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The Impact of Intellectual Property Law on Startups and SMEs: A Systematic Review

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Abstract

Intellectual property (IP) law is one of the main instruments promoting innovation and the competitive advantages with which startups and small and medium enterprises (SMEs) can solidify their market standing. This study aims to analyze how IP protection stimulates innovation, secures investments, and boosts market competitiveness using patents, trademarks, copyrights, and trade secrets. This research used the Preferred Reporting Items for Systematic Reviews and Meta - Analysis (PRISMA) to conduct a systematic literature review, ensuring transparency, accountability, and a systematic methodology in selecting and analyzing relevant articles. The findings indicate that whereas strong protection under the IP regime motivates the innovation process through research and development (R&D), it produces heavy entry costs and legal consequences, whose burdens are keenly felt by those firms that have limited resources. Also, jurisdiction inconsistencies and deficient enforcement mechanisms worsen the infringement risk picture, limiting start-ups' ability to protect their intellectual assets. New trends such as open innovation, collaboratively licensed models, and blockchain-based IPR setups are also elaborated on in the study. These would necessarily challenge the very fundamental patent-based regimes and require new modes for regulation. The study states the necessity for change into a more inclusive and flexible system of IP protection balanced between restricted and open access in such a way that startups and SMEs can certainly and favorably make use of intellectual property as a strategic asset for sustainable economic growth.

Keywords: *Intellectual Property Law, Startups, SMEs, Innovation, Market Competitiveness, Enforcement Challenges*.

Introduction

In this contemporary knowledge-based economy, the role of IP Law is much influential in determining the competitiveness of startups and SMEs. The establishment of IP protection through patents, trademarks, copyrights, and trade secrets gives a company the ability to exploit its own inventions, trade representatives, and creative works while enjoying a competitive advantage in an increasingly fast-moving market (Stehr et al., 2020). A start-up or SME that depends on technological advancements, innovative business models, and digital transformation to earn its presence now must, therefore, have a well-stipulated strategy on how IP is going to be used as much on competition against others as it is going to be an asset to attract investors, business partners, a nd even market reach. However, traversing the whole gamut of registering and enforcing, not to mention litigating, IP rights can be troublesome for small firms, particularly the financially poor and those bereft of pronged legal and administrative capacities (Guckenbiehl

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& Zubielqui, 2022).

The impact of IP law in the startups and SMEs has become important issues of debates between academics, policy servers, and industry players. This discussion has become all the more germane with innovation taking a prominent position in economic growth. Strong IP protection promotes innovation through incentive offers, ensuring exclusivity, and preventing misuse. But at the same time, these factors raise considerable entry costs and legal hurdles-independent for a small business startup. High costs associated with patent applications, trademark registrations, or simple litigation over IP discourage the full utilization of intellectual assets within startups and SMEs (Baran & Zhumabaeva, 2018). Lengthy and complex registration processes, combined with regional and international differences in IP laws, have proven to be another major hurdle for emerging businesses wishing to protect their ideas across multiple jurisdictions (Pokrovskaia et al., 2021).

The budding business culture of disruptive innovation and the influx of globalization in a digital economy are, at present, bringing about open innovation models, which are seen to challenge and vanquish some traditional models of intellectual property (IP) protection. Digital platforms and the effects of artificial intelligence (AI) or blockchain-enterprises' advent, as well as

the Internet of Things (IoT), practically brought architecture that once seemed impossible with conventional IP form. Such technological innovations are redefining ownership, access, and control over intellectual property, meaning that traditional enforcement mechanisms can no longer be effective. In practice, issues like online infringement and digital piracy, counterfeiting, and cross-border IP violations have become quite worrying as they threaten the levels of effectiveness of the enforcement mechanisms available towards IP. Organizations such as start-ups or small and medium-sized enterprises (SMEs) that deal in high technology, e-commerce, or even creative industries are the most severely affected by the damage caused to their intellectual assets throu gh unauthorized reproduction, imitation, or exploitation. This would affect their competitive position on the market and would limit the potential long-term growth and sustainability of these organizations (Mary & Enoch, 2024).

At the same time, these new business models like the platform economy, gig economy, and open-source collaborations warrant an entirely new approach to IP governance, quite unlike those of the older frameworks. Some firms are still able to extract value from a patent-centric IP strategy, while others, through collaborative innovation, engage in open licensing and data-oriented business models that directly contest conventional IP architecture (Bereznoy et al., 2021). This paradigm shift raises critical legal questions around the significance and breadth, as well as receptiveness, of the existing IP laws in addressing the bona fide needs of startups and SMEs. Adding to that challenge is the highly limited awareness among small business owners about IP rights and their legal ramifications. Many do not know that with proper IP protection, they could have secured their innovations and thereby limited risks of infringement and enhanced their competitiveness in the marketplace (Cavallo et al., 2022). Such legal ignorance not only exposes startups and SMEs to potential disputes surrounding IP, but, additionally, reduces their capacity to use intellectual property as a strategic asset toward growth and investment.

On the one hand, the academic literature related to IP law and business development has developed a growing interest; however, much research to date has been oriented toward large multinational corporations and high-tech industries such as pharma and software (Allioui & Mourdi, 2023; Sánchez-García et al., 2024). Thus far, very little research has sought to provide

a systematic analysis of how IP laws affect startups and SMEs, while research has taken into account a variety of sectors, continents, and stages in business development. In addition, few studies have addressed the challenges and prospects in IP law for small businesses, especially in emerging

markets and developing economies where the regulatory framework may exist on paper but the implementation remains weak.

Most existing systematic assessments of IP law and SMEs tend to focus on large corporations, but small enterprises are different in their own ways. Therefore, what little evidence there is either about the ability of startups and SMEs to exploit IP strategies have legally, financially, and regulatory constraining protection, or adopting a broader view, set of conditions (Stevens, 2019); some counterexamples, however, would necessarily entail a very wide definition of IP barriers). More importantly, are current IP laws, tools, and mechanisms helping or hindering smaller enterprises to adjust in a context of new digital technologies, AI innovation, and international trade restrictions? (Lei, 2024)

With the goal of assessing emerging trends in IP law as they pertain to startups and SMEs and thereby bridging this research gap, this study proposes a Systematic Literature Review (SLR). The study will analyze how IP protection stimulates innovation, secures investments, and boosts market competitiveness using patents, trademarks, copyrights, and trade secrets and will also identify some significant roadblocks facing small businesses in obtaining, maintaining, and enforcing their IP rights. Some roadblocks include lack of funds, complex legal procedures, and cross-jurisdictional hurdles in a globalized economic environment. In addition, this research will review the adaptability of current-level IP frameworks to startup and SMEs needs versus their deterrence on both growth and innovations. The results will contribute to the academic discourse, legal academia, and policy advice on recommended trajectories towards an inclusive and accessible IP regime that promotes the growth of small enterprises amidst the fa st-evolving technological and competitive world.

Methods

Research data were collected through a systematic literature review of sources related to digital religion and cyber spirituality. This data was obtained from reputable scientific databases such as Scopus, using targeted keywords like intellectual property law, IP law, intellectual property rights, small and medium enterprises from 2016 to 2025. The study was developed using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) 2020. Further analysis employed bibliometric analysis to understand the development of cyber spirituality research directions, utilizing VOSviewer software. The reported articles' structural and dynamic

development was examined from a longitudinal standpoint using SciMAT. SciMAT may do a variety of bibliometric network investigations and evaluates scientific production from several angles (co-words, co-citation, or co-authors) using techniques, algorithms, and measures. In this instance, the analytic findings can be processed and viewed using the SciMAT application.

Procedure

The procedure was carried out in several stages:

- Select the database: Data were obtained through reputable scientific databases such as Scopus.

- Define the search concept: Keywords were generated to include in the search process. These words include intellectual property law, IP law, intellectual property rights, small and medium, small and medium enterprises, legal barriers, digital economy, technology-based startups, technology-based startups.

- Generate the search equations: Based on the keywords, the following equations were prepared: ("intellectual property law" OR "IP law" OR "intellectual property rights") AND ("startups" OR "small business" OR "small and medium enterprises" OR "SMEs") AND ("legal barriers" OR "IP enforcement" OR "commercialization" OR "funding challenges" OR "market entry") AND ("digital economy" OR "technology-based startups" OR "innovation policy") AND NOT ("pharmaceutical" OR "biotechnology" OR "large corporations"). These equations were applied to find publications that included any of these terms in their titles.

