accurately evaluate the as yet unseen technologies offered by technology venture companies, focusing on patents, which can clarify the contours of the technologies and reveal their competitiveness, is an important perspective in estimating the value of a company. In the past, when analyzing the competitiveness of a company's patents, the tendency was to focus on the quantity of patents, but in recent years, indicators suggesting the quality of patents have been established, and they are increasingly being taken into account in analyzing patents. In the fundraising of technology venture companies in recent years, a correlation between the increase in funding and the quality of patents has become apparent. Accordingly, when employing patent analysis to evaluate these companies in future, it will be important to pay attention not only to the quantity of patents, but also to their quality.

Using citation frequency to calculate patent quality/case examples

Because of the high cost involved in applying for and maintaining patents, it is expected that analysis of patent information will be able to reveal the focal technology fields and future aims of companies. The growing sophistication of analysis tools in recent years has made it possible to focus not only on the quantity of patents, but also on the quality from the vast amount of information in patent databases (DB). One factor that is often used to calculate the

quality of a patent is the number of citations it has received (the number of times that a patent is referred to in the novelty examination of another patent filed later). A large number of citations means that a patent has been benchmarked by many companies. Although there are differences in the methods of calculation and designation, the fact that the frequency of citations is used to calculate patent quality in the commercial patent search DBs with patent analysis functions provided by companies such as Germany's PatentSight and France's Questel (Fig. 1) shows that the idea that a large number of citations indicates the high quality of a patent is growing. In the analysis conducted by the European Commission (EC) in its examination of the acquisition of the US company Monsanto by Germany's Bayer (the acquisition was completed in June 2018), the patent quality indicators provided by PatentSight were employed.

Fig. 1 Designation and calculation of patent quality in commercial patent search DBs (partial)

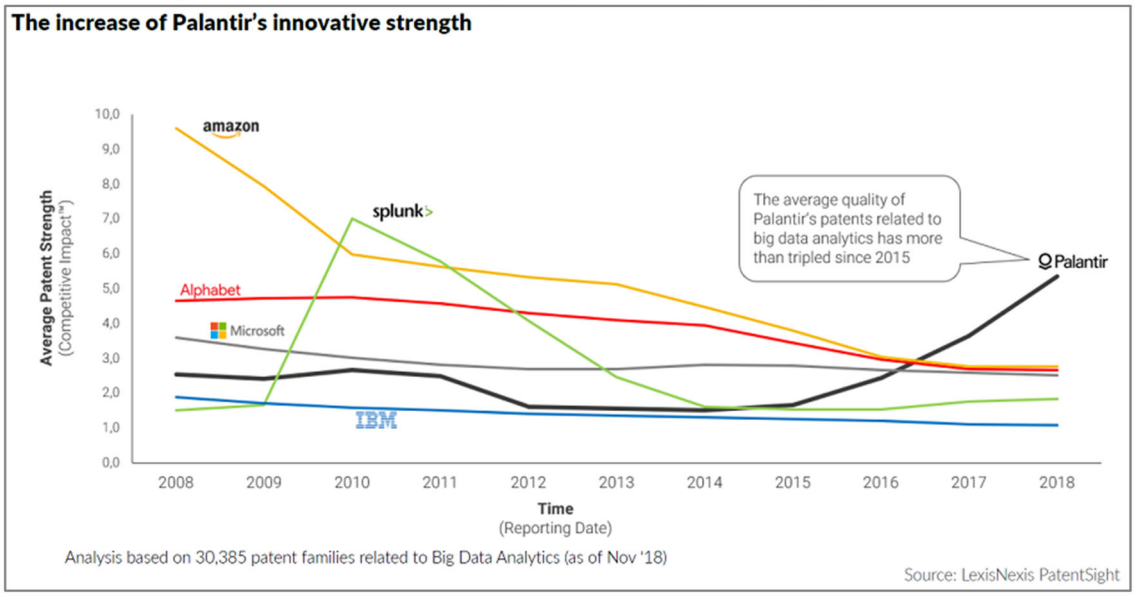
Patent search DB	Designation	Parameters used for calculating patent quality
PatentSight (Germany)	Competitive Impact（CI）	Citation frequency, technology category, year of application, country of application, status (right established, under application, etc.)
Questel (France)	Technology Impact（TI）	Citation frequency, year of application, technology category

