Information Retrieval Challenges: Inventors vs Patent Facilitators

Ms. P. Gowri Prasad[1]; Dr. Vrushali Rane[2]

Librarian, Shah & Anchor Kutchhi Engineering College, Mumbai,Research Scholar, SNDT Women's University, Mumbai[1]; Deputy Librarian BMK Knowledge Resource Centre, SNDT Women's University Mumbai, Maharashtra,India[2]

ABSTRACT

Patent information is of utmost importance for inventors, researchers and patent facilitators. Rising volume, complexity and techno legal language of patents bring barriers in the retrieval of patents. This study examines the challenges faced by two key user groups of inventors and patent facilitators while accessing free and paid patent databases. It was found that needs of patent users are not aligned with the capabilities of current patent information retrieval systems. The paper conceptualizes an ideal Patent Information Retrieval system which combines better search functions, artificial intelligence, multilingual support and enhanced user experience.

KEYWORDS: Patents, Patent Information retrieval, user study, Inventor, Researcher, Patent facilitators, Patent attorney, Patent agents.

1. INTRODUCTION

The Innovation landscape operates within an increasingly complex information ecosystem where patents serve many functions – as legal instruments defining intellectual property boundaries, technical disclosures documenting inventive solutions and strategic intelligence revealing competitive landscapes. For researchers engaged in early-stage investigation, patents offer insights into prevailing solutions and possible research directions, whereas inventors who are developing new technologies rely on patent information to avoid infringement and check novelty.

In today's exponentially expanding technical knowledge, navigating patent data becomes challenging. Patent data provides information about technologies which are existing, market trends and legal rights.

The use of patent data starts right from the idea stage till the enforcement of rights. Patent data is basic to the R&D strategy. Patent data is also important for due diligence before mergers and acquisitions.

Patent is an exclusive right which prevents others from making, using and selling an invention for a period of 20 years. Patent data differs from non-patent literature (NPL) as NPLs focus on theories and experiments. But patent literature describes processes and equipment used. Industrial applicability is a patentability criterion.

Patent user's perspectives are crucial within the innovation ecosystem as they are the primary consumers of patent information. Their input can help in designing effective search strategies and enhance the retrieval experience. Stakeholders of patent information like scientists, researchers and academicians need patent related information to keep abreast about technological advancements and drive innovation. The growth of patent documentation has necessitated the need for an accurate and comprehensive database which can cover both local and global patents. (Bican et al., 2023) (Ali et al., 2025)

1.1 Significance of Patent Information from the lens of the stakeholders (Wei et al,2025)

Quality of Information- Inventors use patent data to avoid duplication of research and checking novelty. Information given in patents such as claims, drawings and technical descriptions can give insights into the prior inventions. This can help the researchers to identify the areas where there is potential for further research and also white spaces, areas where no research has been done. This aids in avoiding duplication of research. Prior art searches can also help in mitigating the risk of rejection of patent application. They can help in reducing the risk of infringement if valid claims are made.

Inventors need latest and comprehensive patent data which can aid them in their innovative endeavors. They need a broad spectrum of information including applicant information, legal status etc.

On the other hand, Patent facilitators depend on patent databases to conduct prior art search, Freedom to Operate (FTO) search and validity searches. They also analyse patent data to decide on patent filing routes. In addition, they give advice about licensing and commercialization of patents.

Quality of Systems- The Patent Information system should be robust and enable task completion smoothly.
Navigation of Platform- The platform should be user friendly and satisfy the requirements of the inventor in patent analysis

2. CHALLENGES ENCOUNTERED FROM THE LENS OF THE PATENT USERS

Massive Patent Data- Patent data is extensive. Patents are also inherently complex due to the use of legal language and technical specifications, resulting in documents that are not only dense but also laden with specialized terminology. This complexity poses significant challenges, even for seasoned patent examiners, when it comes to identifying pertinent prior art. Conventional search methods, particularly those reliant on keyword-based queries, frequently fall short of capturing the full spectrum of relevant patents. Such searches often overlook contextually similar inventions that may employ alternative phrasing or terminology, leading to gaps in the search results. This limitation underscores the necessity for more sophisticated search strategies that can navigate the nuanced landscape of patent literature more effectively (Ali et al., 2025).