Study Screening

Figure 1 is a PRISMA (Preferred Reporting Items for Systematic Reviews and Meta- Analyses) diagram used to document the study selection process in a Systematic Literature Review (SLR) or Meta-Analysis. The diagram shows how studies are selected and screened for inclusion in the final review. A total of 458 articles were retrieved from the Scopus database. Of the 458 studies screened based on title and abstract, 236 were excluded because they were irrelevant. 222 studies were selected for full review. Of the 222 studies assessed for eligibility, 112 studies were excluded. Finally, 110 studies were selected for inclusion in the systematic review or meta-analysis. This selection process was carried out systematically and transparently according to PRISMA standards. Of the initial 458 studies, only 128 met the criteria for further analysis.

Irrelevant studies were excluded mainly because the results did not match the review's focus or because they studied different populations.

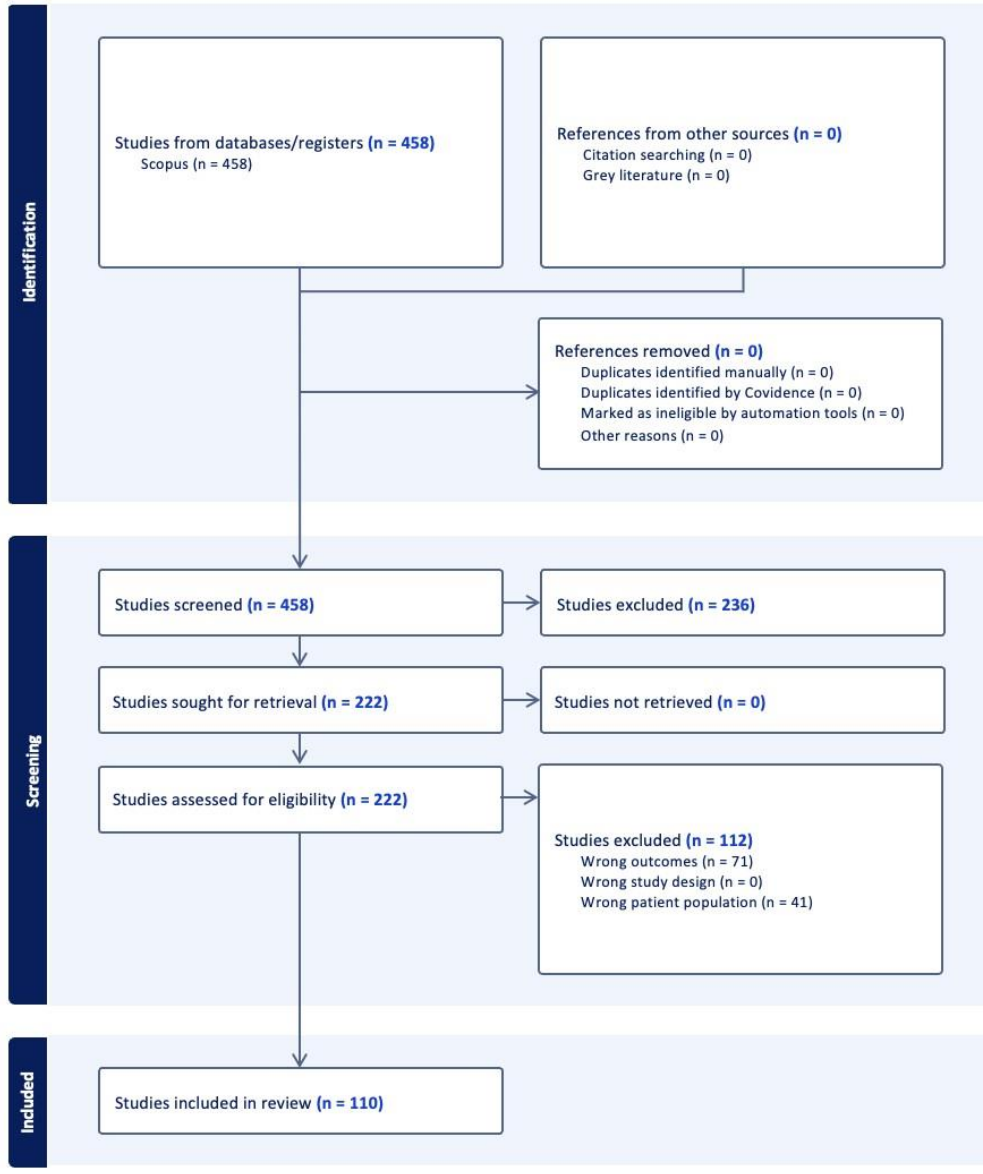

Figure 1. PRISMA Flow Chart

RESULTS Bibliometric Analysis

Figure 2 shows a bibliometric analysis of the impact of intellectual property law on startups and MSMEs. This figure shows several clusters based on the relationship between keywords often appearing in the literature. The red cluster relates to the economic, innovation, and R&D policy aspects in the context of intellectual property. The main keywords include economy, innovation policy, entrepreneur, and open innovation. The green cluster focuses on the patent process and its impact on business. Keywords such as patent, process, cost, and economic growth indicate a close relationship between patent protection and the economic growth of MSMEs/startups. The blue cluster highlights aspects of technology transfer and intellectual property protection, with

keywords such as technology transfer, intellectual property protection, and institution. The yellow cluster reflects aspects of commercialization and implementation of intellectual property law in the industry, with keywords such as commercialization, company, industry, and co-patent.

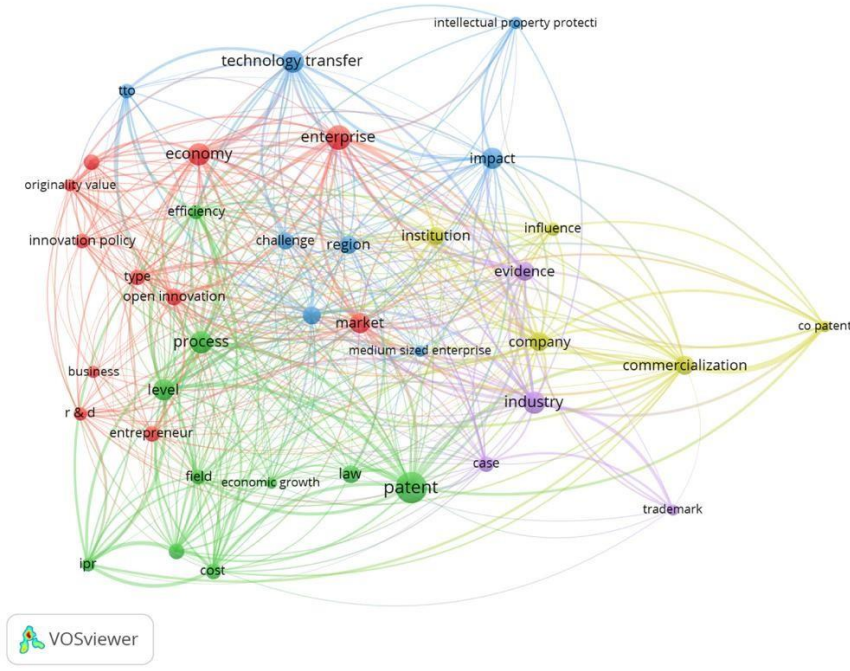

Figure 2. Research Topic Distribution, 2016-2025

The patent keyword has many connections with other concepts, indicating that the patent aspect is very influential in discussions about intellectual property protection for startups and MSMEs. Technology transfer is closely related to intellectual property protection, indicating that

technology transfer often requires strong legal protection—commercialization and co-patent- and shows that patent rights cooperation is important in supporting industrial innovation and corporate development.

This analysis shows that intellectual property protection impacts legal aspects, economic innovation, and commercialization in the startup and MSME sectors.

Patents and technology transfer are key factors in increasing the competitiveness of small and medium businesses. Innovation policies and efficiency in the legal protection process can affect economic growth and business sustainability in this sector.

Figure 3 is a density visualization of bibliometric analysis using VOSviewer. In this visualization, the color indicates the density or intensity of keyword occurrence in the analyzed literature. Bright yellow indicates keywords with high density, often appearing in research. Green indicates keywords with medium density. Dark blue indicates keywords with low density and less frequently appearing.

