

(RESEARCH ARTICLE)



AN EMPIRICAL ASSESSMENT OF THE IMPACT OF ARTIFICIAL INTELLIGENCE ON INDIAN PATENT AND COPYRIGHT LAW: REFORM PRIORITIES FOR GLOBAL HARMONIZATION

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ABSTRACT

AI is fast changing how innovation and creative production are conceived and created, upending the traditional understanding of inventorship, authorship, and ownership as provided by intellectual property (IP) law. This study evaluates the necessity for legal reforms in Indian patent and copyright law in the wake of the advent of AI and to assess its impact on patent/copyright law from an empirical perspective. A structured questionnaire survey was carried out with legal professionals, scholars, patent agents, researchers in AI and industry practitioners to understand the perception on AI-generated inventions, ownership of such inventions, legal uncertainty, and policy preparedness. The findings show that there are many concerns related to ownership uncertainty, lack of legal provisions and growing cross-border disputes surrounding creations facilitated by AI. Comparative analysis shows that India's existing IP regime should be updated in order to be in line with the international standards. Taking into account the empirical findings, the study recommends legislative changes specific to AI, uniform guidelines on inventorship and authorship, mandatory disclosure of AI and more international harmonization. These recommendations seek to build a robust IP system in India and promote responsible innovation through the use of AI.

Keywords: Artificial Intelligence, Intellectual Property Rights, Patent Law, Copyright Law, Legal Reform

1 INTRODUCTION

Artificial Intelligence is a technology that has taken the innovation, creativity and industrial development of various sectors by storm. These advances in technology and economics have led to some important legal questions—and issues—about who owns what, who invented what, who wrote what, and how to protect what has been created by AI. IP laws were originally written to protect works created or invented by humans and are now applied to AI assisted or AI generated works.

In India, the Patent Act, 1970 and the Copyright Act, 1957 still limit the definition of inventor to a human being and author to a creative source – a human being. The Indian Patent act, 1970 and the Copyright act, 1957 still define the inventor as a human being and the creative source as a human being, which leaves the legal protection of AI generated inventions and creative works uncertain. There are no clear, unambiguous statutory provisions regarding the creation of IP rights by AI, resulting in uncertainty about rights ownership, holding, and enforcement. In addition, variations in

IP policies on AI matters, such as the rights and access to and over AI tools, and how those are regulated, make cross-border disputes more likely and international harmonisation more difficult. A few countries and international organizations have launched discussions on adapting IP frameworks to the realities of innovation in the era of AI. But India is still in its infancy in building a robust legal apparatus that can reconcile technology with necessary protections for inventors, creators, and public interest. This has created a need to assess if the existing legislation is ready to tackle the issues raised by the new AI technologies.

This study is a practical evaluation of the effect of Artificial Intelligence on Indian Patents and Copyrights, through a survey of legal professionals, patent agents, academics, AI researchers and industry professionals. It examines the impact of AI on inventorship authenticity, copyright ownership, and IP protection, as well as the critical legal issues of stakeholders. The study outlines practical recommendations for reform priorities based on the empirical results that will enhance the IP governance framework in India and foster more harmonisation with international standards.

2 LITERATURE REVIEW

The current rise of AI has made a huge impact on the field of IP and the way machines are now generating creations such as inventions, artistic pieces, software and more, with little human effort required [1]. It has upset the long-standing nature of patent and copyright law which confers rights on a human inventor or author [2]. As a result, scholars have been looking closely at the legal, ethical, and policy aspects of AI-generated IP. The current patent laws in various countries, such as India, do not explicitly provide for AI systems as inventors, creating potential confusion over who can be considered the owner and who can claim patent rights for AI-assisted inventions [3-4]. Likewise, copyright experts have pointed out that AI-sourced literary, artistic, and musical creations raise the question of authorship and copyright ownership as copyright law typically requires a human creative mind as a precondition for protection [5]. Such restrictions have led to extensive debate on the need for updating the IP system to fit the context of new technologies and systems of AI [6].

