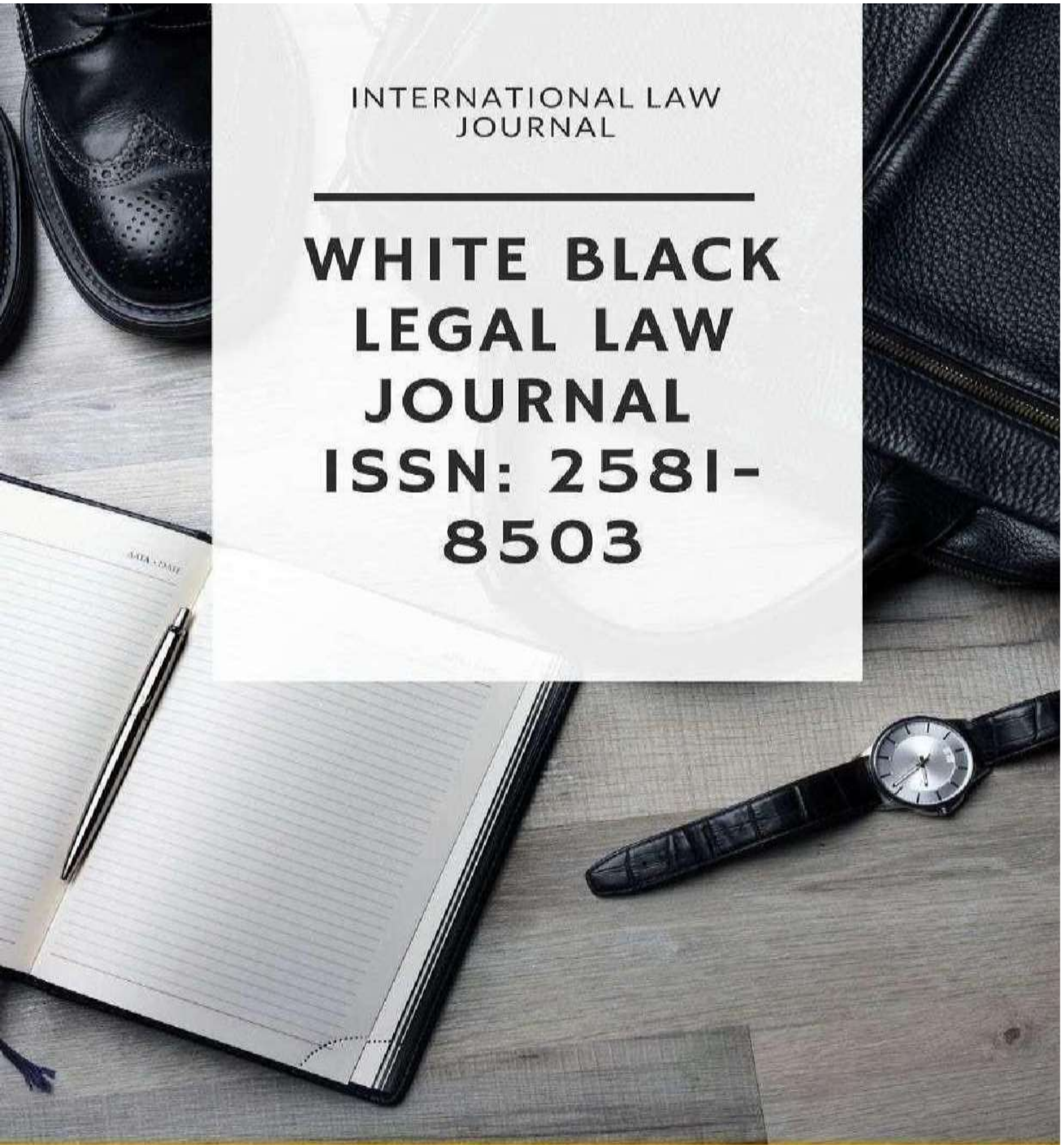

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JUDICIAL APPROACHES TO PATENT ELIGIBILITY OF COMPUTER IMPLEMENTED INVENTIONS IN INDIA: A CONTEMPORARY DOCTRINAL ANALYSIS

AUTHORED BY - HARRIET THOMAS

Abstract

India's patent regime faces ongoing challenges in defining the scope of patentable computer-implemented inventions (CIIs) in a rapidly evolving digital economy. Section 3(k) of the Patents Act, 1970, excludes "a mathematical or business method or a computer programme per se or algorithms," yet courts increasingly confront inventions that integrate software with hardware, communication protocols, and automated architectures. This doctrinal study analyzes landmark cases, including *Ferid Allani*, *OpenTV*, *Microsoft Technology Licensing*, and telecom disputes involving *Ericsson*, to trace the evolution of judicial interpretation of Section 3(k). The research identifies a three-stage judicial test: evaluating the substantive inventive contribution, determining whether the contribution is claimed per se as a mathematical or abstract algorithm, and assessing the presence of a demonstrable technical effect. Findings reveal a gradual shift toward a balanced framework that reconciles statutory fidelity with technological realities, particularly in artificial intelligence, machine learning, and platform-based systems. Despite progress, challenges remain, including inconsistent examiner discretion, complex claim drafting, and uncertainties in emerging technologies. The study concludes that India is forging a nuanced, globally aligned jurisprudence that encourages innovation while safeguarding public access and interoperability.

