

YANOLJA RESEARCH INSIGHTS

Global OTAs' Technology Environments and Strategies Examined Through Patents



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Global OTAs' Technology Environments and Strategies Examined Through Patents

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The advancement of technology has brought innovative changes to various industries, and the tourism industry is no exception. One of the notable innovations in the tourism industry is the emergence of Online Travel Agencies (OTAs). OTAs have technologically revolutionized the process of planning and booking travel, enhancing user experiences. They have attracted many users to their platforms by offering real-time price comparisons, a variety of accommodation and flight options, and convenient booking and payment systems. As a result, the distribution of travel products has quickly shifted from offline to online, and the global OTA market continues to expand. According to Statista, i.e., online platform that specializes in data gathering, the global OTA market, which was valued at \$517.8 billion in 2020, is expected to grow to \$983.2 billion by 2027.

Understanding the technological innovations of major OTA companies is crucial for the industry as it can provide important insights. Other companies can use this knowledge to grasp market trends and trends, and to develop new business strategies. Additionally, companies entering the tourism industry can analyze and benchmark the technology strategies of key OTA companies to improve their business models and establish growth drivers. Furthermore, understanding the technology environments of these companies can help in seeking new partnerships and establishing a position within the industry ecosystem.

When trying to understand the technological innovations of OTA companies, analyzing their patents can be a useful approach. Companies register patents to exclusively use technologies, and they also purchase patents from other companies or secure patents through corporate acquisitions when necessary. Therefore, knowing which patents companies have been striving to secure can provide a better understanding of their technological status and strategies.

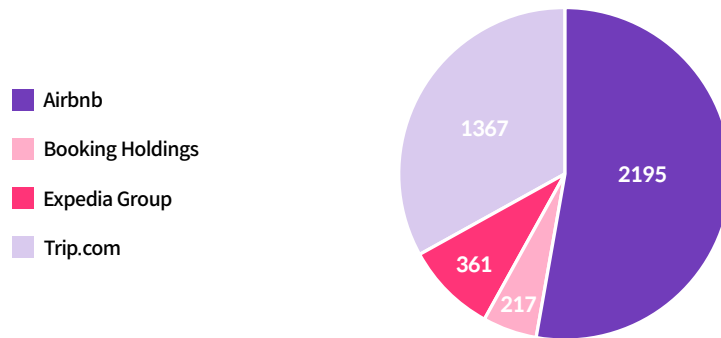
The global OTA market is dominated by a few key companies. Booking Holdings, Expedia Group, Trip.com, and Airbnb are particularly prominent, and according to Statista's 2020 data, these four companies accounted for about 97% of the total global OTA revenue. Analyzing the patents of these companies can be useful in understanding the technological status and strategic direction of the global OTA market.

Traditional patent powerhouse Booking Holdings and emerging leaders Trip.com and Airbnb

From 1996 to 2023, Booking Holdings, Expedia, Trip.com, and Airbnb collectively secured a total of 4,140 patents.¹ These companies have been obtaining patents by developing technologies in-house, acquiring other companies to secure their patents, or transferring patent rights from other companies.

During this period, Airbnb emerged as the company with the most patents, having secured a total of 2,195 patents. Trip.com and Expedia followed, securing 1,367 and 361 patents respectively. Booking Holdings, traditionally a strong patent holder, secured 217 patents.