Source: MGSSI

In addition, by continuously monitoring the quality of patents, it is possible to estimate the development trends of the company concerned. For example, according to an analysis report (Looking into the Digital Crystal Ball) produced by PatentSight using a score representing patent quality (Competitive Impact, hereinafter CI), the US company Palantir Technologies, which specializes in big data analytics and was listed on the New York Stock Exchange in September 2020, improved its patent quality (CI) to surpass even major companies in 2018 in terms of CI, despite having only a small patent portfolio (Fig. 2). Palantir has procured funds of US$2.6 billion to date. While another US company and industry peer, Splunk, which has raised only US$40 million to date, outperformed Palantir in CI around 2010, its CI has continued to decline since then, and fell well below Palantir Technologies in 2018.

Fig. 2 Changes in patent quality by company

Changes in score (Competitive Impact) showing patent quality over time derived from patent citation information, etc. provided by PatentSight



Source: Looking into the Digital Crystal Ball, PatentSight

Through these two examples, the use of citation frequency to analyze patent quality is gaining recognition, and the degree of patent quality can be considered an important factor in a company's development.

THE RELATIONSHIP BETWEEN PATENT QUALITY AND FUND PROCUREMENT IN TECHNOLOGY VENTURES

Because patent quality can serve as an indicator for gauging the development trend of a company, it can be considered as one of the selection criteria for identifying promising companies. This report will now focus on the amount of fundraising by venture companies and analyze the relationship between the TI value and the number of citations, which are indicators of patent quality.

In order to narrow down the target companies of this analysis, first, four fields are selected, namely healthcare, logistics, education, and energy, where technological innovation is expected to take place both during the COVID-19 pandemic and in the long term, and then patents with high relevance to digital technology, an area undergoing remarkable technological development in each of the four fields, are identified. An analysis conducted via Questel's patent search DB (Orbit Intelligence) using the Technology Impact (TI) indicator, which shows the level of patent quality (Fig. 3), revealed differences in the average TI values of patents relating to each field, with the value higher in healthcare than in the other fields.

Fig. 3 Patent quantity and average TI value by field

Area	Patent quantity	Average TI value
Healthcare X Digital Technology	22,670	2.77
Logistics X Digital Technology	29,707	1.70
Education X Digital Technology	16,230	1.52
Energy X Digital Technology	38,824	1.57

Source: Created by MGSSI based on data from Orbit Intelligence

Accordingly, the relationship between patents and funding levels of venture companies in the digital health sector will be further examined. Of the companies in this sector that raised funds through VC investment between April and September 2020, 62 companies have succeeded in procuring funds amounting to US$10 million or more to date. Comparing the amount of funding raised, the number of patents held, and the abovementioned average TI value of each of these companies (Fig. 4), the companies that have raised funds of US$100 million or more to date have a greater number of patents and a higher average TI value than companies that have raised less than US$100 million.

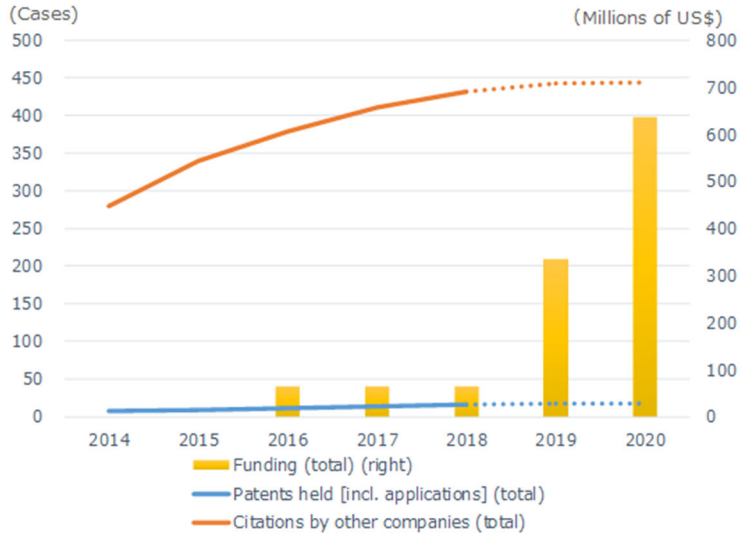
Fig. 4 Number and average TI value of patents held by technology VCs in the digital health sector (by funding amount)