Keywords: *Computer-Implemented Inventions, Technical Effect, Software Patents, Artificial Intelligence, Algorithmic Innovation, Legal Certainty.*

Introduction

The Indian patent system stands at the crossroads of technological innovation and legal tradition. As computer-implemented inventions ("CIIs") increasingly underpin emerging sectors such as telecommunications, fintech, artificial intelligence, and automated control systems,[1] courts are confronted with the complex question of whether software-enabled innovations merit patent protection under the Patents Act, 1970. Section 3(k) of the Act excludes from patentability "a mathematical or business method or a computer programme per se or algorithms,"[2] reflecting a legislative intent to prevent monopolies over abstract ideas while balancing public access and industrial development.

However, the digital economy has blurred the line between abstract software and patentable technical innovation. Courts now grapple with inventions that integrate algorithms with hardware, communication protocols, and automated architectures. In this context, judicial interpretation has emerged as the principal mechanism for defining the threshold of patent eligibility, focusing on the technical effect or contribution of the invention rather than its mere software content.

The primary objective of this doctrinal research is to examine how Indian courts have interpreted Section 3(k) in the context of CIIs, to identify the doctrinal patterns, and to propose a coherent framework for assessing patentability of algorithm-driven and AI-based inventions.

Research Objective

- To targets the core uncertainty in section 3(k) jurisprudence. By examining inconsistencies in Patent Office and IPAB decisions, comparing Indian practice with structured tests used in other jurisdictions, and to propose a principled threshold grounded in technical contribution rather than claim form.
- To brings the issue into a contemporary technological context. It probes whether the "technical effect" requirement meaningfully captures AI innovation, or section 3(k) unintentionally excludes genuine technological advances simply because they are mathematically intensive.
- To focus on institutional design and rule of law concerns. And open space to analyse variability in examination outcomes, the risks of forum- or examiner-dependent patentability, and whether clearer legislative guidance or binding judicial tests are needed.

[1] *Analysis of Section 3(k) of the Patents Act in Light of Case Studies, Global Patent Filing (Sept. 18, 2023), https://www.globalpatentfiling.com/blog/Analysis-of-Section-3-k-of-the-Patents-Act-in-light-of-Case-Studies*
[2] *Demystifying Section 3(k) of the Indian Patents Act, SSRana (Feb. 28, 2024), https://ssrana.in/articles/demystifying-section-3k-of-the-indian-patents-act/*

Research Questions

1. Distinction Between Mathematical Methods and Technical Applications: How can Indian patent law develop a coherent doctrinal test to distinguish excluded mathematical methods from patent-eligible technical applications in algorithm-driven inventions?
2. AI and Machine Learning Innovations: Does the current interpretation of Section 3(k) adequately accommodate artificial intelligence and machine-learning inventions, where mathematical models constitute the substantive inventive contribution?
3. Examiner Discretion and Legal Certainty: To what extent does examiner discretion under Section 3(k) undermine legal certainty and uniformity in patent examination, and should India adopt clearer statutory or judicial guidelines for mathematical and algorithmic inventions?

Scope of the Study

By systematically analyzing statutory provisions, patent office guidelines, and leading case law, including Ferid Allani, OpenTV, Microsoft Technology Licensing, and Ericsson-related disputes, this study contributes to the doctrinal understanding of software patentability in India. It argues that the judiciary is progressively adopting a nuanced approach that balances technological innovation with public policy concerns, yet legal uncertainty persists, particularly in the context of AI, machine learning, and platform-based services.

Statutory and Regulatory Framework

<u>Section 3(k) of the Patents Act, 1970</u>

Section 3(k) of the Indian Patents Act enumerates subject matter that is excluded from patentability. It explicitly bars patents for:[3]

“a mathematical or business method or a computer programme per se or algorithms”.

The legislative intent behind Section 3(k) is twofold: first, to prevent monopolization of abstract ideas that could stifle innovation; second, to preserve public access to foundational methods, especially in the software sector. Notably, the statutory language does not define “per se,” creating interpretive ambiguity that has persisted for decades. India’s patent system has undergone continuous transformation as it responds to the demands of a technology-driven

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[3] *Analysis of Section 3(k) of the Patents Act in Light of Case Studies, GLOBAL PATENT FILING (Sept. 18, 2023), https://www.globalpatentfiling.com/blog/Analysis-of-Section-3-k-of-the-Patents-Act-in-light-of-Case-Studies.*

economy. Computer implemented inventions ("CIIs") sit at the intersection of patent law, software innovation, and commercial strategy in emerging sectors such as telecommunications, fintech, artificial intelligence ("AI"), and automated control systems.[4]

Courts and tribunals have emphasized that Section 3(k) is a threshold filter rather than a commentary on novelty or inventive step. The crux lies in determining when a computer program transitions from an abstract algorithm to a patentable technical solution. Early parliamentary debates indicate that the exclusion was meant to protect domestic software industries that historically relied on open code and collaborative practices. This exclusion reflects a legislative intent to prevent monopolies over abstract ideas or mental steps, yet it was drafted at a time when software was not as integral to technological progress as it is today.