The number of patents secured by the four major OTAs



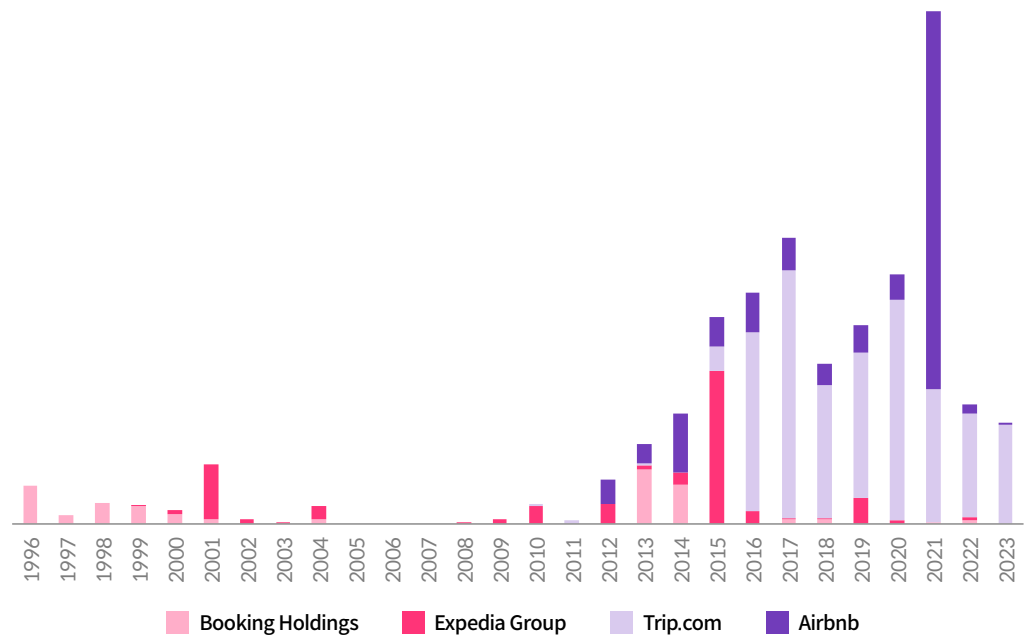
The efforts to secure patents by the four major global OTAs — Booking Holdings, Expedia, Airbnb, and Trip.com — have varied in timing and intensity over the years. Founded in 1996, Booking Holdings was active in patent acquisitions from its inception until the early 2000s, securing a total of 99 patents before 2000. Although its patent acquisition slowed in the early 2000s, the company secured approximately 90 patents through the acquisitions of Kayak and OpenTable in 2013 and 2014, respectively.

Initially passive in securing patents up until 2000, Expedia began intensifying its patent activities in 2001, securing 59 patents that year. From 2001 to 2023, the company has averaged 18 patents per year. Notably, in 2015, Expedia acquired a large number of patents through the acquisitions of Travelocity, HomeAway, and Orbitz.

Airbnb and Trip.com began their patent efforts in the 2010s. Airbnb started aggressively securing patents in 2012, averaging 182 patents per year, particularly in 2021 when it acquired a large number of patents related to social networking services and personalized search results from IBM. Trip.com started its patent activities in 2010, and by 2016, it was securing an average of 167 patents annually.

¹ The analysis utilized patents applied for or previously obtained by Booking Holdings, Expedia Group, Trip.com, Airbnb, and their subsidiaries.

The number of patents secured by the four major OTAs over time



The technological development of major OTAs is diversifying.

In the previous analysis, we confirmed the number of patents secured by four major OTA companies and the different points in time when they acquired these patents. What kind of technologies have they secured? A clue can be found by examining the classification codes of the patents held by these companies.

Patent classification codes are a system used to classify patents based on their technical characteristics or uses. Various patent offices and international organizations have developed a range of classification codes, and recently, the Cooperative Patent Classification (CPC) has been widely used in many countries due to its detailed level of categorization. Each classification code represents a specific technical aspect or application; for example, one of the CPC codes, G06Q50/14, signifies technology specialized in implementing business processes for travel agencies.

Patent examiners assign classification codes based on the nature of technologies related to the inventions contained in a patent. If a patent is developed using one technology, it is assigned one classification code; if it is developed using multiple technologies, it receives multiple classification codes. Recently, as technologies from various fields are increasingly integrated to create new technologies, patents with multiple classification codes are becoming more common.

Therefore, by examining the classification codes recorded in a patent, we can understand how many and what types of technologies are related to that patent. For example, from the figure below, a patent concerning 'Determining a travel route' associated with four classification codes (G01C21/34, G01S19/42, G06Q20/145, G07B15/06) can be interpreted as a patent developed using four different technologies.