Total funding	Companies	Average number of patents held	Average TI value
$100 mil. or more	27	9.59	1.42
Less than $100 mil.	35	2.11	0.68

Note: Based on companies that raised funds through VC investment between April and September 2020, and that have successfully raised total funding of US$10 million or more to date.
Source: Created by MGSSI based on data from PitchBook and Orbit Intelligence

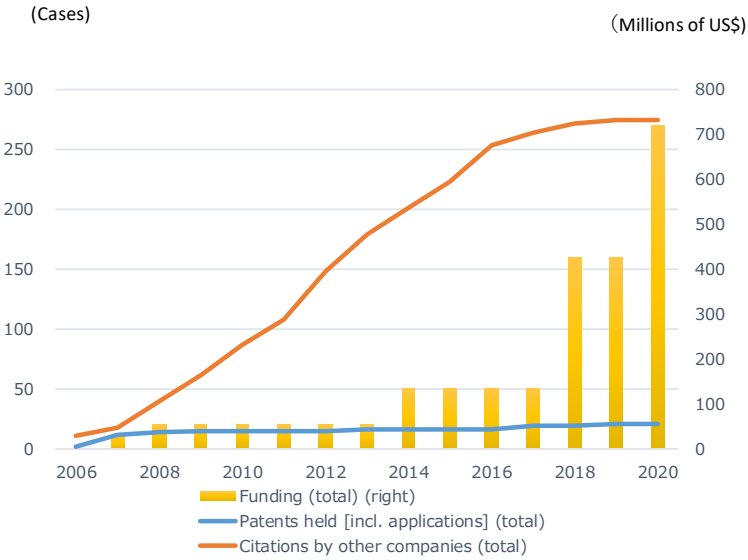
A time-series analysis of patent quality improvement and fund procurement levels focusing on two of these companies that successfully raised a large amount of funding during this period, LumiraDX (UK), which provides next-generation clinical diagnostics technology (approx. US$640 million raised up to September 2020), and Amwell (US), which provides telemedicine services (approx. US$720 million raised up to August 2020, and another US$740 million when listed on the New York Stock Exchange in September 2020), reveals a certain correlation between the increase in the number of citations by other companies, which indicates a rise in patent quality, and the increase in the level of funding for both companies (Figs. 5 & 6).

Fig. 5 Patents held, citation frequency, and funding level (LumiraDX)



Source: Created by MGSSI based on data from PitchBook and Orbit Intelligence

Fig. 6 Patents held, citation frequency, and funding level (Amwell)



Source: Created by MGSSI based on data from PitchBook and Orbit Intelligence

Through an acquisition made in 2016, LumiraDX acquired a patent frequently cited by other companies that had been filed before LumiraDX's foundation in 2014, and since then the amount of funding it has received has risen sharply. Moreover, when looking into the breakdown of patents of other companies that cite patents currently held by LumiraDX, including the one obtained through acquisition, patents held by LumiraDX are cited by many leading companies, among which the number of citations by Apple are particularly prominent. Indeed, Apple has continued to file new patent applications citing LumiraDX patents since 2016, the year in which LumiraDX obtained the investee's patent through its acquisition.

A similar analysis of Amwell reveals that the number of citations of its patents by other companies (including citations from major companies such as Microsoft and IBM) has risen annually, and that the level of funding attracted by the company has also increased thereafter.

The table in Figure 7 compares LumiraDX and Amwell with the top-ranking patent applicants in the digital health sector in terms of the number of patents held and patent quality. The table shows that compared to the top-ranking applicants, including major companies, the two technology venture companies cover a wide range of technology fields with a small patent portfolio, and they outperform the major companies in terms of patent quality in each technology category.