Comparative legal research shows that some countries have already started to have discussions about the policy and judicial considerations of AI created inventions and works of creativity, such as the UK, the USA and European Union member countries [7]. While none of these jurisdictions have codified a legal definition of the independent legal personhood of AI systems, they have proposed frameworks that establish ownership, increase transparency, and suggest responsible [8] AI innovation. Unlike India's IP landscape, which is more traditional, there are practical hurdles in enforcing IP rights for innovations created using AI and the risks of uncertainty in the law. In addition, a few researchers have explored how adopting AI has led to higher intellectual property conflicts [9]. Ambiguous ownership of AI-generated IP, determination of inventorship, IP infringement, data usage, transparency of algorithms, and cross-border enforcement have been widely cited as key issues for AI-generated IP. Additionally, experts suggest creating legislation specifically for AI-generated works, implementing uniform standards for disclosures of AI tools used in the creation process, fostering international collaboration, and aligning IP laws to reduce inconsistencies among jurisdictions [10].

While some of these existing studies offer conceptual and comparative analysis, they are mainly doctrinal or international in focus, and there is relatively little empirical data from the context of India. There has been limited research that has systematically analysed the perception of Indian legal professionals, patent agents, academics, AI researchers and industry players about the current patent and copyright laws in India. This research focuses on filling this void by empirically evaluating the views of stakeholders and identifying with evidence-based recommendations, the priorities for reform of the Indian IP system in the age of AI.

3 METHODOLOGY

For this study, the researcher has used the quantitative empirical research method to evaluate the impact of AI on Indian patent and copyright law and to find the need for legal reforms due to the rise of technological advancements. The research uses a structured questionnaire survey to collect the perceptions of stakeholders on various topics related to AI-generated inventions, copyright ownership, inventorship, legal uncertainty, and policy reform priorities. The general methodological steps are presented in figure 1.

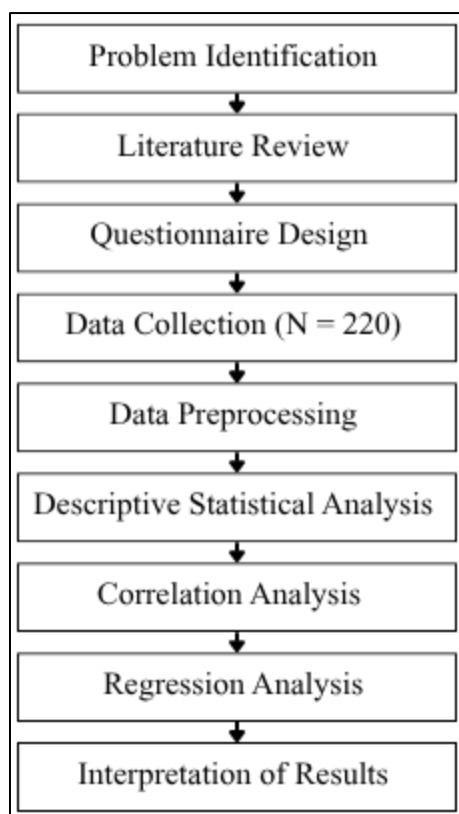


Figure 1: Proposed Framework for AI-Based Intellectual Property Law Assessment

3.1 Research Design

A descriptive/cross-sectional survey design was used to gather data from participants with a variety of professions. The study aims to assess the efficacy of the current Indian IP regime in tackling challenges in relation to AI and propose appropriate reforms for achieving greater harmonization between different IP regimes.

3.2 Data Collection

The primary data were gathered on a structured questionnaire which contained statements rated on a five-point Likert Scale ranging from strongly disagree (1) to strongly agree (5) and demographic information. Key aspects of the questionnaire were related to dimensions of AI driven inventorship, copyright ownership, legal uncertainty, cross-border issues, awareness of IP laws, and priorities for IP reform. There were 220 valid responses from legal practitioners, patent agents, academics and AI researchers and industry practitioners.

3.3 Data Analysis

The data collected was analysed with descriptive and inferential statistical methods. To summarise respondents' opinions, frequency distributions, percentages, mean values and standard deviations were calculated. To discuss the relationship between the legal awareness and the support for legal reform, Pearson correlation analysis was carried out. To find the significant factors that affect the perceived need for reform of the Indian patent and copyright law, multiple linear regression analysis was used. Data have been analysed using tabular and graphical representation for better interpretation of the results.