Inventors frequently transition among various databases, engaging in the strategic selection of platforms that best suit their research and development needs. They might opt for utilizing complimentary databases, which are often favoured for their ability to provide precise and reliable information, while simultaneously exploring subscription-based databases that offer an extensive range of data, encompassing different countries and equipping them with advanced analytical tools for in-depth analysis. An inventor's search for patent information is encouraged by a

practical demand for an exhaustive data which is accurate and specific. This necessitates a need for functional systems. (Wei et al,2025)

Patent Interpretation - Interpreting patent document becomes difficult as they are in a techno legal language. Patent systems may be in a particular language and may often omit patents in other languages. This can pose as a limitation as patents can be in multiple languages. (Widodo & Stiawan, 2025)

Search methodologies - Boolean search methodologies, which conceptualize documents as assemblages of words and queries exhibit limitations due to their exclusive reliance on rigid term congruence, failing to consider synonyms or contextual subtleties, which may result in significant informational omissions. Keyword-centric searches necessitate the input of precise terminologies; however, they encounter the difficulty of ascertaining the optimal quantity of keywords to prevent excessively broad or narrowly focused outcomes. These factors can adversely impact accuracy and introduce bias. (Ali et al., 2025)

Semantic Similarity issues- Finding a semantic similarity between patent documents is challenging if it is based on classification. Involvement of a skilled person is needed. Patents which have same classification codes might be dealing with different technical approach. Hence depending solely on classification can provide similarity at a shallow level instead of technological connection between patents. (Lee & Bai, 2025)

3 DATA COLLECTION AND ANALYSIS

Primary data was collected through a structured questionnaire designed to obtain responses from two categories of participants:

b. Patent facilitators and professionals affiliated with patent offices, legal firms, and innovation centers.

a. Inventors listed as applicants in the Indian Patent Office (inPASS) database within the IPC codes related to wireless communications.

Given the specialized nature of the study population, a purposive sampling technique was employed. This method allows the deliberate selection of respondents who possess relevant experience, knowledge, and engagement in patenting activities in the field of wireless communications.

The sample was composed of:

- Patent Facilitators: Total 40 respondents (50%) professionals engaged in patent drafting, filing, and information retrieval activities.
- Inventors: Total 40 respondents (50%) primarily individuals with one or more granted patents in wireless communications.

Table 1. Frequency of challenges faced by inventors and patent facilitators while using free database.

Challenges	Group	Most of the time	Sometimes	Rarely	Never
No option to search by claims	Inventor	0 (0.0%)	33 (82.5%)	4 (10.0%)	3 (7.5%)
	Facilitator	22 (55.0%)	18 (45.0%)	0 (0.0%)	0 (0.0%)
Too many captchas while searching	Inventor	22 (55.0%)	14 (35.0%)	3 (7.5%)	1 (2.5%)
	Facilitator	17 (42.5%)	14 (35.0%)	9 (22.5%)	0 (0.0%)
Search results are not downloadable	Inventor	15 (37.5%)	13 (32.5%)	8 (20.0%)	4 (10.0%)
	Facilitator	19 (47.5%)	16 (40.0%)	5 (12.5%)	0 (0.0%)
Does not support Boolean search	Inventor	19 (47.5%)	10 (25.0%)	7 (17.5%)	4 (10.0%)
	Facilitator	11 (27.5%)	24 (60.0%)	5 (12.5%)	0 (0.0%)
Difficult to analyse data	Inventor	17 (42.5%)	10 (25.0%)	9 (22.5%)	4 (10.0%)
	Facilitator	13 (32.5%)	27 (67.5%)	0 (0.0%)	0 (0.0%)
No graphical representation of data	Inventor	13 (32.5%)	21 (52.5%)	5 (12.5%)	1 (2.5%)
	Facilitator	15 (37.5%)	18 (45.0%)	7 (17.5%)	0 (0.0%)
Database is not up to date	Inventor	13 (32.5%)	20 (50.0%)	7 (17.5%)	0 (0.0%)
	Facilitator	9 (22.5%)	10 (25.0%)	12 (30.0%)	9 (22.5%)
Does not support truncation	Inventor	11 (27.5%)	18 (45.0%)	8 (20.0%)	3 (7.5%)
	Facilitator	12 (30.0%)	10 (25.0%)	14 (35.0%)	4 (10.0%)
Lot of irrelevant search results	Inventor	12 (30.0%)	10 (25.0%)	8 (20.0%)	10 (25.0%)
	Facilitator	8 (20.0%)	13 (32.5%)	4 (10.0%)	15 (37.5%)