Fig. 7 Patents held in digital health sector and average TI value by technology field (Top-ranking applicants vs 2 technology venture companies, as of October 2020)

Applicant	Patents held (incl. applications)	TI value by technology field			
		Data processing systems or methods	ICT (medical, healthcare)	Electronic digital data processing	Medical diagnostics
Philips	422	3.65	3.44	3.53	4
Canon	382	2.66	2.6	2.94	2.67
Toshiba	376	2.99	2.85	3.16	3.1
Samsung	268	3.4	3.44	3.4	3.76
Fujitsu	253	2.31	1.97	2.4	2.75
IBM	252	3.46	3.46	3.37	3.79
Cerner	232	3.92	3.91	4.08	4.16
Fujifilm	228	3.19	3.11	3.11	3.29
Hitachi	204	2.97	2.62	2.89	3.14
General Electric	198	4.14	4.26	4.08	4.11
Amwell	16	5.59	5.83	5.4	6.33
LumiraDX	1	9.05	9.05	9.05	9.05

Source: Created by MGSSI based on data from Orbit Intelligence

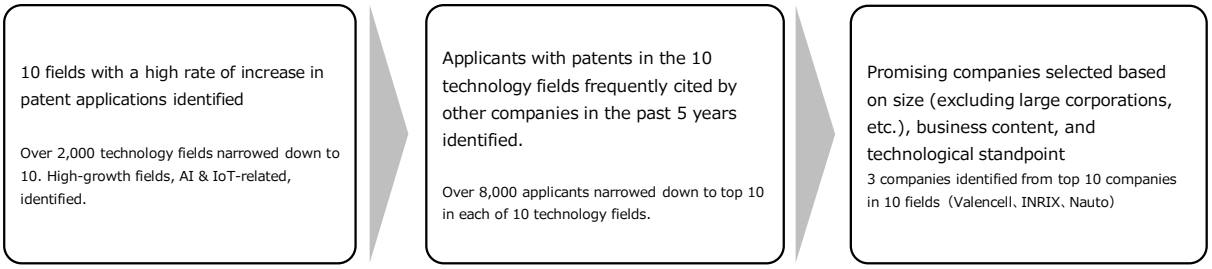
Since the amount and the timing of fund procurement varies for each company depending on the timing of funding needs and other factors, it is not possible to surely identify promising technology ventures by means of such analysis alone. However, in the case of these two venture companies, the trend is for an increase in patent quality to be accompanied by an increase in fund procurement, indicating that patent quality is an important perspective to be considered when evaluating technology venture companies.

SELECTING VENTURES THAT HAVE POTANTIAL TO ENHANCE THEIR CORPORATE VALUE

Selection of promising ventures in growth sectors through patent analysis

Having noted that the number of citations can be an indicator for selecting promising technology venture companies, the process shown in Figure 8 is used to pick out promising candidates. Although this report deals with the digital health sector, it is not limited to that field alone; the same process can be used in any sector in which a certain number of patent applications are filed.