3.4 Research Variables

The study considers Support for Legal Reform as the dependent variable. Independent variables include Legal Awareness, AI Usage Experience, Ownership Ambiguity, Inventorship Uncertainty, Copyright Challenges, and Cross-border Legal Issues. The variables were chosen based on previous studies related to the topic of Artificial Intelligence and intellectual property governance.

The research framework proposed here assumes the growing use of AI has implications for the determination of inventorship, copyright ownership, legal certainty and international disputes over intellectual property rights. All of these factors impact on stakeholders' perceptions about the need for reform of the patent and copyright laws in India. The framework also suggests that improving clarity of the law, transparency, and encouraging international harmonization, can help improve IP governance in relation to AI.

4 RESULTS AND DISCUSSION

In this section, the empirical results are revealed from the questionnaire survey conducted to examine the effect of Artificial Intelligence on the Indian Patent and Copyright Law. The data collected were analyzed through descriptive statistics, correlation analysis, regression analysis, and Structural Equation Modeling (SEM) to analyze the stakeholders' perceptions on the problem of intellectual property issues arising from the use of AI and the need for legal reforms. The findings offer insights into the interdependencies of legal awareness, AI adoption, ownership challenges, policy preparedness, and reform agenda, aiding in the formulation of evidence-based policy recommendations to enhance the Indian IP regime.

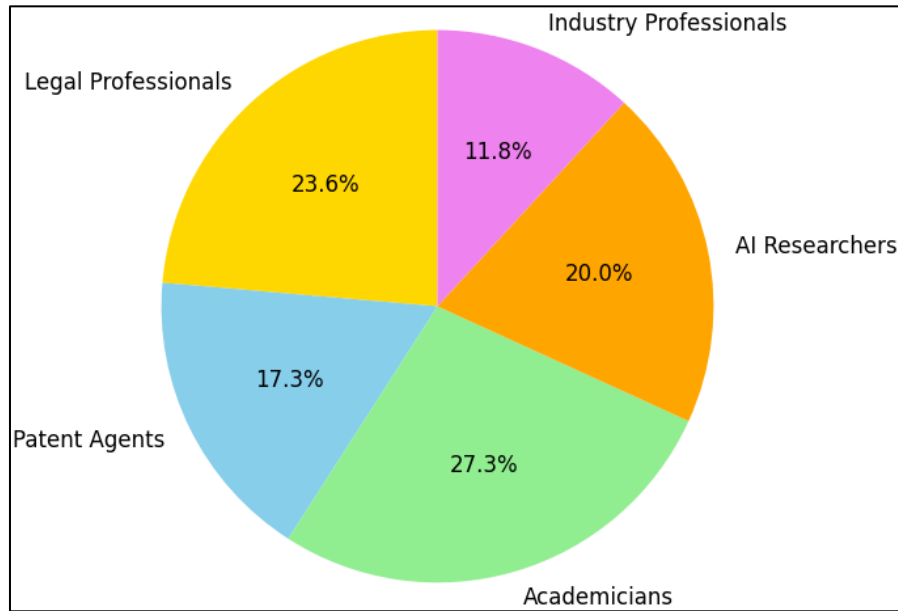


Figure 2: Distribution of respondents by profession

Figure 2 shows the distribution of respondents by profession. The survey featured a diverse mix of stakeholders, including legal professionals, patent agents, academia and AI researchers, and industry practitioners. This provides a more balanced representation from each of these groups which enhances the reliability of the empirical results by adding legal, academic, technical and industrial insights into the challenges of AI for IP protection.

Table 1: Perceived Impact of AI on Patent and Copyright Protection

Statement	Mean	SD
AI challenges inventorship determination	4.46	0.61
AI creates copyright ownership ambiguity	4.51	0.58
Existing IP laws are inadequate	4.37	0.69
AI increases legal disputes	4.29	0.74
AI requires regulatory intervention	4.63	0.54

Table 1 below indicates the respondents' views on the effect of AI on patent and copyright protection. The need for regulatory intervention received the highest average score (4.63), suggesting a high level of agreement that the current legal framework needs updating to address AI-related challenges. The strong agreement was also seen with respect to copyright ownership ambiguity (Mean = 4.51) and complicated inventorship determination (Mean = 4.46). Moreover, the high mean scores of inadequate IP laws (4.37) and growing legal conflicts (4.29), indicate the general dissatisfaction with the existing Indian IP laws in regulating AI-generated inventions and creative works.