The primary question courts now confront is whether and when a software-enabled invention demonstrates the type of technical contribution necessary to qualify for patent protection. Judicial interpretation has become the principal mechanism for evolving this boundary. Through a doctrinal examination of ten major cases, this article analyzes how Indian courts have interpreted technical effect, inventive step, claim construction, and the legal significance of patent office guidelines.

Patent Office Guidelines

The Indian Patent Office (IPO) has issued multiple sets of guidelines for computer-related inventions (CRIs):[5]

1. 2013 Guidelines: Adopted a restrictive reading of Section 3(k), generally rejecting software claims.
2. 2015–2016 Guidelines: Attempted a more balanced approach but were criticized for inconsistency and withdrawn.
3. 2017 & 2019 Guidelines: Focused on "technical effect" and "technical contribution" as central criteria for patentability.

While not legally binding, these guidelines provide courts with insight into administrative interpretation, which often influences judicial reasoning.[6]

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[4] *Demystifying Section 3(k) of the Indian Patents Act, SSRANA (Feb. 28, 2024), https://ssrana.in/articles/demystifying-section-3k-of-the-indian-patents-act/.*

[5] *Office of the Controller General of Patents, Designs & Trade Marks, Guidelines for Examination of Computer Related Inventions (2013).*

[6] *Office of the Controller General of Patents, Designs & Trade Marks, Revised Guidelines for Examination of Computer Related Inventions*

Interplay with Other Provisions

Section 2(1)(ja) defines "inventive step" as a feature that provides a technical advance or economic significance.[7] Courts increasingly use this provision alongside Section 3(k) to evaluate whether software-enabled inventions exhibit true technical innovation. Comparative analysis with the European Union's "technical effect" test and the U.S. "Alice/Mayo" [8]framework demonstrates that Indian jurisprudence is carving a **distinctively pragmatic approach**, prioritizing functionality over abstract form.

Industrial applicability

To understand when software deserves patent protection is to think of it like a navigation system in a car. A simple map stored on a phone is like a basic computer program. It only shows information and does not change how the car works. This is similar to a "computer programme per se" under Section 3(k), which is excluded.[9] But when the navigation software is integrated with sensors, traffic systems, and engine controls to automatically reroute the car and optimize fuel use, it becomes part of a technical system. At that stage, the software is no longer just code. It produces a real technical effect. Indian courts, as discussed in your paper, increasingly protect this second category because it solves a technical problem in a practical way.[10]

In the context of industrial applicability, software is protected when it functions like a machine component rather than a digital instruction manual. For example, a word-processing program only helps humans write and edit text. It does not improve any industrial process. Such software usually fails under Section 3(k). In contrast, software that controls robotic arms in a factory, manages telecom networks, or regulates payment authentication systems directly affects industrial operations. It becomes comparable to a gear or circuit in a machine. Your document highlights that Indian courts now focus on this functional role, especially in telecom, fintech, and AI systems, where algorithms are inseparable from infrastructure.

Apart from the United States, several major jurisdictions protect software under their patent laws when it shows technical contribution. The European Union, under the European Patent Convention, allows patents for "computer-implemented inventions" that produce a technical effect, such as improved data transmission or memory management. Japan recognizes software

[7] *The Patents Act, 1970, § 2(1)(ja) (India).*

[8] *Alice Corp. v. CLS Bank Int'l, 573 U.S. 208 (2014); Aerotel Ltd. v. Telco Holdings Ltd., [2006] EWCA (Civ) 1371 (UK) (technical effect approach).*

[9] *The Patents Act, 1970, § 3(k) (India).*

[10] *Ferid Allani v. Union of India, 2019 SCC OnLine Del 11867 (India).*

patents when information processing is concretely realized using hardware resources. China also permits software-related patents if the invention combines algorithms with technical features and solves a technical problem.[11] These systems resemble the Indian approach after *Ferid Allani*, where protection depends on substance rather than labels. Your research reflects that India is gradually aligning with this European and East Asian model rather than the more restrictive American "abstract idea" framework.

The legal philosophy behind covering certain software under patent law is mainly grounded in utilitarian and incentive-based theory. Patent law exists to encourage socially useful innovation by granting temporary monopolies. If a software invention improves network speed, reduces system crashes, or enhances cybersecurity, it benefits society in concrete ways. Granting protection motivates developers to invest in such costly research. Your paper reflects this by emphasizing that courts look for "technical effect" as proof of real social and industrial value.[12]

At the same time, Indian law is influenced by the public domain and anti-monopoly philosophy. Section 3(k) reflects the belief that abstract ideas, formulas, and pure algorithms belong to everyone. If basic software logic were monopolized, innovation would slow down and small developers would be excluded. This approach is rooted in classical patent theory that distinguishes between "discoveries" and "applications." Mathematical models are discoveries. Their practical technical use is invention. Your document repeatedly shows that courts try to preserve this balance by filtering out abstract claims while protecting applied technologies.