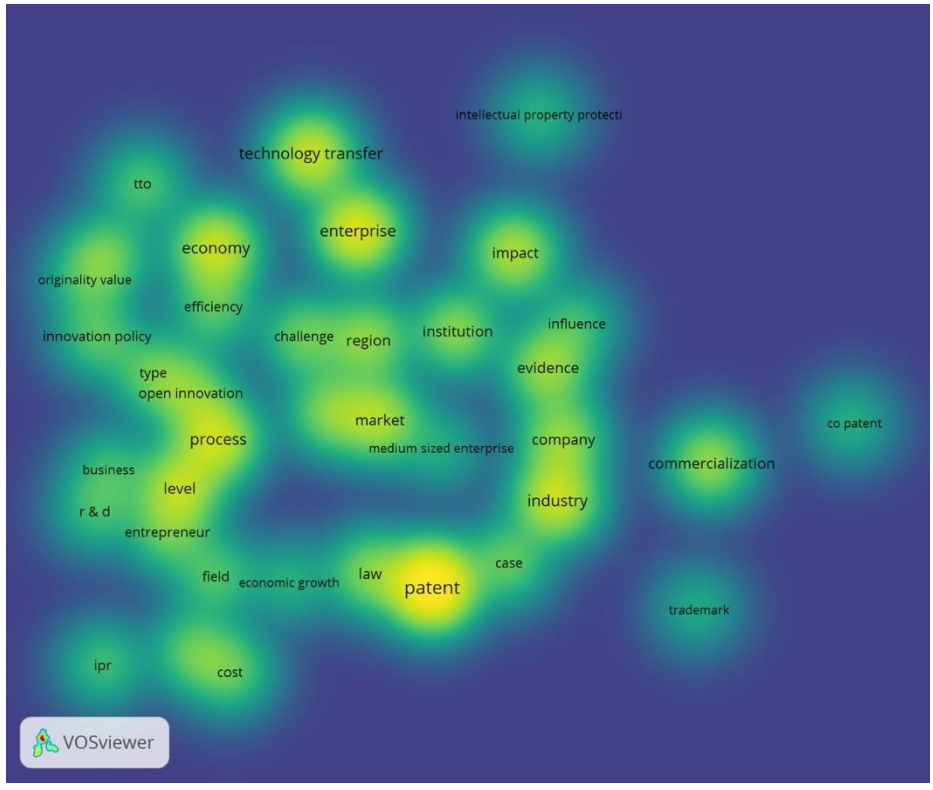

Figure 3. Density Analysis of the Impact of Intellectual Property Law on Startups and Smes

The main topic with high density (bright yellow) has keywords such as "patent", "law", "enterprise", "technology transfer", "process", and "industry" are the most frequently appearing in

research. This shows that the legal aspects of intellectual property, patents, and the innovation and technology transfer process are the main topics in research related to startups and MSMEs. Supporting topics with medium density (green) have keywords such as "impact", "market", "company", "institution", "commercialization", and "economic growth". This shows that the impact of intellectual property on companies and markets and innovation commercialization strategies are also significant concerns. Topics with low density (dark blue green) have keywords such as "co-patent", "trademark", "intellectual property protection", and "originality value" that appear less frequently. This means that, despite their importance, these aspects have not been the main focus of many studies. Current research focuses more on patents, intellectual property law, and their impact on industry and technological innovation. Future research opportunities could shed more light on less researched aspects such as patent collaboration (co-patent), trademark, and intellectual property protection.

Figure 4 is the result of bibliometric analysis using VOSviewer with overlay visualization, which shows research trends related to the impact of intellectual property law on startups and MSMEs from 2019 to 2022. The colors in the network indicate the temporal development of research. The colors blue and purple (2019-2020) indicate topics that were researched earlier. The color green (2021) indicates topics that are starting to develop further. Yellow (2022) indicates newer topics and trends in current research. From the image, keywords such as patent, cost, and R&D

were more widely researched in 2019-2020, while technology transfer, intellectual property protection, and commercialization became more dominant in 2021-2022.

Intellectual Property Protection and Technology Transfer (Green-Yellow) have keywords such as technology transfer, intellectual property protection, and enterprise emerging as the latest trends, indicating that research is increasingly focusing on how intellectual property law facilitates innovation and business growth. Patents and Protection Costs (Blue-Green) have the keywords patent concept, cost, and law, which are still strong topics but have developed in previous years. This indicates that many previous studies have discussed the impact of patent law and costs in implementing intellectual property protection on startups and MSMEs. Commercialization and Industry (Green-Yellow) the keywords commercialization, industry, and co-patent indicate a new focus in research on how startups and MSMEs commercialize their innovations through intellectual property law protection. Figure 4 shows more basic legal aspects, such as patents and the cost of intellectual property protection. Since 2021-20 in 2019-202022, research has shifted to

aspects of commercialization, technology transfer, and the economic impact of intellectual property law.

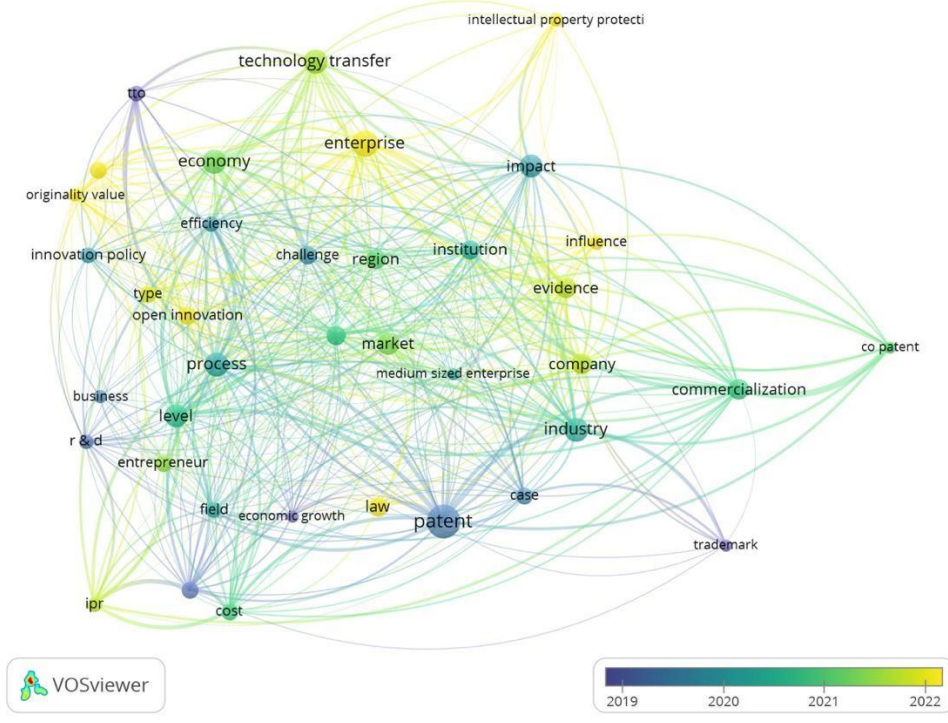

Figure 4. Text Network Analysis of the Impact of Intellectual Property Law on Startups And Smes

Relevance for Startups and MSMEs. Recent studies highlight how startups and MSMEs can leverage intellectual property protection to support innovation and business growth. Technology transfer and co-patent collaboration are key strategies in optimizing intellectual property in the small and medium business sectors.

Scientific Performance and Production

Figure 5 shows the reflecting the frequency range in respect to the within much of the period in between 2016 and 2025, entitled " The Impact of Intellectual Property Law on Startups and SMEs: A Systematic Review".