Following key findings emerge regarding the frequency of challenges faced by inventors and Facilitators in using free patent databases. Table 1 reveals that both groups encounter several operational and functional difficulties while searching, retrieving, and analysing patent information. This suggests that usability and database performance remain critical bottlenecks in efficient patent exploration (Sherriff & Rogers, 2023). It was found that "No option to search by claims" was reported *most of the time* by 55.0% of Facilitators, while inventors primarily faced this issue only *sometimes* (82.5%). This is an important finding in the understanding of the differential experience of database users, where Facilitators—often engaged in documentation or validation—require claim-level search more frequently than inventors. The present study confirmed the findings about structural limitations in free patent databases in prior literature (List, 2008; Walter, 2022).
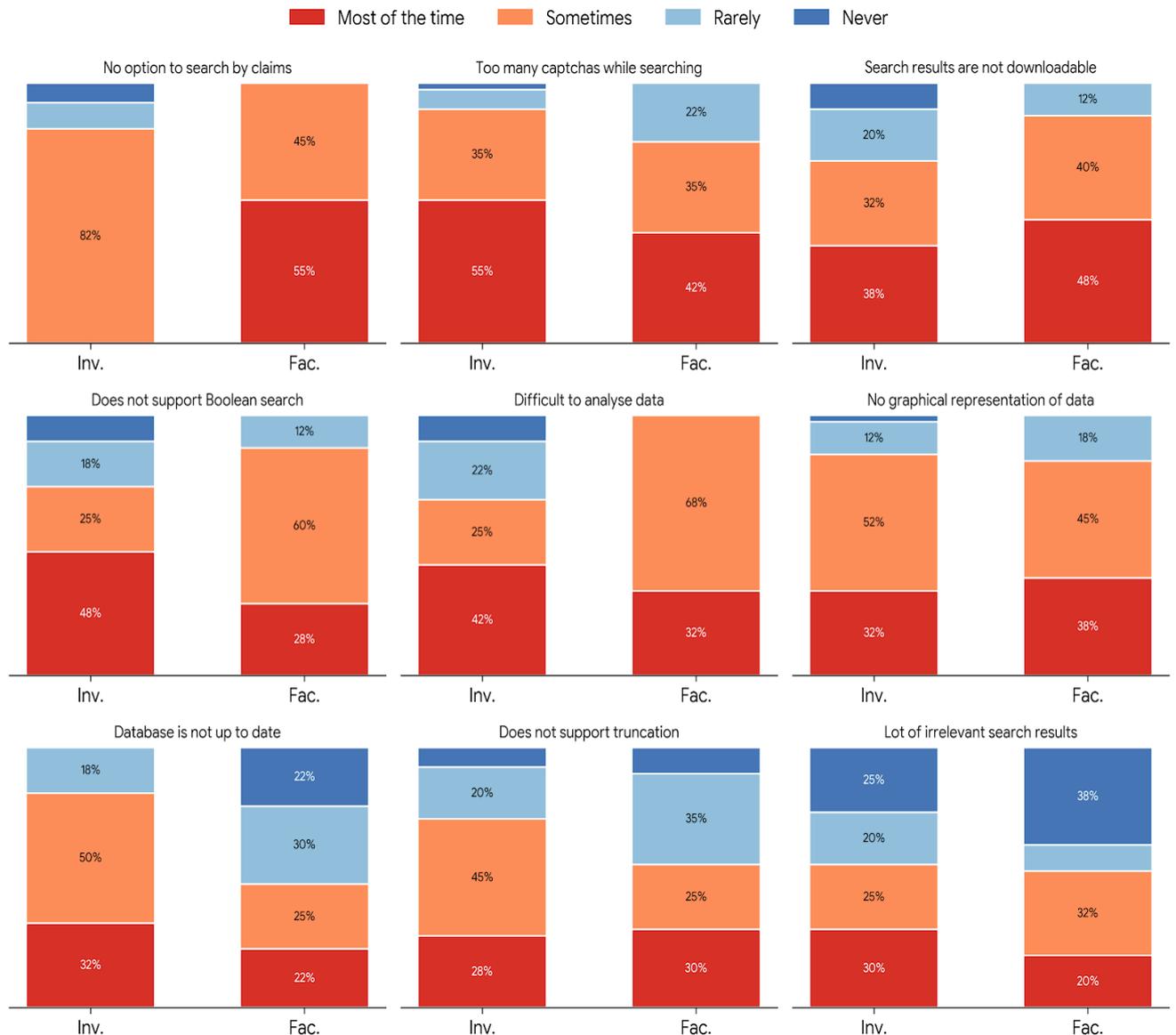
Figure 1. Challenges faced by inventors and patent facilitators while using free database.