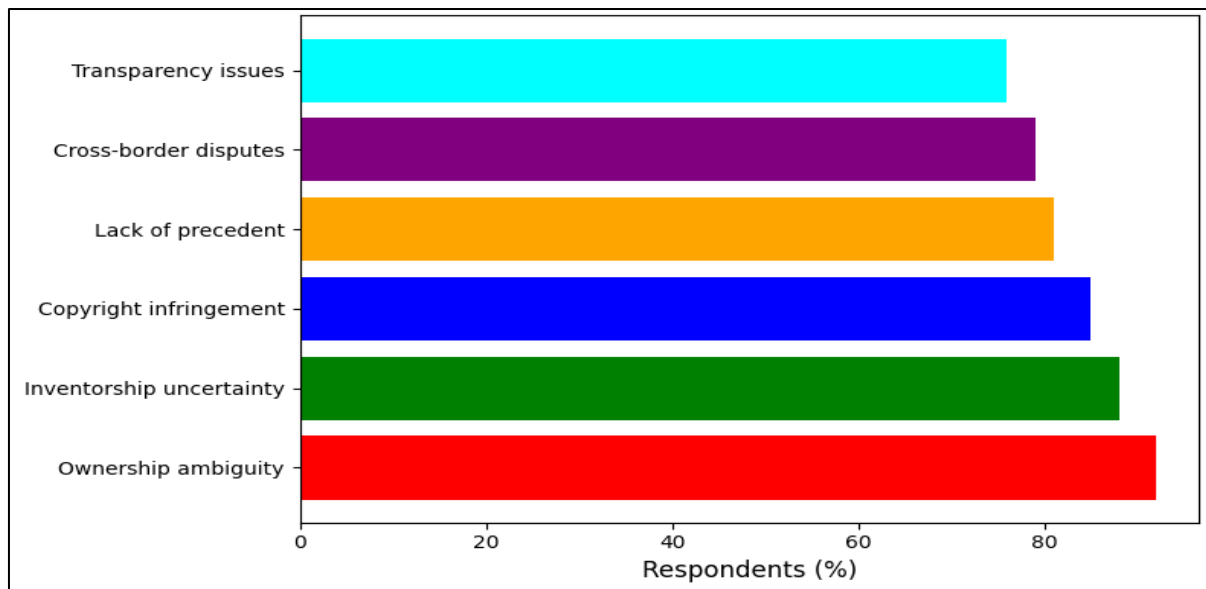


Figure 3: Major legal challenges due to AI

As seen from figure 3, the key legal issues of AI are highlighted. The top issues were ownership ambiguity, inventorship uncertainty, copyright concerns, no legal precedent, cross border concerns and transparency issues with AI. The findings indicate that AI-driven innovations raise intricate legal issues that are hard to navigate within the current IP framework, highlighting the urgent demand for comprehensive changes in legislation.