Patents related to various technology fields are linked with multiple classification codes

(19) United States	
(12) Patent Application Publication	(10) Pub. No.: US 2015/0330799 A1
Boss et al.	(43) Pub. Date: Nov. 19, 2015
<hr/>	
(12) DETERMINING A TRAVEL ROUTE	(52) CPC..... G01C 21/34 (2013.01); G01S 19/42 (2013.01); G06Q 20/145 (2013.01); G07B 15/06 (2013.01)

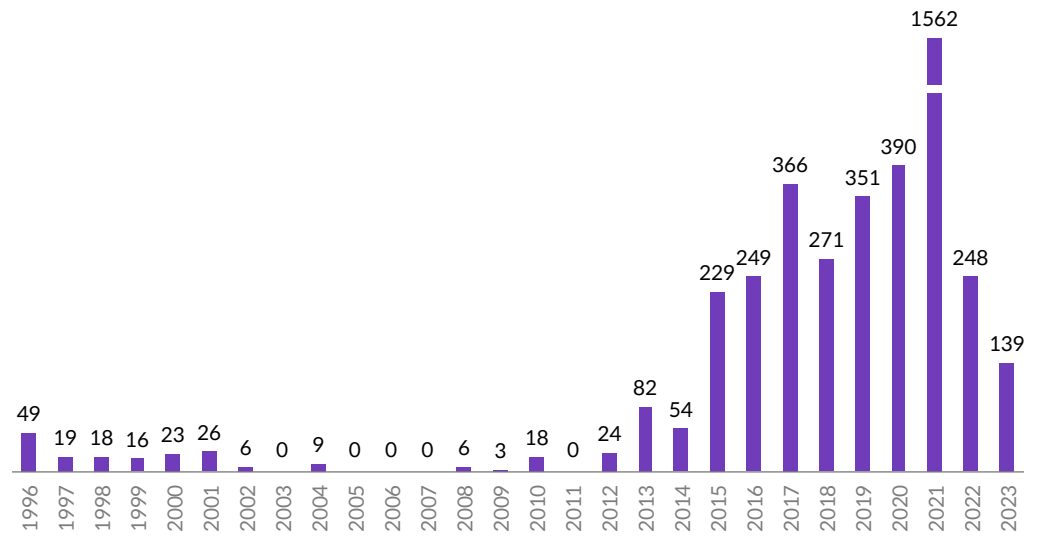
Source: United States Patent and Trademark Office (USPTO)

Thus, by examining the classification codes of the patents a company holds, it is possible to understand the fields of technology that the company is utilizing. For example, if a company has secured many patents related to the classification code G06Q50/14, which signifies 'ICT technologies for implementing business processes of travel agencies', it can be interpreted that the company is focusing on inventing patents that utilize this technology.

Moreover, by investigating the types of classification codes associated with the patents a company holds, one can determine how many technological fields the company is interested in and utilizing. For instance, suppose companies A and B each hold 10 patents. If the patents held by A are related to 20 different classification codes, and those held by B are related to 6, it can be inferred that A has a broader interest and application in various technological fields compared to B.

An examination of the types of classification codes associated with the patents held by companies like Booking Holdings, Expedia, Trip.com, and Airbnb shows that these companies are increasingly interested in and utilizing diverse technological fields. From 1996 to 2014, the number of classification codes related to patents secured by these companies each year did not exceed 100, but starting in 2015, over 200 types began to be identified. This indicates that these companies started securing patents that utilize a variety of technological fields. Particularly in 2021, when Airbnb acquired a large number of patents from IBM, a total of 1,562 classification codes were discovered.

Trends in the types of patent classification codes held by the major OTAs



1996-2007: The OTA industry lays the groundwork with ICT technology

It has been observed that major OTA companies have been increasingly developing and acquiring a diverse range of technologies over time. How have the technologies of interest to these companies changed? An examination of the classification codes associated with the patents they have secured over time can provide insights into this.

Between 1996 and 2007, when the major OTA companies were laying their foundations, their focus was on applying ICT technology to the tourism industry. About 77% of the 73 classification codes related to the patents they secured, which amounts to 56 codes, were related to ICT. The fact that 9 out of the top 10 most frequently applied classification codes were related to ICT also supports that during this period, the major OTA companies focused on developing and securing patents by applying ICT technology to the tourism industry.