Third philosophical foundation visible in Indian jurisprudence is techno-functionalism. This approach judges inventions by what they actually do in the real world. Instead of asking "Is this software?", courts ask "Does this improve how a system functions?" If the answer is yes, protection is justified.[13] This explains the three-stage test discussed in your paper: identifying contribution, excluding per se algorithms, and verifying technical effect. It reflects a modern understanding that in digital industries, innovation often lies in functional architecture rather than physical parts.[14]

In conclusion, software needs protection under the Patents Act when it behaves like a working part of an industrial system rather than a standalone set of instructions. Countries such as those in the EU, Japan, and China follow similar models, showing that India is not isolated in this approach. Philosophically, this framework rests on three pillars: rewarding useful innovation,

[11] *Guidelines for Patent Examination, China National Intellectual Property Administration (CNIPA), Part II, ch.9.*
[12] *Ericsson v. Intex Techs. (India) Ltd., 2015 SCC OnLine Del 13647 (India).*
[13] *Ferid Allani v. Union of India, 2019 SCC OnLine Del 11867 (India).*
[14] *Office of the Controller General of Patents, Designs & Trade Marks, Revised Guidelines for Examination of Computer Related Inventions (CRIs) (2017).*

preserving the public domain, and evaluating inventions through their real technical function. Your document demonstrates that Indian courts are consciously building this balance to accommodate AI and platform technologies without surrendering core patent principles.[15]

Doctrinal Analysis: Judicial Approaches

Early Jurisprudence: Inconsistent Interpretations

Before 2019, Indian courts and tribunals struggled to develop a stable and predictable approach to Section 3(k). Although they consistently claimed to focus on the "substance" of inventions rather than their wording, in practice their reasoning varied from case to case. This led to uncertainty for applicants, who often could not anticipate whether their software-related inventions would be accepted or rejected. The absence of a clear doctrinal test meant that outcomes depended heavily on individual examiners and tribunal members rather than on settled legal principles. In Yahoo! Inc. v. Controller of Patents (2011), the IPAB dealt with a patent application relating to instant messaging. The applicant argued that the invention involved technical processing of messages over a network. However, the tribunal focused on the underlying function of the invention and held that it merely computerized a known method of communication. Since sending messages between users was already a common business and social activity, implementing it through software did not amount to technical innovation. The tribunal treated the invention as a business method in digital form and excluded it under Section 3(k). This decision reflected an early tendency to equate digitisation with non-patentability, without deeply examining whether the software improved network performance or system efficiency.

In Accenture Global Services GmbH v. Assistant Controller (2012), the IPAB examined software used in financial and business processes. The applicant claimed that the invention optimized workflow and data handling. However, the tribunal held that efficiency in business operations, even if achieved through sophisticated software, was not enough to qualify as a technical contribution. It emphasised that unless the software produced a "technical transformation" in the system itself, such as improving hardware functioning or data transmission mechanisms, it would remain excluded. This judgment reinforced the view that commercial usefulness alone could not justify patent protection. At the same time, it did not clearly explain what level of technical change would be sufficient, leaving the standard vague. The decision in Section 3(K) illustrates the restrictive approach taken toward mathematically

[15] *European Patent Convention art. 52; Japan Patent Act; CNIPA Guidelines.*

driven inventions. In this case, the invention involved calculating chaos theory exponents using a computer system. Although the computation was performed through specialized software and hardware, the tribunal focused on the mathematical nature of the contribution. It held that the core of the invention lay in a mathematical formula and not in any technological improvement to the computer system. Therefore, it was rejected as a mathematical method implemented on a computer. This case shows that tribunals often treated mathematical intensity as a reason for exclusion, even when the invention had potential scientific or engineering applications.

Taken together, these decisions show that pre-2019 jurisprudence was driven more by suspicion of software patents than by a structured legal test. Courts and tribunals were primarily concerned with preventing monopolies over abstract ideas and business practices. While this objective was legitimate, it led to an overly cautious approach. Instead of carefully analysing whether software produced a real technical effect, many decisions relied on broad labels such as "business method," "algorithm," or "mathematical model."

Another major problem during this period was inconsistency in reasoning. In some cases, tribunals demanded evidence of hardware-level improvement. In others, they focused mainly on the commercial nature of the invention. There was no uniform explanation of what "technical effect" actually meant. As a result, similar inventions could receive different treatment depending on the examiner or bench involved. This undermined legal certainty and discouraged investment in software-based research.

Because of this doctrinal instability, applicants became heavily dependent on examiner discretion. Patentability often turned on how well claims were drafted rather than on the actual technological merit of the invention. Skilled drafting could sometimes mask the software nature of an invention, while poorly framed claims could lead to rejection even for genuinely innovative systems. This situation weakened confidence in the patent system and made enforcement and licensing difficult. In essence, the pre-2019 phase was marked by a defensive and fragmented interpretation of Section 3(k). Although tribunals aimed to preserve the public domain and prevent abuse of patent rights, they failed to develop a coherent framework for evaluating computer-implemented inventions. This vacuum in doctrinal clarity ultimately made judicial intervention necessary, which later came through decisions like Ferid Allani. The post-2019 shift can be understood as a response to these early shortcomings and uncertainties.