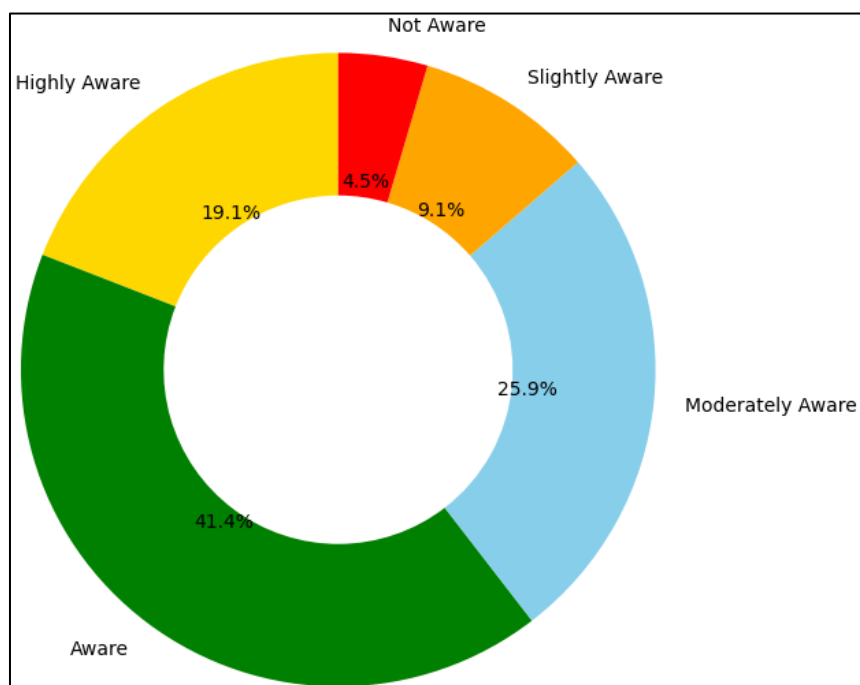


Figure 4: Awareness level of respondents

Figure 4 illustrates about respondents' awareness of existing Indian intellectual property laws. The majority said they were fairly aware of the current legislation, and fewer people said they were aware of it. The majority said they were moderately aware of the current legislation, and few said they were limitedly aware of it. The distribution indicates that the answers to the survey questions are grounded in a fair degree of knowledge about patent/copyright laws; this enhances the credibility of the empirical results.

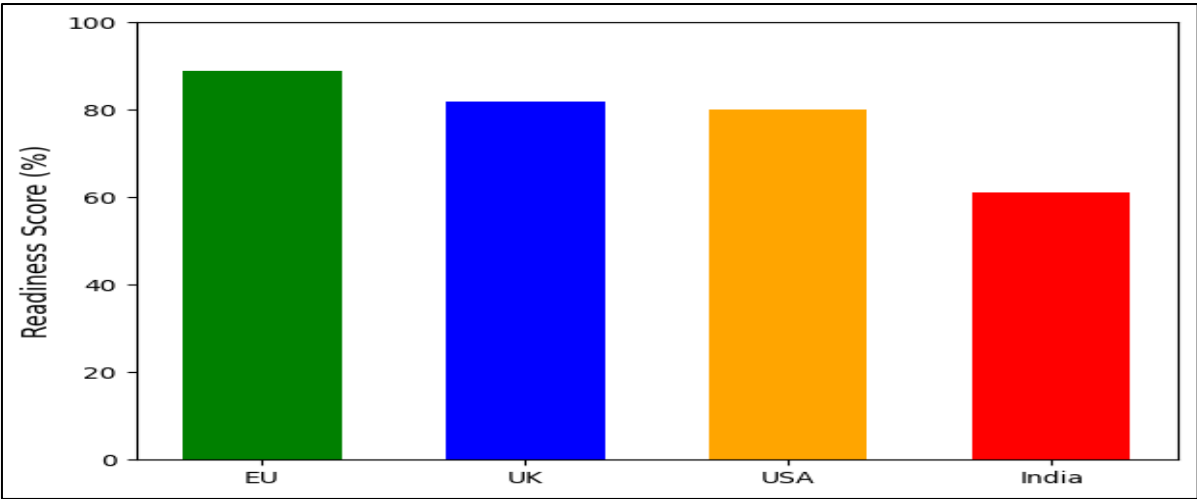


Figure 5: Comparison of AI-IP policy readiness

Figure 5 shows a comparison of the intellectual property policy readiness of various jurisdictions concerning AI. The EU was the most ready, with the UK and the USA coming in second, while India was relatively un-ready. The analysis suggests that the existing IP regime in India needs to be fine-tuned through policy-making and law reforms, to be aligned with the international standards.

Table 2: Correlation Between Legal Awareness and Support for Reform

Variable	Correlation (r)	p-value
Awareness vs Reform Support	0.74	<0.001

The relationship between legal awareness and support for legal reform is provided in Table 2. There is a strong positive correlation ($r = 0.74$, $p < 0.001$) between the level of knowledge about intellectual property laws and the support for reform measures to deal with legal issues related to AI. The significant correlation indicates that awareness level is an important factor in determining stakeholders' perceptions about the need to update the Indian patent and copyright law.