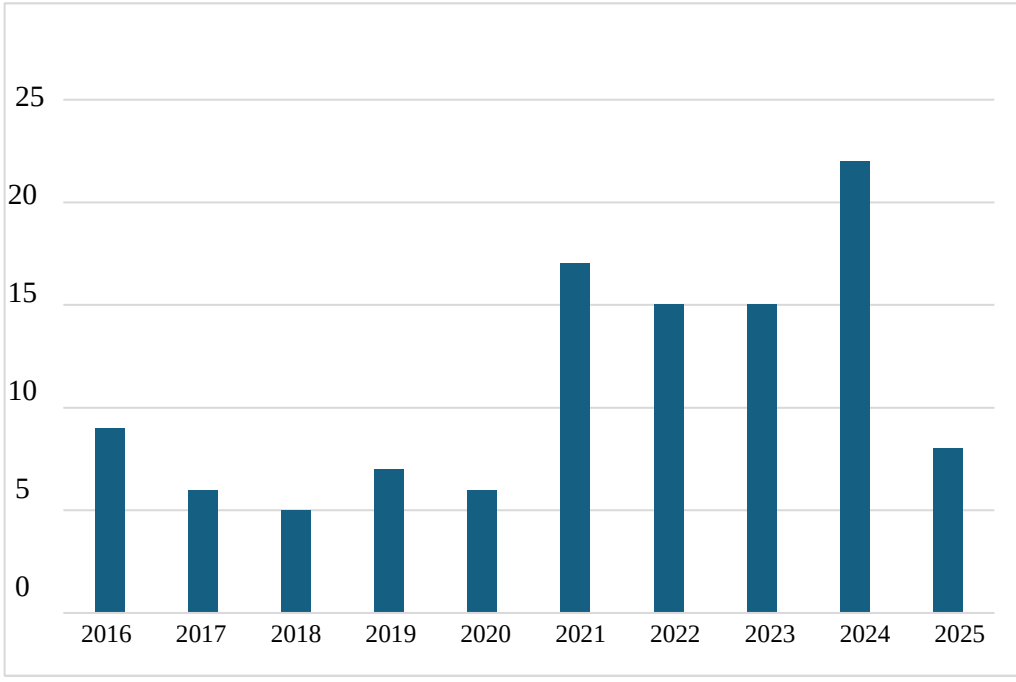

Figure 5. Publication Frequency

Figure 5 shows the frequency of publications related to the topics discussed in the study "The Impact of Intellectual Property Law on Startups and SMEs: A Systematic Review" from 2016 to 2025. From 2016 to 2020, the number of publications was relatively stable, with slight fluctuations, ranging from 5 to 10 publications per year. In 2021, there was a significant increase in the number of publications, reaching more than 15. This trend continued in 2022 and 2023, with the number of publications remaining high, indicating an increasing interest in intellectual property law in the context of startups and SMEs. The peak of publications occurred in 2024, with the highest number of publications exceeding 20 articles, indicating that this issue is gaining more attention in the academic community. The year 2025 showed a decrease in the number of publications, but still a significant number compared to the early years. Overall, these trends show that academic attention to the impact of intellectual property law on st artups and SMEs has increased significantly since 2021, reflecting the relevance and urgency of this topic in recent years. Figure 6 presents the top ten most publications by subject area published in the topic of the impact of intellectual property law on startups and SMEs.

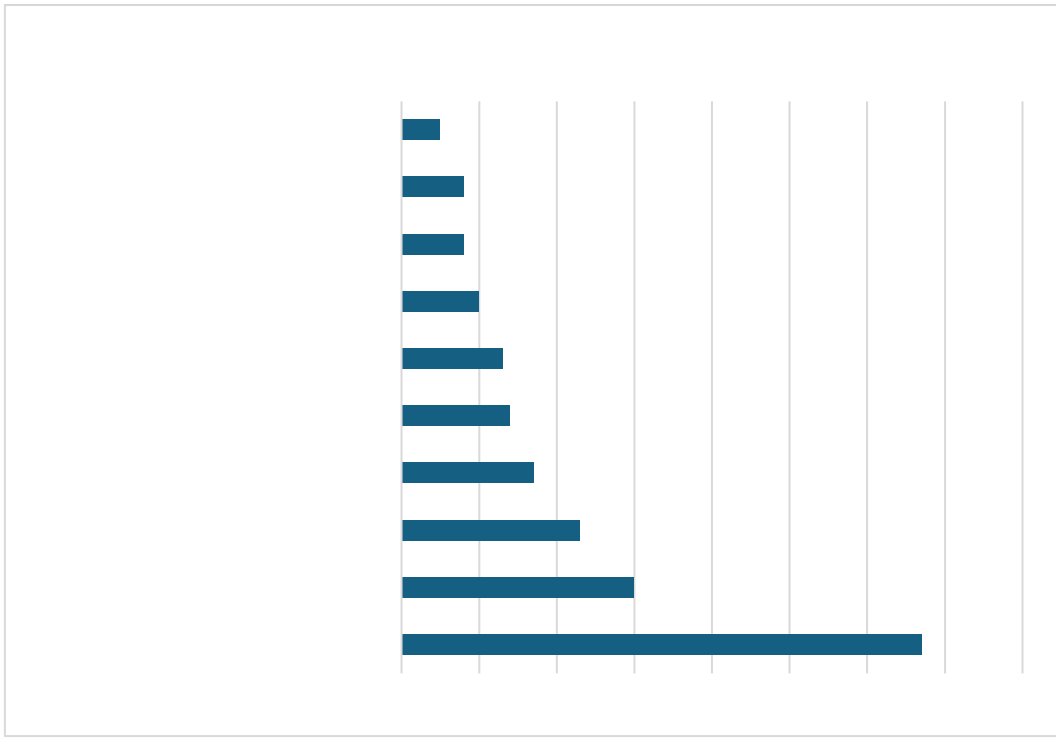

Figure 6. Number Of Publications by Subject Area

Figure 6 shows the number of publications by subject area related to the study "The Impact of Intellectual Property Law on Startups and SMEs: A Systematic Review". Business, Management, and Accounting had the highest number of publications, with almost 70 publications indicating that intellectual property law is highly relevant in business and management, especially in relation to startups and SMEs. Social Sciences came in second with more than 30 publications, indicating that social aspects, policies, and law's impact on society are also significant concerns in this research. Economics, Econometrics, and Finance came in third with around 20 publications, highlighting the relationship between intellectual property law and economic and financial aspects, including implications for startup and SME business models. Engineering, Decision Sciences, and Computer Science had a lower but still significant number of publications, indicating that technology and innovation are also part of the discussion on intellectual property, especially in the context of patents and technological innovation. Environmental Science, Psychology, Energy, and Mathematics had the lowest number of publications, indicating that despite their relevance to certain aspects of intellectual property law, these fields are not the main focus of research related to startups and SMEs. Overall, this trend shows that the study of intellectual property law in the context of startups and SMEs is more widely researched from a business, social, and economic

perspective. At the same time, the relationship with engineering, computer science, and natural sciences tends to be more specific and limited. Figure 7 is a pie chart showing the most frequently occurring keywords in studies related to the impact of intellectual property law on startups and

SMEs.

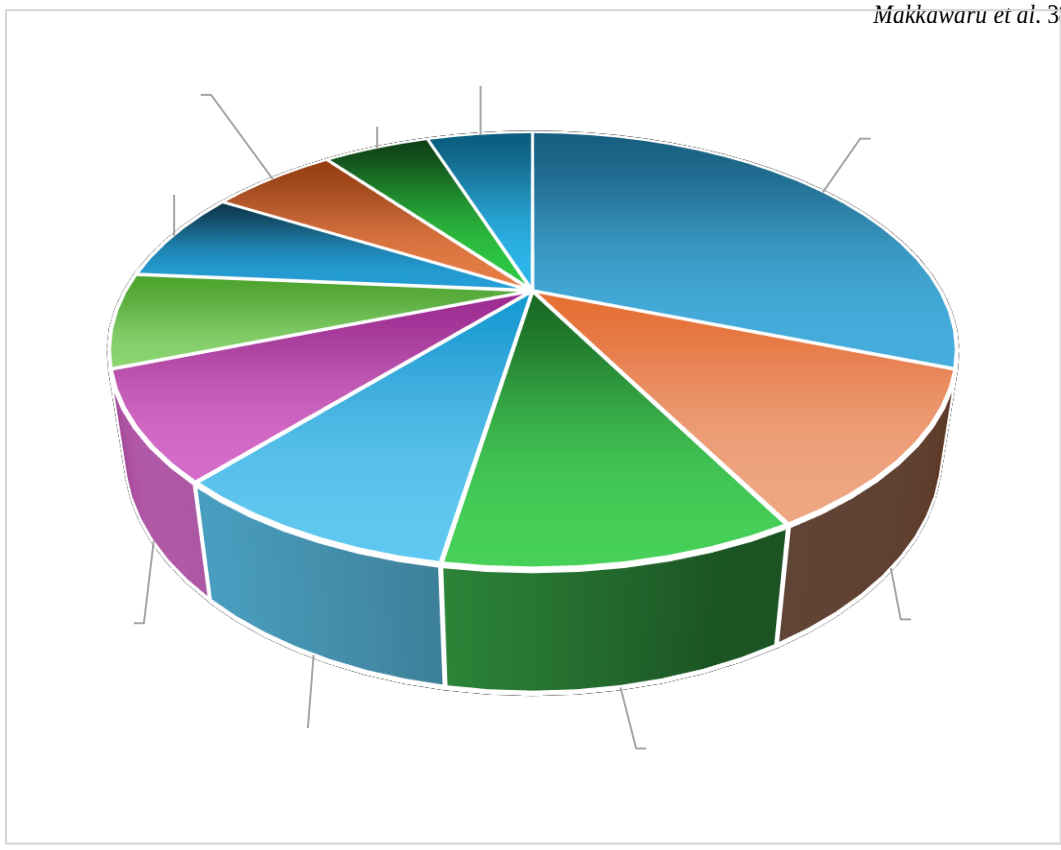

Figure 7. Most Frequent Words Regarding the Impact of Intellectual Property Law on Startups and Smes