Another promising finding was that "Too many captchas while searching" posed a notable challenge, affecting 55.0% of inventors and 42.5% of Facilitators most of the time. Our results demonstrated that repetitive authentication significantly disrupts search continuity and analytical workflow. This result highlights that little is known about the user fatigue caused by CAPTCHA frequency in open-access databases, particularly among professional users Findings on "Search results are not downloadable" at least hint that data-extraction constraints impede secondary analysis and citation documentation. Nearly half of both groups (47.5% of Facilitators and 37.5% of inventors) reported this issue occurring most of the time. Together, the present findings confirm that data-retrieval inefficiency limits the practical usability of such databases for research or innovation tracking (Walter, 2022). A further novel finding is that "Difficult to analyse data" was experienced more frequently by Facilitators (67.5% sometimes) than by inventors (42.5% most of the time). This result now provides evidence to infer that Facilitators often require structured analytical and visualization tools, which remain absent in most free databases. Moreover, the lack of "graphical representation of data" (reported by over 80% of users either most of the time or sometimes) reinforces the need for data-visualization integration in free-access platforms (Sherriff & Rogers, 2023).

The results demonstrate two things. First, "Database is not up to date" continues to be a major constraint, with 82.5% of Facilitators and 47.5% of inventors facing this either most of the time or sometimes. Second, "Does not support truncation" and "Lot of irrelevant search results" remain persistent issues, indicating weak search algorithms and indexing accuracy. The results of the analysis found clear support for the conclusion that data-retrieval precision and freshness are key quality determinants in database usability (Tolstaya, 2017). Planned comparisons revealed that inventors reported fewer delays and faster retrieval speeds than Facilitators, as seen under "Slow retrieval", where 45.0% of Facilitators experienced it rarely, compared to 40.0% of inventors reporting never. This casts new light on variations in perceived system performance depending on user expectations and query complexity. This yields increasingly good results on data coverage but highlights sporadic usage due to functionality issues. From these results, it is clear that continuous improvement in user interface, download options, and search flexibility would enhance database reliability and usage frequency (Bhangale, 2015). Overall, our method of comparative analysis between inventors and Facilitators obtained robust results. The results are substantially better than prior anecdotal findings because they provide quantified insights into usage frequency and problem types. The applicability of these new results can be further tested on other open-access patent databases to validate generalizability. The implications of these findings are discussed in the context of patent information management, innovation facilitation, and digital resource optimisation (List, 2008). This analysis found evidence for a pressing need to develop user-centric, AI-integrated, and regularly updated patent search platforms that address the limitations revealed in this study. The implications of these findings are discussed in the context of patent information management, innovation facilitation, and digital resource optimisation

Table 2. Frequency of challenges faced to inventor and patent facilitators while using paid database.