Particularly during this period, there was a significant effort to secure patents utilizing ICT technologies that underpin online travel agency operations and implement the business processes of travel agencies. Numerous patents were found utilizing ICT technologies adapted for transactions such as buying, selling, or leasing transactions (G06Q30/06), payment circuits (G06Q20/04), electronic shopping systems (G06Q20/12), solvency checks (G06Q20/403), payment architectures involving a neutral party (G06Q20/02), and payment architectures following credit schemes (G06Q20/24). There were 63 patents related to implementing the business processes of travel agencies using ICT technology.

Classification codes most related to the patents secured by major OTAs between 1996 and 2007

Code	Title	Patent
G06Q10/02	ICT adapted for reservations for tickets, services, or events	145
G06Q30/02	ICT adapted for marketing, price estimation or determination	109
G06Q30/06	ICT adapted for buying, selling, or leasing transactions	95
G06Q20/04	ICT adapted for payment circuits	66
G06Q20/12	ICT adapted for electronic shopping systems	66
G06Q50/14	ICT adapted for implementation of business process of travel agencies	63
G07F9/026	Device for alarm, monitoring, and auditing in vending machines	62
G06Q20/403	ICT adapted for solvency checks	62
G06Q20/02	ICT adapted for payment architectures involving a neutral party	62
G06Q20/24	ICT adapted for payment architectures following credit schemes	62

2008-2014: Growing interest in data processing and wireless communication network technologies

During this period, major OTA companies continued their focus on ICT technologies. Following the previous era, they showed great interest in ICT technologies for booking tickets, services, and events, as well as implementing business processes for travel agencies. Additionally, there was a significant increase in efforts to secure patents utilizing ICT for implementing business processes of hotels or restaurants (G06Q50/12) and for item investigation in electronic shopping (G06Q30/0623).

A notable aspect of this period was that major OTA companies began to actively use technologies for processing digital data and wireless communication network technologies. This coincided with the spread of mobile technologies and the widespread use of smartphones and tablet PCs, prompting major OTAs to develop or secure patents that allowed customers to use these devices for their services.

Specifically, regarding data processing technology, numerous patents were secured to satisfy user needs. Particularly, these companies secured patents for technology that customizes search results based on user profile information (G06F16/9535) and technology that displays results for user queries (G06F16/248), with 54 and 37 patents respectively. In terms of wireless communication network service technology, many patents were secured that utilize technologies based on user or device location information. Additionally, patents that utilize network layout technologies for network services connecting multiple devices were filed.

Classification codes most related to the patents secured by major OTAs between 2008 and 2014

Code	Title	Patent
G06Q10/02	ICT adapted for reservations for tickets, services, or events	128
G06Q50/14	ICT adapted for implementation of business process of travel agencies	75
G06F16/9535	Electric digital data processing for search customization based on user profiles and personalization	54
G06Q50/12	ICT adapted for implementation of business process of hotels or restaurants	37
G06F16/248	Electric digital data processing for presenting query results during information retrieval	37
G06Q50/10	ICT adapted for implementation of business process of services	36
G06Q30/0623	ICT adapted for item investigation in electronic shipping	31
H04L67/10	Network arrangements or protocols in which an application is distributed across nodes	30
H04W4/021	Services related to places of interest and adapted for wireless communication networks	30
H04W4/02	Services making use of location information and adapted for wireless communication networks	28

2015-2023: Rising interest in social network services and machine learning

The year 2015 marked a significant shift in the technologies of interest for major OTA companies. While they continued to innovate in areas such as ICT technologies for ticketing, service and event reservations, and implementing business processes for travel agencies, hotels, or restaurants—a continuation from previous years—new areas of focus emerged.

Firstly, there was an increased interest in technologies for implementing social network services. During this period, these companies secured 222 patents involving ICT technologies (G06Q50/01) for the implementation of social network services, and 177 patents for telecommunications technologies (H04L51/52) used for messaging between users within social networks.

Additionally, similar to other industries, there was a rapid rise in interest in artificial intelligence. These companies secured 121 patents involving machine learning (G06N20/00). They also developed advanced models by combining artificial neural networks, securing 103 patents for technologies that create sophisticated models (G06N3/045), and 101 patents for methods that use data to train AI models (G06N3/08), specifically applied within the tourism industry.