Figure 7 is a pie chart showing the most frequently occurring words in research related to the impact of intellectual property law on startups and SMEs. "Innovation" (31%) is the most dominant word, indicating that research on intellectual property law is closely related to innovation, which is an important factor for the growth of startups and SMEs. "Intellectual Property Rights" (11%) and "Technology Transfer" (11%) indicate that intellectual property rights protection and technology transfer are key aspects of managing innovation in startups and SMEs. "China" (9%) shows that many studies on intellectual property law and its impact on startups and SMEs focus on China, possibly because this country has a rapidly developing IP protection system

and many technology-based startups. "Patents and Inventions" (8%) highlights the importance of patents and innovation as a protection mechanism for small businesses facing competition in the market. "Laws and Legislation" (7%) and "Intellectual Property" (7%) reflect the importance of regulation in the intellectual property law system that affects small businesses. "Commercialization" (6%) indicates that monetization or commercialization of innovation is also an important part of the discussion of intellectual property law. "Knowledge" (5%) and "Patents" (5%) indicate that the aspect of knowledge and patent rights are part of the central

discourse in this study. These results show that intellectual property law significantly impacts innovation, legal protection, and business strategies of startups and SMEs, with particular attention to patents, technology transfer, and policies applicable in countries such as China.

Structural and Thematics Development

In this research, two periods (2016-2020 and 2021-2025) are used as references. The volume of keywords gathered over each time is displayed via the keyword continuity analysis. In this case, in the first period (2016-2020), there were 18 keywords, while in the second period (2021-2025), there were 33 keywords. This is normal, considering that production volumes vary from year to year. The number of keywords not used in the following period is indicated by the up arrow. The downward arrow points to recently added keywords to the project-based learning in scientific research sector. Using this information along with the volume of keywords for the first period (2016-2020) and the second period (2021-2025), the keyword matching percentage between the two periods is determined. The horizontal arrow indicates the 33% match percentage. This demonstrates that there is already a research line in the area of the impact of intellectual property law on startups and SMEs, even though it is a new scientific trend currently being produced (Figure8).

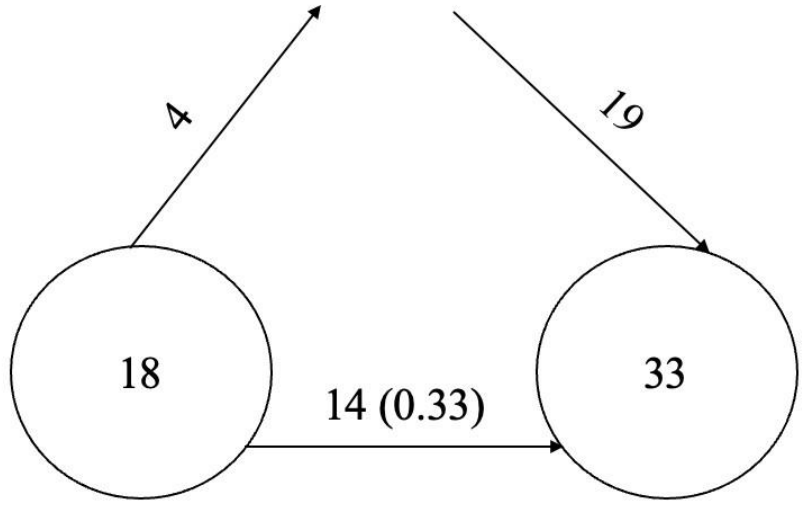

Figure 8. Keyword Continuity Between Contiguous Intervals

Each theme's degree of importance is displayed in the strategic diagram of topics that emerged from the co-word analysis. Figure 9 shows the strategic diagram by h-index of the impact of intellectual property law on startups and SMEs.

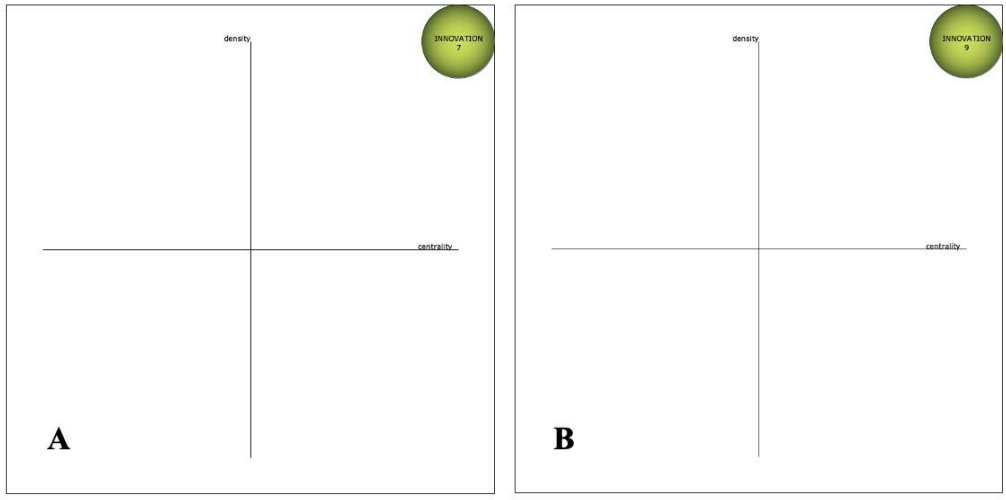

Figure 9. Strategic Diagram By H-Index of The Impact of Intellectual Property Law on Startups and Smes. Note: (A) Interval 2016-2020; (B) Interval 2021-2025.

The h-index is used to categorize this strategy diagram. The Cartesian axis displays a topic's density (represented by the Y axis), which displays the exterior relationships between the numerous themes that emerge from the research, and its centrality (represented by the X axis, which displays the internal relationships that exist in each theme). Based on the Strategic Diagram by h-index shown in Figure 9, the analysis using Sci-MAT illustrates the evolution of the impact of Intellectual Property (IP) Law on startups and SMEs in two periods. Figure 9A (Interval 2016-2020) shows that the topic of INNOVATION is in the upper right quadrant, indicating that this theme has a high level of centrality and density, thus acting as a driving or core theme in research in this period. The h-index value = 7 reflects the influence level of related publications. Figure 9B (Interval 2021-2025) shows that INNOVATION remains in the same strategic position in the upper right quadrant, indicating that this topic remains the main focus of research. However, the h-index value increased to 9, indicating that research in this period is growing and more influential than the previous period. The consistency of the "INNOVATION" theme shows that the role of IP Law in driving innovation in startups and SMEs continues to be a primary concern. The increase in h- index from 7 to 9 indicates a significant increase in the number of publications and scientific impact of related research in 2021-2025 compared to 2016-2020. The increase in h-index from 7 to 9 indicates a significant increase in the number of publications and scientific impact of related research in 2021-2025 compared to 2016-2020. The increasing academic attention to this theme indicates the urgency of reforming IP policies to be more adaptive to the rapidly growing startup ecosystem. Figure 9 shows that the topic of "INNOVATION" about IP Law remains relevant and is increasingly developing in academic research, emphasizing the importance of IP policies that support the growth of startups and SMEs more effectively in the era of globalization and digital transformation.

Figure 10 is a Cluster Network that illustrates the relationship between concepts or topics in the field of research on the impact of intellectual property law on startups and SMEs for the period 2016-2020.