<u>The turning point through Ferid Allani case</u>

The decision in Ferid Allani v. Union of India (2019) marks a clear turning point in Indian software patent jurisprudence because it shifted the focus from rigid exclusion to functional evaluation. Before this case, patent authorities often rejected software-related inventions almost automatically by citing Section 3(k), without examining what the invention actually achieved. The Delhi High Court strongly criticised this practice and held that such "mechanical" application of the law was inconsistent with the objectives of the Patents Act in a modern, technology-driven economy. In this case, the petitioner had filed a patent application relating to a method and device for accessing web information. The Patent Office had rejected it mainly on the ground that it involved a computer program. The High Court found this approach legally flawed. It observed that merely because an invention is implemented through software does not mean it should be excluded. What matters is whether the invention produces a technical effect or solves a technical problem. The Court made it clear that Section 3(k) is not meant to block all digital or software-based inventions, but only those that are purely abstract. A major contribution of the judgment was its emphasis on "technical effect" and "technical contribution" as the real tests of patentability. The Court explained that if a computer program improves the functioning of a system, enhances efficiency, optimizes resource usage, increases speed, improves security, or enables better data processing, it may qualify for patent protection. In other words, when software makes a machine or network work better, faster, or more reliably, it moves beyond being a mere program and becomes a technological innovation. The Court also rejected the idea that patent examiners should focus only on the form of claims. Earlier, many applications were rejected simply because the word "software" or "algorithm" appeared in them. In Ferid Allani, the Court insisted that claims must be read as a whole and in context. It stated that authorities must examine the actual contribution of the invention, not just its linguistic structure. This marked a shift from a formalistic approach to a substance-based approach. Another important aspect of the judgment was its recognition of changing technological realities. The Court acknowledged that in the modern digital economy, most inventions in fields like telecommunications, AI, fintech, and data systems are driven by software. If all such inventions were excluded, India would fall behind in global innovation. Therefore, patent law must evolve with technology while remaining faithful to statutory limits. This reflects a pragmatic and forward-looking judicial mindset.

The judgment also drew inspiration from international practice, particularly European jurisprudence, which allows patents for computer-implemented inventions that produce technical effects. Without directly importing foreign tests, the Court aligned Indian law with global standards. This helped position India as a more predictable and innovation-friendly jurisdiction for technology companies and researchers. Most importantly, Ferid Allani laid down a guiding principle: computer programs are not automatically excluded, but only those that are claimed "per se" without any technical application. When a program is embedded in a system and contributes to its technical functioning, it deserves to be assessed on normal patentability criteria like novelty and inventive step. This clarified that Section 3(k) is a threshold filter, not a blanket ban.

After this judgment, courts and examiners were expected to adopt a more balanced and reasoned approach. Subsequent cases began referring to technical effect and functional contribution instead of relying solely on exclusions. As a result, Ferid Allani reshaped judicial reasoning by introducing consistency, flexibility, and technological sensitivity into software patent evaluation. In essence, Ferid Allani transformed Indian patent law from a defensive, exclusion-oriented regime into a more nuanced and innovation-sensitive framework. It recognised that in the digital age, software is often the heart of technological progress. By protecting programs that genuinely contribute to technology, while still excluding abstract ideas, the judgment restored balance between innovation incentives and public interest.

Subsequent Developments and High Court Refinements

Post-Ferid Allani decisions reveal emerging coherence:

1. OpenTV Inc. v. Controller of Patents (2023): Highlighted that improved content delivery systems may be patentable when they demonstrate technical innovation.
2. Microsoft Technology Licensing v. Assistant Controller (2023): Innovations in operating system architecture were recognized for technical effect, emphasizing functional assessment over labels.
3. Ericsson v. Intex (2023) & Comviva Technologies Ltd. (2024): Courts acknowledged that telecom and payment-processing inventions, which combine hardware and algorithmic elements, could not be dismissed as mere algorithms. These decisions reflect judicial sensitivity to real-world technological complexity.
4. BlackBerry Ltd. v. Controller of Patents (2024): Reinforced the principle that claims must be analyzed as a whole; superficial labels like "algorithm" or "software" cannot trigger automatic exclusion.
5. Kroll Information Assurance LLC v. Controller General (2025): Upheld refusal where the claimed invention lacked tangible technical effect, confirming limits to the flexibility under Section 3(k).

Emerging Judicial Test under Section 3(k)

Over time, especially after Ferid Allani and later High Court decisions, Indian courts have gradually developed a practical and functional method for examining software-related inventions. Instead of relying only on rigid statutory wording, judges now follow an implicit three-stage test that focuses on what the invention actually contributes to technology. This test helps separate genuine technological innovations from abstract ideas disguised as inventions.

The first stage is to identify the actual contribution of the invention. At this step, courts do not look at individual sentences or technical jargon in isolation. Instead, they read the patent claims as a whole. The objective is to understand what the inventor has really added to existing knowledge. For example, the court asks: Is this invention merely performing known steps on a computer, or is it introducing a new way of operating a system? This prevents applicants from gaining protection simply by clever drafting. Even if a claim is written in complex technical language, the court looks beyond form to substance and examines the real inventive input.

The second stage is to check whether the invention falls under "per se" exclusion. Here, the court examines whether the core contribution is nothing more than a mathematical formula, algorithm, business method, or abstract logic. If the invention only involves calculations, decision rules, or data processing without any technical application, it is treated as excluded subject matter. The word "per se" is crucial. It means that only pure and standalone abstractions are barred. If the invention is nothing but logic running on a computer, it fails at this stage. This step ensures that fundamental ideas, methods, and formulas remain freely available to everyone.

The third stage is to evaluate technical effect or technical problem-solving. If the invention survives the second stage, the court then asks whether it produces a real and demonstrable technical outcome. This includes improvements such as faster data transmission, reduced memory usage, better network stability, enhanced security, improved hardware interaction, or more efficient system control. The focus is on practical technological results, not just intellectual or commercial benefits. The invention must make a machine, system, or network work better in a measurable way. If no such effect is shown, the invention is excluded even if it appears sophisticated.