Classification codes most related to the patents secured by major OTAs between 2015 and 2023

Code	Title	Patent
G06Q10/02	ICT adapted for reservations for tickets, services, or events	288
G06Q50/01	ICT adapted for implementation of business process of social networking	222
G06F16/9535	Electric digital data processing for search customization based on user profiles and personalization	197
H04L51/52	Transmission of digital information for user-to-user messaging for supporting social networking services	177
G06Q50/14	ICT adapted for implementation of business process of travel agencies	173
G06F16/24578	Electric digital data processing for information retrieval based on user ranking	142
G06N20/00	Machine learning	121
G06N3/045	Combination of neural networks	103
G06N3/08	Methods for training neural networks	101
G06Q50/12	ICT adapted for implementation of business process of hotels or restaurants	100

More active technology development and patent acquisition are needed.

The influence of platform companies, including OTAs (Online Travel Agencies), is growing stronger. As of April 2024, six of the top ten global companies by market capitalization were platform companies, and all eleven companies selected by the global investment bank Evercore in March 2024 as ‘Electric 11’²—predicted to perform exceptionally well—are also platform companies. The inclusion of companies like Booking Holdings and Airbnb in the Electric 11 is seen as a positive sign for the tourism industry, indicating ongoing growth in the global OTA market. However, despite this growth and dominance, the OTA industry must recognize the importance of technological advancements and patent ownership.

The table below shows the market capitalization of the top ten companies, among which the platform companies have also been securing a significant number of patents. It’s evident that major platform companies have not only large market capitalizations but also a vast number of patents compared to major OTA companies. This disparity in scale and technological capability could pose a threat to OTA businesses.

² In March 2024, Mark Mahaney, a prominent Wall Street analyst, related a list of companies entitled ‘Electric 11’ which includes Alphabet, Amazon, Meta, Netflix, Spotify, Doordash, Airbnb, Booking Holdings, Uber, Shopify, and The Trade Desk.

Market capitalization and the number of patents of major platform companies

Company	Market capitalization	Number of patents
Microsoft	\$3.003T	204,336
Apple	\$2.579T	132,304
NVIDIA	\$2.116T	16,489
Alphabet	\$1.947T	124,596
Amazon	\$1.864T	33,644
Meta	\$1.279T	28,835

A significant threat to traditional OTA companies is the potential for large platform companies to leverage their extensive user base and substantial financial resources to launch or expand tourism-related services, thereby capturing market share from existing OTAs. For example, Google, a subsidiary of Alphabet, offers a meta-search platform providing booking and pricing information for flights, hotels, and shared accommodations. Since its launch, it has rapidly grown and increased its market share. These companies use their parent company's user base, funding, and platform ecosystem to provide convenience and extensive information to tourists, thereby exerting considerable influence on the OTA market.

Moreover, major platform companies currently exert substantial influence with their rich data analytics infrastructure and unparalleled artificial intelligence capabilities, bringing innovation to various sectors including manufacturing, gaming, and healthcare. If these companies apply their technological prowess to develop services or business models related to travel and tourism, they could potentially dominate the tourism industry and decrease the market share of OTA companies. Just as OpenAI revolutionized the perception of AI's role and potential with ChatGPT, highlighting tourism as an application area for GPT during last year's DevDay, companies with AI capabilities could easily enter the tourism industry, likely transforming existing industry paradigms. If they develop services not currently offered by traditional OTAs and protect these innovations with patents, OTA companies may find themselves watching their influence wane.

OTAs have historically led innovations in the tourism industry based on technological capabilities. Starting with the development of ICT technologies, they have progressively enhanced their technological prowess using wireless communication networks and digital data processing technologies, and more recently, leveraging artificial intelligence technologies like machine learning to further innovate the tourism industry. However, OTA companies now need to focus more aggressively on technology development and securing patents to survive the competition with large platform companies. This approach is not just about securing a

short-term competitive advantage but about preempting core technologies that will shape the future of the tourism industry, thus protecting the opportunities these technologies create. For domestic OTA companies, adopting this strategy while expanding into global markets could help them establish and strengthen a dominant market position internationally through continuous technological development.

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