Challenges	Group	Most of the time	Sometimes	Rarely	Never
High subscription cost	Inventor	33 (82.5%)	7 (17.5%)	0 (0.0%)	0 (0.0%)
	Facilitator	39 (97.5%)	1 (2.5%)	0 (0.0%)	0 (0.0%)
Do not have access	Inventor	30 (75.0%)	10 (25.0%)	0 (0.0%)	0 (0.0%)
	Facilitator	30 (75.0%)	10 (25.0%)	0 (0.0%)	0 (0.0%)
Limited number of simultaneous users	Inventor	26 (65.0%)	7 (17.5%)	2 (5.0%)	5 (12.5%)
	Facilitator	25 (62.5%)	12 (30.0%)	2 (5.0%)	1 (2.5%)
Lack of proper training and support	Inventor	15 (37.5%)	11 (27.5%)	10 (25.0%)	4 (10.0%)
	Facilitator	15 (37.5%)	14 (35.0%)	11 (27.5%)	0 (0.0%)
Complicated user interface	Inventor	12 (30.0%)	7 (17.5%)	17 (42.5%)	4 (10.0%)
	Facilitator	12 (30.0%)	7 (17.5%)	21 (52.5%)	0 (0.0%)
Not useful for regional patents or language issues.	Inventor	4 (10.0%)	16 (40.0%)	20 (50.0%)	0 (0.0%)

Challenges	Group	Most of the time	Sometimes	Rarely	Never
	Facilitator	0 (0.0%)	20 (50.0%)	20 (50.0%)	0 (0.0%)
Slow response time	Inventor	6 (15.0%)	3 (7.5%)	18 (45.0%)	13 (32.5%)
	Facilitator	6 (15.0%)	3 (7.5%)	14 (35.0%)	17 (42.5%)
Limitations in search (keyword, filters not available)	Inventor	0 (0.0%)	12 (30.0%)	17 (42.5%)	11 (27.5%)
	Facilitator	0 (0.0%)	18 (45.0%)	17 (42.5%)	5 (12.5%)
Difficulty in accessing full text documents	Inventor	0 (0.0%)	7 (17.5%)	22 (55.0%)	11 (27.5%)
	Facilitator	0 (0.0%)	13 (32.5%)	22 (55.0%)	5 (12.5%)