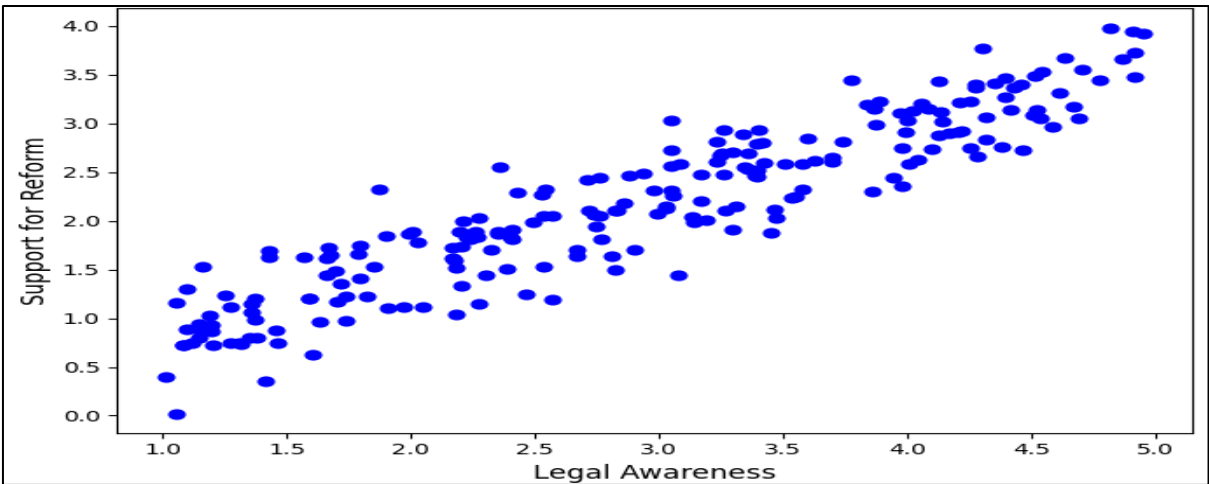


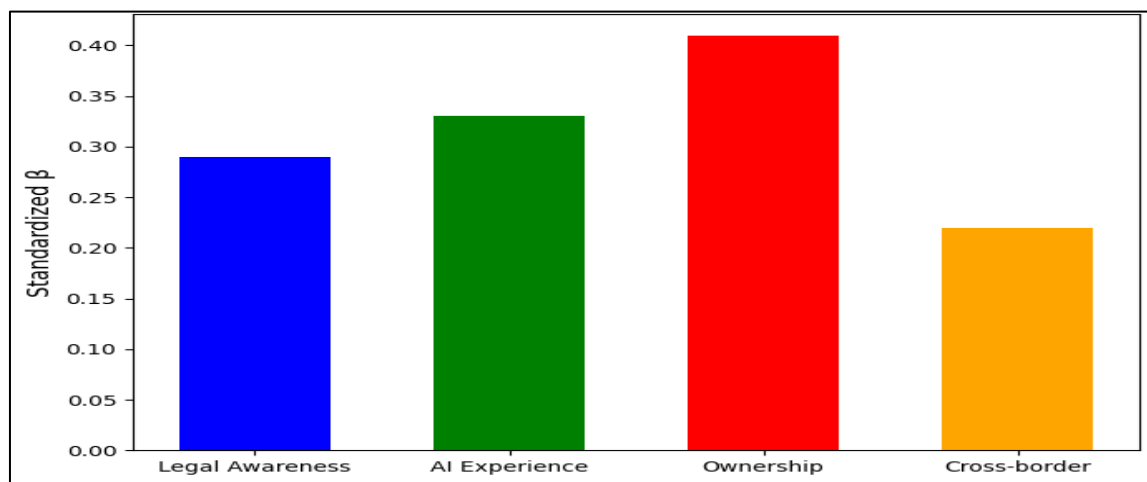
Figure 6: Scatter plot showing positive correlation

As can be seen in figure 6, there is a positive correlation between the awareness of law and support for law reform. From the scatter plot, it is evident that there is an upward trend, suggesting that individuals with more knowledge of patent and copyright laws are more willing to support reforms in the legal framework concerning AI-related IP issues. This positive correlation indicates that legal awareness has a significant effect on stakeholders' perception of the need for modernizing existing laws. The results indicate that knowledge and education about AI and IP could be useful to support the process of policy dialogue and promote greater receptivity to policy change.