An important feature of this framework is that failure at the second or third stage leads to rejection under Section 3(k) itself, without moving to novelty or inventive step. This means that courts treat Section 3(k) as a preliminary filter. Only if an invention passes this threshold is it examined for originality and non-obviousness. This avoids wasting judicial and administrative resources on claims that are fundamentally ineligible.

This three-stage approach also reflects a careful balancing of competing interests. On one hand, it protects the public domain by ensuring that mathematical methods and abstract reasoning cannot be monopolized. Researchers, students, startups, and developers remain free to use basic algorithms and formulas. On the other hand, it prevents genuine technological inventions from being unfairly rejected merely because they use software. When algorithms are embedded in machines, networks, or industrial systems and create real technical improvements, they are given legal recognition.

Another advantage of this framework is that it reduces arbitrariness. Earlier, outcomes depended heavily on individual examiners' attitudes toward software. Now, courts provide a structured path for analysis. Examiners and applicants can follow the same logical sequence: identify contribution, test exclusion, and verify technical effect. This promotes consistency and predictability in patent decisions. In practical terms, this test encourages better innovation and better claim drafting. Inventors are motivated to focus on technical problem-solving rather than abstract computation. They must clearly explain how their software interacts with hardware or systems and what technological benefit it delivers. At the same time, authorities are guided to look for functional value instead of rejecting applications mechanically. Overall, this three-stage functional test represents a mature and modern interpretation of Section 3(k). It reflects judicial awareness that in the digital age, innovation often lies in software-driven architectures. By filtering out abstractions while protecting real technological contributions, this approach preserves both public interest and innovation incentives. It has become the backbone of India's evolving jurisprudence on computer-implemented inventions.

Challenges and Gaps in Section 3(k) Implementation

Despite judicial efforts to clarify patent eligibility, several challenges persist:

Variability in Examination Practices

Patent examiners continue to apply Section 3(k) inconsistently. Applicants report divergent interpretations of "technical effect," particularly for AI-based, machine learning, or data-driven inventions. Courts, including Ferid Allani and Comviva Technologies Ltd., have frequently corrected examiners who mechanically rejected applications, emphasizing the need for substantive evaluation.

Claim Drafting Complexities

Drafting claims that highlight technical contribution without falling into excluded categories remains a significant hurdle. Ambiguous claims risk rejection even when the invention demonstrates genuine technical innovation. High Court rulings, such as BlackBerry Ltd. v

Controller of Patents, stress the importance of evaluating claims as a whole rather than relying on labels like "algorithm" or "software per se".

Lack of Legislative Clarity

While judicial interpretation has provided guidance, Section 3(k) lacks a codified doctrinal **test**. Scholars argue that Parliament could amend the Act to reflect contemporary technological realities, though others caution that overbroad statutory expansion may enable patenting of abstract software, undermining the public domain.

Emerging Technology Concerns

New technological paradigms, such as AI, IoT, cyber-physical systems, and platform architectures, challenge the traditional distinction between abstract algorithms and patentable technical effects. Courts will need to adapt the technical effect test to assess contributions that are often deeply mathematical yet deliver tangible technological outcomes, as seen in predictive diagnostic systems, autonomous vehicles, and advanced fintech platforms.

Comparative Doctrinal Insights

European Union

The EU applies the "technical effect" test. Software is patentable if it produces a technical solution to a technical problem. Indian courts, particularly in Ferid Allani, have drawn inspiration from this principle while emphasizing functional contribution rather than claim form.

United States

The U.S. applies the Alice/Mayo two-step test. Software is patent-eligible only if it does not claim an abstract idea and demonstrates an inventive concept beyond mere implementation. Indian jurisprudence has avoided a restrictive wholesale adoption, recognizing that a broad exclusion could stifle software-driven innovation.

Lessons for India

Comparative analysis shows that India is gradually developing a distinctive and balanced approach to software patentability, positioned somewhere between the restrictive model of the

United States and the technical-effect-oriented framework of the European Union.[16] Instead of copying either system entirely, Indian courts have adapted foreign principles to suit domestic policy goals, technological realities, and developmental needs.

First, India places strong emphasis on substantive technical contribution rather than formal labels. Indian courts have repeatedly held that the mere presence of words like "algorithm," "software," or "computer program" in a claim cannot justify automatic rejection. What matters is what the invention actually does. If it improves system performance, network efficiency, data security, or hardware interaction, it may qualify for protection. This approach differs from the United States, where courts often focus on whether an invention falls within the category of an "abstract idea."[17] In many US cases, even technologically useful software has been rejected because it was seen as implementing a business or mental process on a computer. This has created uncertainty and unpredictability for innovators.[18] In contrast, India avoids rigid categorisation and prefers functional evaluation, which makes the system more practical and technology-sensitive.