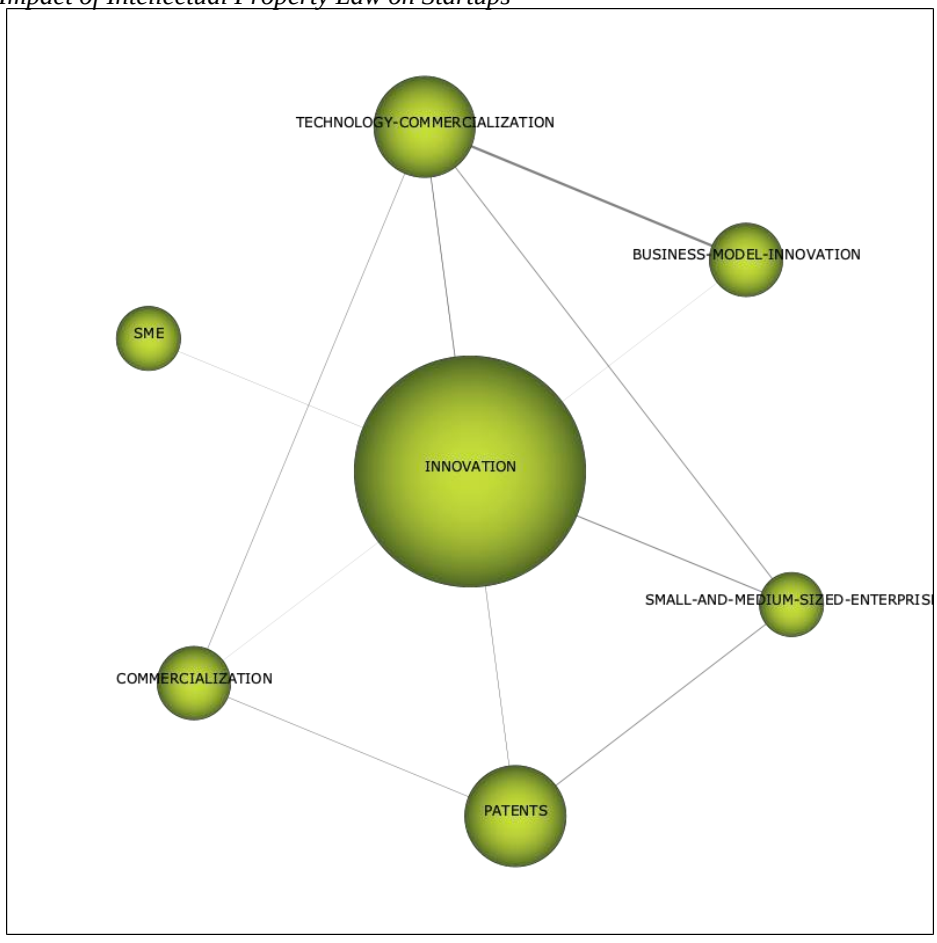

Figure 10. Cluster Network of The Impact of Intellectual Property Law on Startups and Smes Interval 2016-2020

"INNOVATION" is the most significant and dominant point, indicating that innovation is the centre of research in this period. This shows that intellectual property protection significantly encourages or inhibits innovation among startups and SMEs. "PATENT" shows that patent protection is one of the main factors influencing innovation in startups and SMEs. "SMILE AND MEDIUM SIZED ENTERPRISE" indicates that research in this period focuses heavily on the impact of the IPR Law on small and medium-sized companies. "COMMERCIALIZATION" shows the relationship between innovation and the commercialization strategy of innovation results, which is highly dependent on the IP protection system. "BUSINESS MODEL-INNOVATION" and "TECHNOLOGY-COMMERCIALIZATION" indicate that technology-based business models and digital commerce are also the main focus of research. This analysis shows that Intellectual Property Law Protection is closely related to innovation in startups and

SMEs, with patents and commercialization as the main factors influencing business growth. Technology-based business models and innovation commercialisation are challenges startups face in guaranteeing their intellectual property rights. Research in this period focuses on how IP regulations can support or hinder the development of innovative businesses, especially for small and medium-sized companies. This figure shows that research from 2016 to 2020 has paid great

attention to how the IPR Law can help startups and SMEs develop in an innovative business ecosystem despite challenges in protecting and commercialising intellectual property rights. Figure 11 is a Cluster Network that illustrates the relationship between concepts or topics in the field of research on the impact of intellectual property law on startups and SMEs for the period 2021-2025.

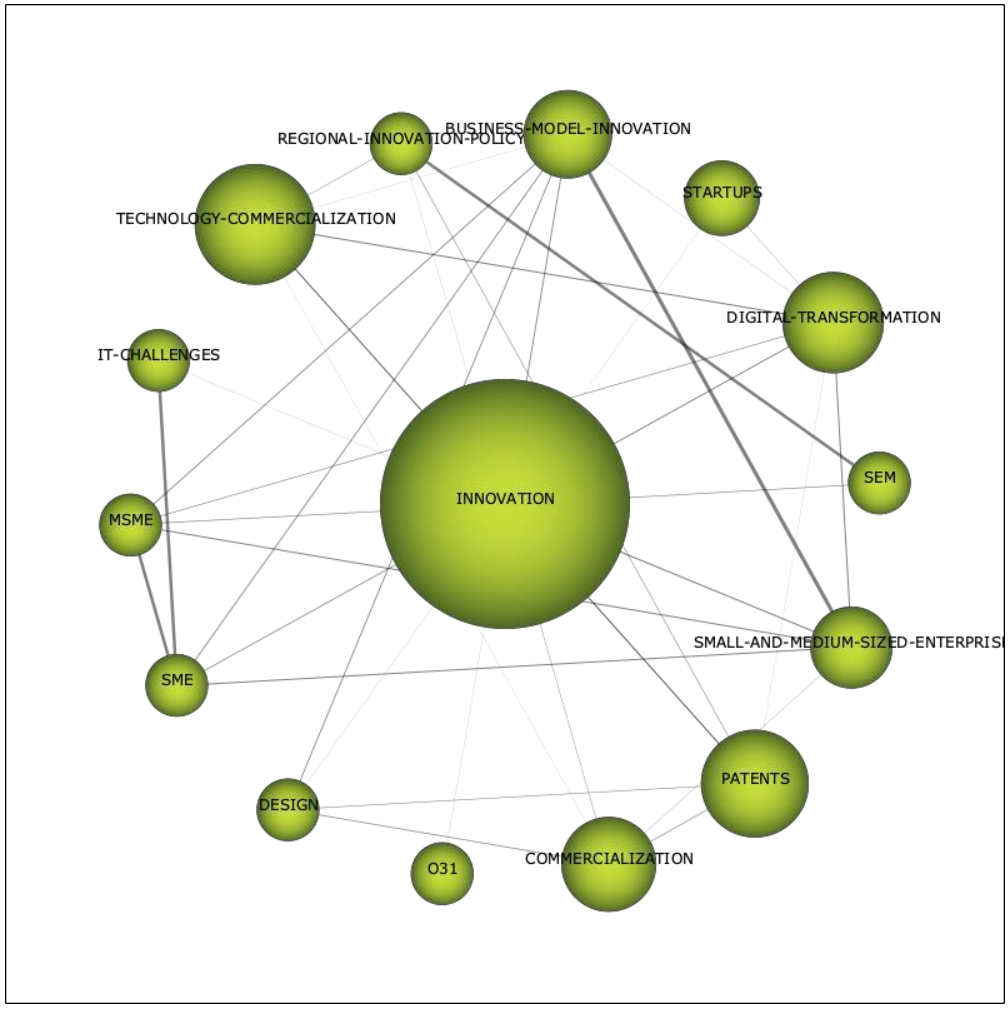

Figure 11. Cluster Network of the Impact Of Intellectual Property Law on Startups and Smes Interval 2021-2025

Similar to the 2016-2020 period, "INNOVATION" remains the most significant node, indicating that innovation remains central to discussions on IP law for startups and SMEs. This suggests that IP regulation still plays a significant role in encouraging or limiting business innovation. The 2021-2025 period shows an increase in innovation-related concepts compared to the previous period. The emergence of new nodes such as "DIGITAL-TRANSFORMATION" and "STARTUPS" indicate that digitalization is increasingly becoming a significant factor in IP protection. The terms "IT CHALLENGES" and "O31" (which are likely related to economic classification or innovation policy) indicate that research has begun to explore more deeply the

challenges faced by startups and SMEs in the IP-based innovation ecosystem.

The nodes “PATENTS”, “COMMERCIALIZATION”, and “DESIGN” remain important, indicating that patent protection and commercialization strategies remain top concerns.