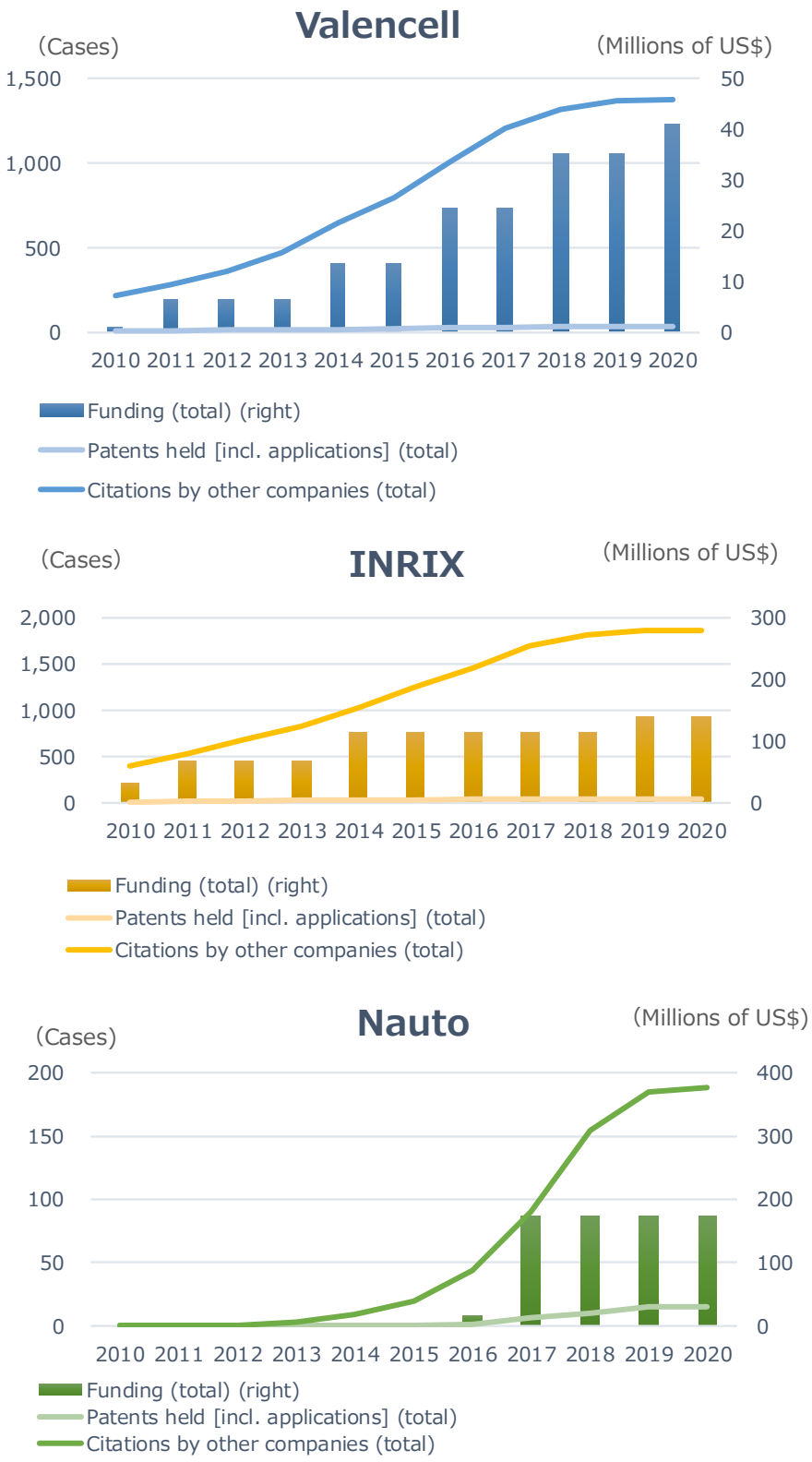
Fig. 8 Process used in this report to select promising ventures



It can be said that many companies are interested in technology fields that are experiencing a pronounced increase in the number of patent applications. Firstly, in order to identify those technology fields, ten fields demonstrating a particularly high rate of increase in patent applications are singled out from a total of over 2,000 areas classified under the IPC system (a standardized system used internationally to classify patents based on the technological content of patent documents). Next, because companies holding high-quality patents in technology fields in which a high rate of increase in patent applications is seen may be considered to attract greater attention in their industry, focusing on the number of citations, which indicates the level of patent quality, ten companies with a particularly high number of

citations in each of the ten technology fields are identified. Since the companies identified up to this point included some large corporations, the list is narrowed down further after reviewing factors such as the size of each company and details of its business. Finally, three companies, Valencell, INRIX, and Nauto, have surfaced (Fig. 9).

Fig. 9 Patents held, citation frequency, and funding level (Valencell、INRIX、Nauto)



Source: Created by MGSSI based on data from PitchBook and Orbit Intelligence

Valencell specializes in biometric sensor technology, INRIX's strength lies in highly accurate traffic information provision and prediction based on a range of information sources, and Nauto provides image analysis of in-vehicle cameras and associated data to insurance companies and other clients. Each of these three companies holds patents with a growing number of citations in other companies' patent applications in recent years, including citations by major companies, and this increase is expected to continue in the future. Compared to LumiraDX and Amwell, however, the funding received by these three companies is still on a small scale, and they are considered to be promising candidates with the likelihood of attracting further funding.

The importance of patent analysis in the selection of candidates for partnership and the formulation of patent strategy

Although patent rights allow a company to monopolize inventions that it has developed in-house, due to the complexities of industrial structures and technology, it is difficult to realize products and services employing the latest digital technology based only on the patents of a single company. As it becomes increasingly important to acquire the patents required for realizing new products and services from other companies through various means, including technology partnerships, purchasing of patents, and M&A, the strategic significance of holding high-quality patents is growing.

It is also important to effectively employ patent analysis when selecting potential technology partners and investees, and to continuously review the patent portfolio and formulate patent strategy in response to the ever-changing market environment and patent status.

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