Second, India strongly seeks to preserve public access to mathematical and abstract methods, reflecting a policy choice rooted in developmental and public-interest considerations.[19] Like the EU and the US, Indian law excludes pure algorithms and formulas. However, India applies this exclusion through the concept of "per se" rather than through broad judicial doctrines.[20] In the EU, mathematical methods are excluded unless they produce a "further technical effect." This is similar to India's technical effect test. In the US, however, the exclusion operates through judicially created doctrines on abstract ideas, which are often applied very strictly. As a result, many foundational digital innovations in the US remain unpatentable even when they have practical utility. India's approach is comparatively more balanced. It protects core knowledge for public use, while still allowing patents when that knowledge is applied in a technological system.

Third, India deliberately incorporates flexibility to accommodate emerging technologies such as AI, IoT, and embedded systems. Modern inventions rarely consist of hardware alone. They

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[16] *Ibid*

[17] *Alice Corp. v. CLS Bank Int'l, 573 U.S. 208 (2014).*

[18] *Bilski v. Kappos*, 561 U.S. 593 (2010); *see, e.g., Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709 (Fed. Cir. 2014) (invalidating online advertising method as abstract); *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350 (Fed. Cir. 2014) (holding online guarantee method ineligible as an abstract idea implemented on a computer)

[19] The Patents (Amendment) Act, No. 38 of 2002, Statement of Objects and Reasons (India) (introducing § 3(k) to prevent monopolisation of abstract intellectual creations while promoting technology-driven industrial growth)

[20] Patents Act § 3(k) (India); *see also Demystifying Section 3(k) of the Indian Patents Act*, S.S. Rana & Co. (Apr. 20, 2025) (explaining that the "per se" language allows patentability where a mathematical method or algorithm is tied to a specific technical application).

operate through machine learning models, real-time data processing, and networked platforms. Indian courts recognize that excluding such inventions simply because they rely heavily on software would be unrealistic. Therefore, they assess these technologies in context. For example, an AI model used only for prediction may be excluded, but an AI system that controls medical devices or optimizes power grids may qualify. This resembles the EU's approach, where AI and data-processing inventions are assessed based on their technical application. The US system, on the other hand, has struggled to accommodate AI inventions because many are viewed as abstract data analysis, leading to frequent rejections.

Another important feature of India's approach is its integration of patent policy with economic development goals. Unlike the US, which focuses mainly on market competition and litigation control, and the EU, which emphasizes technological standardization, India balances patent law with access, affordability, and domestic innovation. Courts are conscious that overly broad software patents could harm small developers, startups, and public institutions. At the same time, they recognize that denying protection altogether would discourage investment. This developmental perspective gives Indian jurisprudence a unique character.

India's model also promotes context-sensitive interpretation. Instead of applying one universal formula, courts examine the industrial environment in which the invention operates. Telecom systems, fintech platforms, healthcare software, and manufacturing automation are evaluated differently based on their technical complexity. This is closer to the EU's sector-sensitive approach and differs from the US, where broad doctrinal tests are often applied uniformly, regardless of industry.

Further, India's approach strengthens institutional dialogue between courts and patent offices. Judicial decisions increasingly guide examiners on how to assess technical contribution. This creates gradual standardization without rigid legislation. In the US, much of patent eligibility law is shaped by Supreme Court rulings that leave limited room for administrative flexibility. In the EU, examination is highly structured but sometimes overly technical. India occupies a middle space, allowing adaptability through case law.

Another distinguishing feature is India's effort to harmonize with global standards without sacrificing sovereignty. Indian courts refer to European and international practices but do not mechanically import them. They adapt foreign ideas to Indian statutory language and social conditions. This selective harmonization facilitates international licensing and cooperation while preserving domestic policy autonomy.

Overall, India's emerging framework reflects a three-way balance. It supports innovation by protecting real technological advances. It safeguards the public domain by excluding abstract ideas and basic methods. And it maintains global compatibility by aligning with international technical-effect principles.[21] Compared to the US, India is less restrictive and more technology-oriented. Compared to the EU, it is more development-focused and flexible. In conclusion, India is carving out a "middle-path" model of software patentability. It avoids the excessive rigidity of American jurisprudence and the highly formalized structure of European practice. Instead, it adopts a functional, context-driven, and policy-conscious approach. This model is particularly suited to India's growing digital economy, where innovation must coexist with accessibility, competition, and social welfare.

Policy Implications

A coherent and well-defined test for software patentability plays a crucial role in shaping India's innovation ecosystem. When courts apply clear and consistent standards under Section 3(k), inventors, startups, and technology companies gain confidence in the legal system. They are able to predict, with reasonable certainty, whether their inventions are likely to receive protection. This legal predictability encourages greater investment in research and development, especially in capital-intensive sectors such as artificial intelligence, telecommunications, biotechnology informatics, fintech, and embedded systems. Investors are more willing to fund long-term projects when they know that successful outcomes can be legally secured through patents.

A balanced judicial approach also prevents the monopolization of fundamental ideas and basic methods. By excluding pure algorithms, mathematical models, and abstract logic, courts ensure that essential building blocks of digital innovation remain freely available. This openness promotes interoperability between systems and platforms. For example, different software products can communicate, integrate, and compete fairly without fear of infringing overly broad patents. This is particularly important in sectors like payment systems, healthcare technology, and cloud computing, where collaboration and compatibility are essential for growth and public benefit.