From the short review above, key findings emerge regarding the frequency of challenges faced by inventors and Facilitators in using paid patent databases. Table 2 indicates that both groups experience substantial access and usability barriers. This suggests that subscription cost, user access limitations and interface issues present major obstacles to effective database usage (Ouyang, 2022; Sherriff & Rogers, 2023). Further it is showed that "High subscription cost" was reported most of the time by 97.5% of Facilitators and 82.5% of inventors. This is an important finding in the understanding of the economic constraints faced by users and confirms that cost remains the dominant barrier to adoption in premium patent-services (Ouyang, 2022). The present study confirmed the findings about access cost as a major impediment in commercial patent information services (IPWatchdog, 2016). Another promising finding was that "Do not have access" was tied for both groups with 75.0% reporting most of the time. Our results demonstrated that lack of access—despite subscription availability—reflects institutional or individual constraints in deployment. This result highlights that little is known about how access rights limitations (user licenses, simultaneous users) impact usage of paid databases. It is further revealed that "Limited number of simultaneous users" revealed that 65.0% of inventors and 62.5% of Facilitators reported this issue most of the time. Together, the present findings confirm that licensing models limiting concurrent access degrade usability and may force users to shift to less effective alternatives (Sherriff & Rogers, 2023).
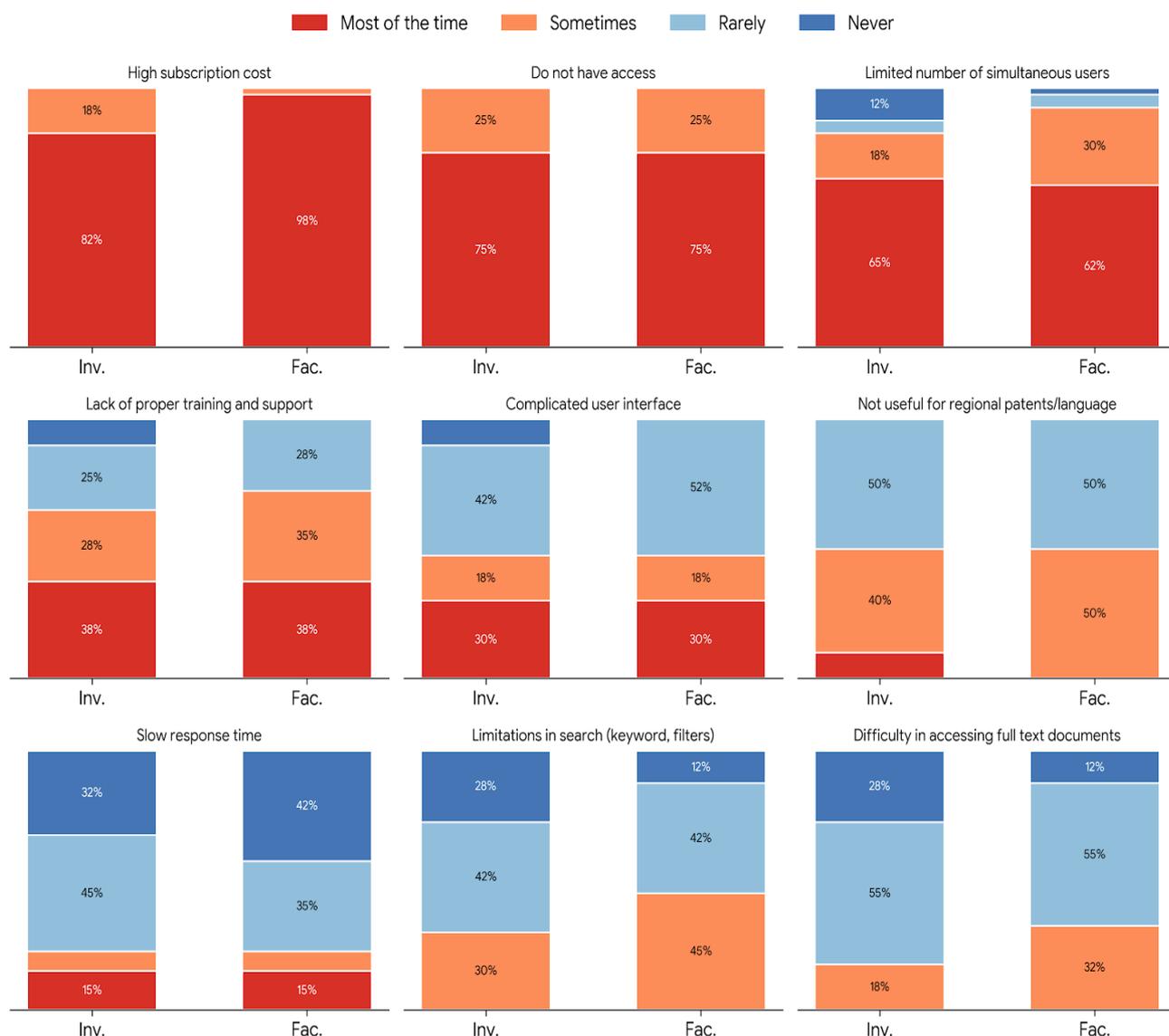
Figure 2. Challenges faced by inventors and patent facilitators while using paid database.

A further novel finding is that "Lack of proper training and support" was experienced by 37.5% of both groups most of the time (and a further ~30% sometimes). The result now provides evidence to infer that beyond cost and access, the human-support dimension is under-addressed in paid services. Moreover, the challenge of "Complicated user interface" (30.0% reported most of the time) reinforces the need for more user-friendly design in commercial patent databases. The results demonstrate two things. First, "Not useful for regional patents or language issues" scored 50.0% (inventors) and 50.0% (Facilitators) in the rarely category, showing that while less acute, regional-language limitations persist. Only 15% of both inventors and facilitators report slow response time "most of the time" while 77.5-80% place it in the "rarely" or "never" categories, so system performance is generally acceptable with random lags. No respondents in either group report search limitations "most of the time". On the other hand, 45% facilitators and 30% inventors mentioned it "sometimes" or "rarely" indicating that advanced or complex searches highlight the system limitations. Comparative analysis further revealed that inventors recorded more frequent issues in "Limitations in search" (42.5% sometimes; 27.5% rarely) compared to Facilitators (45.0% sometimes; 12.5% never). This casts new light on the fact that search-filter capabilities may be more valued by role-groups depending