However, there is increasing attention to "TECHNOLOGY-COMMERCIALIZATION" and "BUSINESS MODEL-INNOVATION", indicating that aspects of technology-based business models and innovation strategies are increasingly becoming part of the discussion of intellectual property law. "MSME" (Micro, Small, and Medium Enterprises) appears as a broader category than just "SME", indicating that recent studies are starting to include micro businesses in the analysis of the impact of IP law. The "SEM" node can refer to the analysis method (Structural Equation Modeling) used in research to measure the impact of IP regulations more quantitatively.

Based on Figure 11, research in the 2021-2025 period shows an expansion and deepening of focus in studying the impact of IP Law on startups and SMEs. Digital transformation and technology-based business models are increasingly becoming key factors in innovation, so intellectual property regulations must adapt to these changes. Patent protection, commercialization, and design remain relevant, but new challenges arise related to digitalization, innovative business models, and how micro SMEs can adapt to the IP protection system. Compared to the 2016-2020 period, the latest research is more oriented towards challenges and policy implementation, showing a shift from simply understanding the impact of IP Law towards adaptation strategies for startups and SMEs.

Discussion

The intersection of IP law and the entrepreneurial sphere of startups and SMEs presents a multifaceted challenge that affects innovation, investment, and market competitiveness. A solid IP system is indispensable to secure business ideas, techno-innovations, and creative contents; although meanwhile, it creates many more legal and financial and administrative hurdles, which weigh heavily on small firms (Baran & Zhumabaeva, 2018). The systematic literature review conducted here identifies key dimensions of this interacting mechanism, imparting both advantages and limitations in respect of IP law with regard to startups and SMEs.

Intellectual Property Protection and Innovation Investments

Strong intellectual property (IP) protection is a key incentive for fostering innovation-the genesis of all research and development (R&D) and the exclusive domain of newbies with good ideas. For start-ups and SMEs, which ordinarily thrive on disruptive technologies and innovative business models, the acquisition of IP rights-whether patents, trademarks, copyrights, or trade secrets-is a most important avenue to ensuring differentiation and competitive advantage in the marketplace (Stehr et al., 2020). A very good IP portfolio increases the firm's abilities to commercialize its innovations and increase its attractiveness in the eyes of investors and venture capitalists. Most of the time, investors evaluate the probability and further scalability of start - ups on the basis of their IP assets, knowing that properly protected innovations would minimize risks for the start-up in entering the market and being copied by competitors. If, on the other hand, small firms do not have adequate IP protection, they are vulnerable to misappropriation, infringement, and unlawful competition, all of which can seriously harm their market authority and long-term sustainability (Guckenbiehl & Zubielqui, 2022).

In theory-at least-these IP rights should be a safeguard. But in practice, their implementation and

enforcement become major economic and legal challenges, especially for start-ups and SMEs with poor financial and administrative resources. For instance, the time- consuming and expensive nature of patent application processes often prevents small enterprises from taking advantage of IP protection. Startups may be discouraged from using formal methods to protect their discoveries due to the high expenses of patent filing, maintenance, and legal enforcement, leaving them vulnerable to illegal exploitation (Elert & Henrekson, 2016). Furthermore, businesses who operate in multiple jurisdictions face more challenges due to the continued fragmentation and complexity of international IP legislation. For small businesses looking to enter the global market, disparities in national intellectual property laws, variances in patent review procedures, and the lack of a globally cohesive enforcement system pose significant

obstacles. The need for securing IP rights in various jurisdictions increases compliance costs, burdens firms administratively, and delays time to get legal protection- all of which could disadvantage startups and SMEs compared to their big and established multinationals with deep legal and financial pockets (Pokrovskaia et al., 2021).

Hence, while IP protection aims at spurring innovation through exclusivity, it paradoxically creates market-entry barriers that can inhibit newcomers. The strong enforcement of IP appears monopolistic since it allows incumbents to consolidate their market power, thereby potentially restricting technological diffusion and limiting competition. Startups that are typically rejected by other funding sources find it difficult to work under the strict IP regime, and accordingly, the IP system may discourage them from pursuing high-risk-high-reward innovations. In addition, IP disputes stretch litigation, draining small firm's already limited resources and dissuading them from defending their intellectual property rights. The rigid application of traditional frameworks may stifle the very sense of entrepreneurship that it is meant to encourage (Hacker et al., 2024).

Given such hardships, IP protection needs careful balancing and broader inclusiveness, along with the protection of innovator interests, whereby few legal and economic barriers should not impede competition and market access. Also, alternative mechanisms should be in the mind of policymakers, for instance, fast-track patent examination for startups, reduced filing fees for small and medium-sized enterprises, and international cooperation for IP harmonization. Open-source cooperation, patent pools, and alternative licensing schemes could all contribute to the spread of information while preserving the financial interests of innovators. Lastly, a well-rounded approach to IP governance that balances legal rights with business realities will help to build a thr iving entrepreneurial ecosystem, allowing SMEs and startups to innovate successfully and participate in significant economic development (Fasnacht, 2018).

Start-Up and SME's Challenges in IP Rights Enforcement

Enforcement of intellectual property rights becomes more tedious for start-ups and small and medium enterprises as compared to any multinationals. Such tediousness is contributed by factors like financial constraints with legal intricacies and jurisdictional inconsistencies. Whereas multinational corporations have huge legal and financial resources to fight against intellectual assets through litigation, most start-ups and SMEs are incapable of doing so. The associated costs concerning IP enforcement, which include legal fees, expert consultations, and court proceedings,

become disincentives for many small businesses against pursuing legal action against infringers. Thus, many SMEs settle for informal dispute resolution or entirely do away with enforcement that could weaken the effectiveness of the IP system in innovation and entrepreneurship

protection (Mary & Enoch, 2024).

The advent of online platforms has indeed amplified the budding problems of IP enforcement, especially for industries based on e-commerce, high high-tech, and creative content. Adopted by such platforms is the increased level of copyright infringement, counterfeiting, and digital piracy which makes it harder for small firms to manage unauthorized reproduction and distribution of their intellectual assets. Further complication of enforcement efforts comes to play with the anonymity and global reach of online markets because infringers may operate across several jurisdictions, exploiting a synergy of regulatory gaps and inconsistency in national IP laws. A case in point deals with startups engaged in software development, digital media, and online retail with issues of unauthorized replication regarding their goods along with brand identity theft that take place which could significantly erode potential future competitiveness on the market and sources of revenue (Deutscher, 2022).

One of the most significant barriers for effective IP enforcement in this globally integrated business environment is the complexity of cross-border legal frameworks. Because of jurisdictional fragmentation in IP laws, protection granted in one country cannot guarantee its extension into another so that businesses are compelled to seek multiple registrations and comply with different legal obligations. This disparity creates enforcement bottlenecks, as startups and SMEs seeking to grow internationally will have to put up with very intricate procedural hurdles in the protection of their IP assets. Additionally, those differences in judicial interpretations of IP rights, variances between enforcement mechanisms, and limited international cooperation in IP dispute resolution add to the woes of small enterprises tending to export businesses in various markets (Pokrovskaia et al., 2021).

In addition to legal and financial impediments, a major obstacle for start -ups and other SMEs regarding IP enforcement is the general lack of awareness and strategic understanding of IP rights. Many an entrepreneur and small businesspersons remain unaware of their very IP interests and regard IP registration as a mere bureaucratic hindrance, unconcerned about the fact that it could serve to promote their business. Such lack of IP literacy translates to little or no protection, thus leaving start-ups open to misappropriation, infringement, and competitive disadvantages. In

cases where legal advice is lacking, many SMEs do not adopt proactive measures for IP management, i.e. timely patent filings, trademark registrations, and confidentiality agreements, essential for sustainability and long-term market positioning (Cavallo et al., 2022).

Policy measures to tackle these issues must be urgently put in place by governments, intergovernmental organizations, and industry stakeholders, which would serve to build stronger IP enforcement mechanisms for start-ups and SMEs. Setting an example for specialized IP courts or environments for expedited dispute resolution would provide cost-effective and time-efficient remedies to small business owners who confront infringement claims. Governments should also offer some finances to assist resource-constrained startups in securing and enforcing their intellectual rights, i.e., legal aid programs and subsidized IP filing fees. Furthermore, increasing IP literacy by means of educational campaigns, entrepreneurship training programs, and public - private partnerships may empower small business owners to recognize the strategic advantage of IP protection and adopt proactive enforcement strategies.