Table 3: Regression Analysis

Predictor	β	t-value	p-value
Legal Awareness	0.29	5.94	<0.001
AI Usage Experience	0.33	6.88	<0.001
Ownership Concerns	0.41	8.11	<0.001
Cross-border Issues	0.22	4.97	<0.001

The results of the regression analysis on the factors affecting support for the legal reform are summarized in Table 3. The ownership concerns had the highest positive impact ($\beta = 0.41$) to be followed by AI usage experience ($\beta = 0.33$), legal awareness ($\beta = 0.29$) and cross-border issues ($\beta = 0.22$). All predictors were shown to be statistically significant ($p < 0.001$) suggesting that all of the above variables collectively contribute to stakeholders' need for AI specific IP reform. The findings illustrate that experience using AI and knowledge of legal constraints have significant impacts on reform priorities.

**Figure 7: Standardized regression coefficients**

The standardized regression coefficients of the variables affecting support for legal reform are shown in figure 7. The strongest predictor of reform demand is the ownership concerns regression coefficient, which suggests that uncertainty over who owns AI-created intellectual property is the highest. Experience with using AI and legal awareness also show strong positive impacts and cross-border legal issues moderately positively impact reform support. The comparison shows that the attitudes of the stakeholders towards revisiting Indian patent and copyright law are heavily influenced by practical application of AI, and their awareness of current legal constraints.

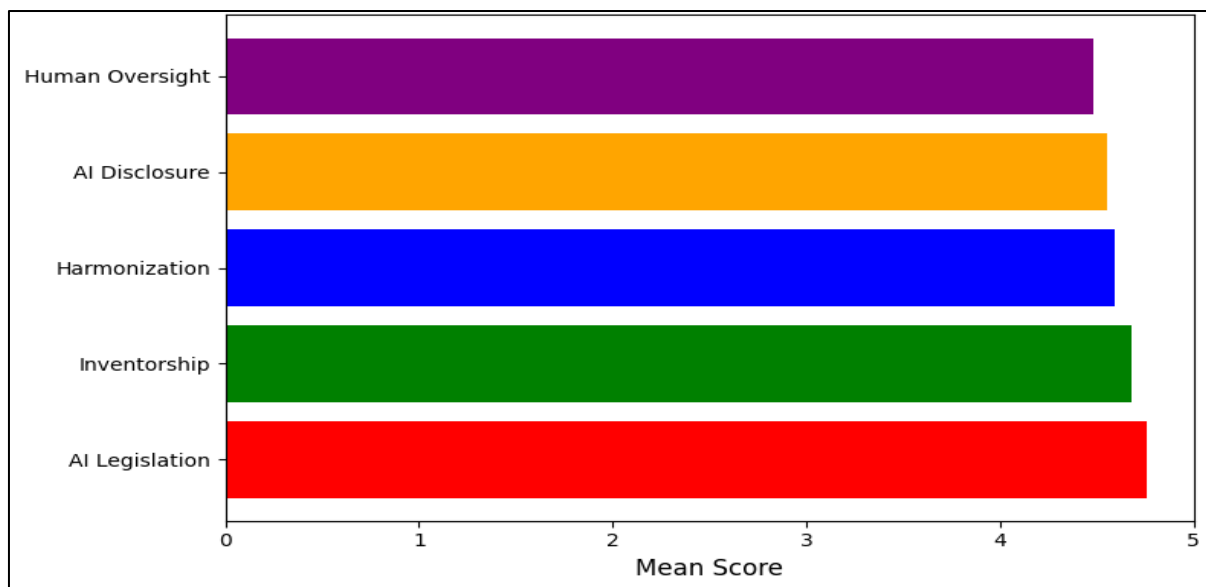


Figure 8: Ranking of reform priorities

Figure 8 shows respondents' ratings of the proposed priorities for legal reform. Clear inventorship rules and international harmonization of intellectual property laws were also important, as were laws specific to AI. The mandatory disclosure of AI involvement and the need for human oversight also were well received. These results suggest that a holistic framework that establishes ownership rights, promotes transparency, and adapts the Indian IP framework to meet evolving global best practices is desirable.