on their tasks. In terms of difficulty in accessing full text, a majority of both the groups reported "rarely" with facilitators showing a higher proportion in "sometimes". This suggest that gaps in coverage, licensing or issues with the user interface occur in certain cases rather than consistently.

The results of the analysis found clear support for the conclusion that subscription alone does not guarantee comprehensive search functionality, download capability or performance (Ali, Tufail, De Silva & Abas, 2024; Blind et.al, 2023).

Table 2 data suggests that high subscription cost and lack of access are the most common and severe challenges. This affects most of the inventors and facilitators frequently. Issues like limited simultaneous users, lack of proper training, and complicated user interface occur mainly at the "sometimes" or "rarely" levels. This shows moderate usability challenges. Issues concerning regional patent coverage and language barriers are less frequent indicating that these are not perceived as a primary obstacle for most users. Parameters like slow response time, limitations in search, and difficulty in accessing full text seem to be sporadic than persistent. This indicates that system performance and functionality are adequate but not completely perfect. Based on the data, continuous improvement of licensing models, multilingual support, user interface design, training and direct access to full-text content would enhance database reliability and usage frequency across professional user categories. This yields increasingly good results on data usability when combined with support and training rather than relying solely on premium subscription.

These findings suggest that economic and access-related constraints dominate, while technical and usability issues are intermittent, workflow-disrupting challenges rather than long standing concerns in paid patent databases.

Overall, our comparative analysis between inventors and Facilitators obtained robust results. The results are substantially better than prior discussions because they provide quantified insights into usage frequency and problem types in paid systems (IPWatchdog, 2016). The applicability of these new results can be further tested on other paid patent-database platforms to validate generalizability. The implications of these findings are discussed in the context of patent information management, licensing strategies, institutional investment in patent analytics tools, and innovation support systems. This analysis found evidence for a pressing need to develop user-centric subscription models, role-based access training, and functional transparency in paid patent database services.

4. IDEAL PATENT INFORMATION RETRIEVAL SYSTEM

This paper proposes an ideal Patent Information Retrieval System which combines Enhanced search capabilities, integrating Artificial Intelligence and a user-friendly interface. Target users would be inventors, researchers, patent facilitators, lawyers and businesses.

- **Enhanced Search Capabilities**- This should consist of bibliographic data, text, various patent classifications and legal status of patents. Natural language processing should be used for understanding intuitive queries. Patent offices worldwide should be covered with constant synchronization.
- **Integrating Artificial Intelligence**- Search results should be ranked based on query intent. Patents should be classified according to various patent classification schemes using AI. Analyzing the trend and predicting the future growth. Patents should be mapped with prior arts.

- **Usability**- User interface should be progressive from Basic to Advanced Search options. It should support operations on different devices like desktops, laptops, tablets and mobile. There should be a provision for analyzing the results visually.

CONCLUSION

The study explores the practical difficulties that inventors and patent facilitators encounter while using free and paid patent platforms. Comparative analysis of these two-user group shows that although patent systems are central to innovative landscapes, their current design does not address user's requirements. Free databases are hampered by issues such as incomplete or obsolete records, limited search sophistication, minimal data processing and analytics. On the other hand, commercial tools offer better coverage and advanced functionalities. However, they have high subscription costs. These findings argue for a future ready patent information environment which integrates powerful search algorithms, artificial intelligence, refined indexing, multilingual support and intuitive interactive design that would bridge the existing gaps. This research provides suggestions for database providers to design a solution which would strengthen the information access and retrieval experience of the Patent stakeholders.

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