The backdrop of global trade and digital transformation carries with it an urgent need to strengthen international cooperation on IP enforcement with harmonization of legal standards,

cross-border enforcement accords, and development of digital technologies to track in real-time when IP violations occur. The introduction of artificial intelligence (AI) and blockchain into IP management systems would further enhance transparency, authentication, and automated enforcement and subsequently decrease the administrative load imposed on start-ups and SMEs. By creating a balanced ecosystem for IP enforcement, one which promotes access on the economic side, through a complete set of measures fitness for IP protection, the policymakers may create a more equitable environment conducive to innovation, where start-ups and SMEs can thrive, free from the constant threat of misappropriation of their intellectual property (Chang et al., 2022).

Emerging Trends: Open Innovation and Alternative IP Strategies

The speed-up and increasingly global digital transformation have brought changes to intellectual property (IP) assets, along with new forms that displace the traditional patent-focused approaches. Startups and small and medium-sized enterprises (SMEs) are considering how to use alternative strategies such as open innovation, collaborative licensing, and data-pooling agreements as viable mechanisms for managing proprietary rights, while also gathering and commercializing knowledge through the worldwide shared knowledge systems (Kazantsev et al.,

2023). It allows businesses to draw on pooled resources, enable a faster innovative cycle, and drive ecosystem proliferation without the limitations of inbuilt frameworks (Bereznoy et al., 2021). This is a new opportunity for startups; however, they also open up a new legal set of ambiguities with their ownership rights, revenue distribution, and the enforceability of co-created IP.

Open innovation has been increasingly characterized by reliance on open-source development models. Start-up companies in sectors like software, artificial intelligence (AI), or biotechnology are going away from exclusive ownership of IP into collaborative research and development; licensing models, and creative commons agreements (Krauss et al., 2021). Such frameworks allow companies to gain an economic benefit from collective intelligence, accelerate technological development, and significantly lower the costs associated with traditional IP protections, such as patents and trademarks. However, a high level of legal and economic viability will depend on adequate governance frameworks that articulate contributions, rights, and obligations among multiple stakeholders. Unsatisfactory legal coverage of collaborative ownership of IP will trigger disputes on profits from monetization, unauthorized commercialization, and infringement risks, especially for cross-border partnerships governed by very different IP laws (Lei, 2024).

Moreover, the development of decentralized technologies, blockchain, and artificial intelligence, as well as the Internet of Things, shatter traditional IP governance. New approaches for registration, tracking, and enforcement of IP are brought by, for instance, the smart contracts and decentralized ledgers peculiar to blockchain technology. Blockchain-based IP registries enable attestations to creative works that are immutable and time-stamped. These may better facilitate proof of ownership in legal disputes, reduce administrative inefficiencies, and enhance transparency. Such contracts as smart contracts, being self-executing agreements that are encoded into blockchain networks, may define rules for automating licensing agreements and royalty distributions so that the creators can receive fair compensations for their intellectual contributions without the mediation with their intermediaries (Lei, 2024).

IP Management tools powered by AI bring forth high-end solutions for startups and SMEs. Machine-learning algorithms conduct automated prior searches, present potential IP infringement issues, and assist companies in strategizing for patent and trademark filings. AI could also serve copyright enforcement by detecting unauthorized use of digital assets, such as through real -time content-recognition technologies. The flip side, however, comes loaded with complex legal and

ethical considerations in relation to AI-generated works, ownership attribution, and liability for violations brought forth by such autonomous systems. Current IP laws, wherein human authorship and inventorship predominantly prevail, will certainly be in demand for radical reform to comprehend AI creativity and innovation (Bereznoy et al., 2021).

Thematically, though, advances in technology have not engendered any corresponding reform in the regulatory regime that governs IP rights as they relate to the realities of digital commerce and decentralized development (Gulati & Pal, 2024). Codified in an era when the physical invention or tangible asset was the basis of design law, traditional IP drags behind in its ability to grapple with the ethereal and ever-evolving makeup of digital products, algorithms, and data-based enterprises. Those start-ups working in fast-evolving sectors are often faced with contradictory and unclear regulations regarding IP protection for software, machine learning models, and digital content, further complicating an already difficult task of obtaining enforceable rights in several jurisdictions. Added to this is the complexity of conflicting cross-border legislation on commercial enforcement of IP rights, since these businesses have to navigate divergent national laws that protect their innovations onto the global marketplace.

Therefore, with relevant IP laws amid open innovation and technological disruption, the law must be adaptive, one that safeguards proprietary interests yet allows for collaborative growth. An instance of reform would be the introduction of hybrid IP regimes amalgamating open-source governance with concepts from classical patent and copyright law (Li, 2020). This may mean creating specialized categories of IP for digital assets, AI-generated works, and decentralized innovation models. This would strengthen global harmonization initiatives aimed at establishing uniform legal standards for emerging technologies and collaborative IP approaches (Halpert et al.,2017).

Firms need to navigate through this progressive environment in a proactive fashion regarding critical factors influencing their developing IP portfolio management with respect to trends in the IP marketplace. They also need to consider differences in IP trade-offs between exclusivity and openness under IP models that best adapt themselves to industry contexts, business models, and long-term strategic positioning. New technologies such as blockchain and artificial intelligence will encourage security and enforceability for the assets; partnerships and licensing of knowledge can provide access without relinquishing proprietary rights. True to this assertion, as the digital economy reshapes definitions around innovation and ownership, adaptation to some other well-defined IP strategies will be one of the markers between winners and losers for startups and SMEs in the international market.

Policy Implications and Recommendations

The necessity of a more adaptive and inclusive IP legal framework that looks squarely at the specific problems faced by startups and SMEs is made paramount by the findings of this study. Policy measures should thus be directed to simplifying IP registration procedures, thereby reducing the financial and administrative burden and broadening access to legal assistance for

small enterprises to more efficiently protect their innovations. In view of the complex nature of IP enforcement across borders, international legal harmonization should be the priority so that jurisdictional inconsistencies can be mitigated, and the protection of intellectual assets in international markets can be strengthened. Likewise, co-creation between public institutions, private sector stakeholders, and academia can help forge a bridge over the knowledge gaps through targeted training, financial incentives, and advisory services for startups and SMEs on IP management strategies.

Legal systems must be reformulated to meet new challenges such as online infringement, data ownership disputes, and protection for AI-generated innovations, at best, within the rapidly changing environment of digital technologies. Open innovation models can be promoted, even to spur creativity in entrepreneurship within an environment of rights enforcement when combined with flexible licensing mechanisms and collaborative IP-sharing frameworks. Thus, governments and regulators could develop a fair and efficient intellectual property system, which secures intellectual assets while further enhancing innovation, investment, and sustainable business growth in an increasingly competitive and technology-driven economy (Vimalnath et al., 2023).

Conclusion

Intellectual Property (IP) law plays an essential role in determining the competitive position of any startup or SME by legal mechanisms for protecting innovation, attracting investments to support it, and securing its place in the market. Although patents, trademarks, copyrights, and trade secrets secure strong protection, high cost, procedural complication of the system, and inconsistency in jurisdiction and enforcement disadvantage micro- and small enterprises. Many of the resource-constrained organizations are illegal; typically, they are

enterprises with little or no legal awareness and without money to spend on protecting their IP. Such enterprises are most likely to be exploited and experience unfair competition. New structures that provide the guarantees of open innovation, collaborative licensing, and blockchain as IP protection systems for the innovation process tend to create a challenge for traditional regulations to be modified. In the coming years, to successfully support IP laws for the growth of startups and SMEs, protection must be balanced with access, made easier for enforcement processes, cost- effective, and integrated with digital innovations. Thus, this would lead toward an inclusive, flexible system for IP that can thus sustain innovation, attracting investments, and improv ing the world competitiveness of the digital economy.

Author Contributions

Conceptualization, Z.M. and H.S.; methodology, Z.M.; formal analysis, Z.M.; investigation, Z.M.; resources, Z.M.; data curation, Z.M.; H.S; Y.Y; writing—original draft preparation, Z.M.; writing—review and editing, Z.M.; H.S; Y.Y.; A.A.; A.A.; A. R.; visualization, Z.M.; H.S; Y.Y.; A.A.; A.A.; supervision, Z.M.; funding acquisition, Z.M. All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflicts of interest.

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The data that support the findings of this study are available from the corresponding author upon reasonable request.

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