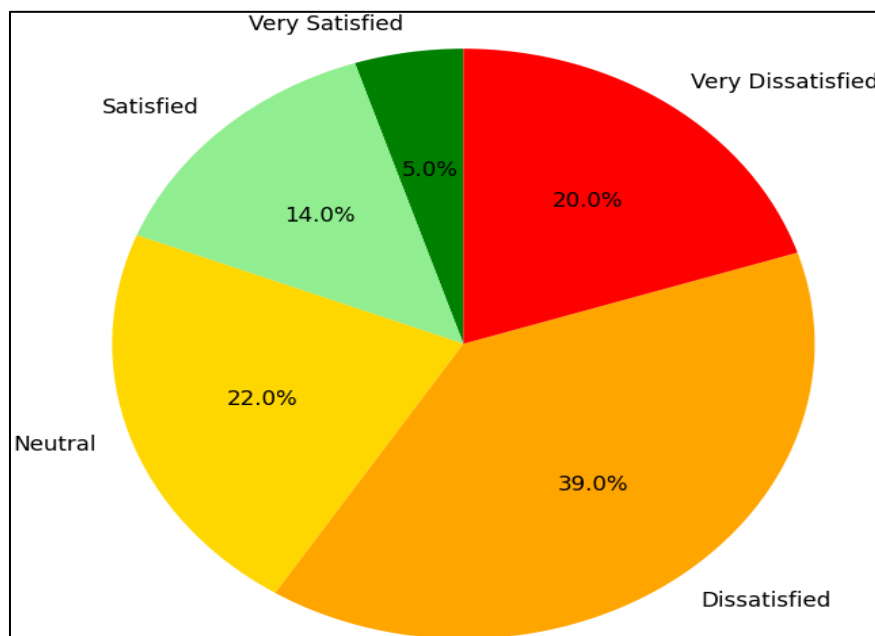


Figure 9: Satisfaction with Existing India IP Framework

Figure 9 reflects respondents' satisfaction on the current IP system in India. Many respondents were not satisfied or strongly not satisfied with the scope and application of existing laws regarding legal protection of inventions and creative works created with the aid of AI, with only few respondents reporting satisfaction. This distribution is indicative of the general anxiety over the capacity of current patent and copyright legislation to keep up with new technology. The results echo the need for holistic legislative overhaul to offer more legal clarity, better enforcement and embrace AI innovation.

Table 4: Structural Equation Model (SEM) Results

Relationship	Path Coefficient	p-value
AI Adoption → Ownership Ambiguity	0.79	<0.001
Ownership Ambiguity → Reform Need	0.72	<0.001
Legal Awareness → Reform Need	0.46	<0.001
International Discrepancies → Reform Need	0.68	<0.001

The results of SEM used to explore the relations between the key variables in the research are presented in Table 4. The ownership ambiguity showed the highest path coefficient value of 0.79 with the adoption of AI, and with the ownership ambiguity, the value of the path coefficient was 0.72 with the perceived need for legal reform. Other significant positive relationships with reform requirements were attained for legal awareness (0.46) and international legal discrepancies (0.68). All the relationships were found to be statistically significant ($p < 0.001$), which confirms the conceptual framework proposed and highlights the significant role of legal uncertainties in the need for modernization of the Indian patent and copyright law with the help of AI.

the empirical results clearly show that AI is posing huge problems in terms of inventorship, authorship, ownership, and protection of IP rights under the Indian copyright law. The statistical analyses show that the four areas of legal awareness, ownership ambiguity, AI use, and international legal inconsistencies are key drivers of stakeholders' expectations for legislative reform. The findings confirm the need for AI-specific legislation, clear and harmonised ownership rules, increased transparency in the regulatory framework, and more international harmonisation. These reforms would enhance legal clarity, bolster IP rights, and foster responsible innovation using AI in India's rapidly changing technological landscape.

5 CONCLUSION

The study focused on measuring the effect of AI on Indian patent and copyright laws in an empirical way and illustrated the increasing legal issues that may arise from AI assisted inventions and creations. The results indicate a number of serious issues concerning inventorship, authorship, ownership uncertainty, and the lack of proper legal instruments to deal with new technologies that are emerging with AI. The analysis also reveals high levels of stakeholder support for more comprehensive legal reforms and the closer of legal frameworks to international IP standards. In this context, the study suggests the implementation of legislation with provisions specific to AI, enhanced clarity in ownership rules, establishing AI disclosure requirements, and international harmonization efforts to bolster India's IP regime and foster responsible innovation and legal certainty.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

Authors declare no conflict of interest.

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