At the same time, alignment with international standards strengthens India's position in the global technology market. When Indian patent law follows principles similar to those used in Europe, Japan, and other major jurisdictions, foreign companies find it easier to operate and invest in India. Cross-border licensing becomes simpler because patent rights are interpreted in comparable ways. This reduces legal friction in technology transfer agreements, joint

[21] *Ibid*

ventures, and international research collaborations. It also improves India's credibility in trade negotiations involving intellectual property rights.

Another important advantage is the promotion of domestic innovation and entrepreneurship. A predictable patent regime enables Indian startups and small enterprises to protect their technological assets. Many young companies rely heavily on software-based solutions. When they are assured that genuine technical innovations will be protected, they are more likely to commercialize their ideas rather than keeping them as trade secrets. This strengthens India's indigenous technology base and reduces dependence on foreign platforms.

Clear jurisprudence also improves the quality of patent examination. When courts articulate detailed principles, patent examiners receive better guidance. This leads to more reasoned and uniform decisions at the administrative level. Reduced arbitrariness saves time and resources for both applicants and authorities. It also decreases litigation, as fewer disputes arise from inconsistent or poorly reasoned rejections.

A well-calibrated approach further supports ethical and responsible innovation. By denying protection to abstract business models and purely data-extractive algorithms, courts discourage exploitative practices such as excessive data monopolies and unfair digital dominance. At the same time, by rewarding genuine technical improvements, they promote socially beneficial technologies in areas like healthcare diagnostics, environmental monitoring, cybersecurity, and smart infrastructure.

Balanced jurisprudence also facilitates knowledge diffusion and follow-on innovation. Since core methods remain in the public domain, researchers and developers can build upon existing ideas without fear of infringement. This cumulative innovation model is essential in software development, where progress often occurs through incremental improvements and collaborative ecosystems. From a policy perspective, such a framework helps India maintain equilibrium between public interest and private rights. It ensures that patent law does not become a tool for rent-seeking or market control, while still providing adequate incentives for creativity and technological risk-taking. This balance is especially important in a developing economy where access, affordability, and competition are major concerns.

Finally, a coherent and internationally aligned approach enhances India's long-term competitiveness in the knowledge economy. It signals that India is committed to protecting innovation in a fair, transparent, and modern manner. This attracts global research centers, encourages skilled professionals to stay and innovate locally, and integrates India more deeply into global value chains. A structured and balanced interpretation of Section 3(k) not only promotes investment and prevents monopolization but also strengthens domestic entrepreneurship, improves examination quality, supports responsible innovation, enables knowledge sharing, safeguards public interest, and enhances India's global technological standing. It transforms patent law from a mere legal instrument into a strategic tool for sustainable digital development.

Suggestions

- Indian courts are gradually converging on a functional test: an invention is patentable if it contributes technically to a system, rather than merely performing abstract computation. Cases like Ericsson v Intex and Comviva Technologies Ltd. illustrate judicial sensitivity to domain-specific technical contributions, particularly where algorithms are inseparable from hardware or network optimization.
- Current Section 3(k) interpretation inadequately accommodates innovations in AI and machine learning, where the inventive step often lies in mathematical models. Courts have recognized this challenge, suggesting that technical effect must be assessed in context. This is especially critical for diagnostics, predictive modeling, and fintech algorithms, where abstract models produce tangible technological results.
- Excessive reliance on examiner discretion undermines predictability. Courts have intervened in numerous cases to correct mechanical application of Section 3(k), emphasizing substantive assessment. A codified judicial or statutory guideline defining "technical contribution" would reduce inconsistency, enhance legal certainty, and strengthen India's innovation ecosystem.

Conclusion

Indian jurisprudence on computer-implemented inventions has evolved significantly, moving from a rigid exclusion of software under Section 3(k) to a more nuanced, technologically informed approach. Landmark judgments, including *Ferid Allani*, *OpenTV*, and *Microsoft Technology Licensing*, have established that the patentability of software-enabled inventions should be assessed based on **substantive technical contribution**, rather than relying on labels or the mere presence of algorithms. Courts have emphasized the importance of examining the invention's purpose, its contribution to system performance, and its tangible technical effects, reflecting a shift toward functional and context-sensitive analysis. A coherent three-stage judicial framework has emerged. First, claims are construed in their entirety to identify the actual inventive contribution. Second, the court determines whether the contribution is claimed

per se as a mathematical method, abstract logic, or algorithm. Third, the invention is assessed for demonstrable **technical effect** or the resolution of a technical problem. This layered approach balances the need to protect genuine technological innovation with the imperative to maintain public access to abstract methods and mathematical formulas.

The courts' evolving approach carries significant policy and technological implications. By focusing on functional contribution, the judiciary encourages innovation in AI, machine learning, fintech, telecommunications, and platform-based systems while safeguarding interoperability and preventing monopolization of abstract concepts. This ensures that India remains competitive in technology-intensive sectors and aligns more closely with international standards, particularly those in the European Union and other jurisdictions that emphasize technical effect. Despite these advancements, challenges remain. Examination practices continue to vary, leading to legal uncertainty, and the complexity of drafting claims that meet the technical contribution threshold remains a significant hurdle. Additionally, emerging technologies such as AI, cyber-physical systems, and advanced platform architectures test the boundaries of the current doctrinal framework, highlighting the need for continued judicial and legislative refinement. To address these issues, a codified doctrinal test or clearer judicial guidelines would enhance consistency and legal certainty. Overall, Indian courts are establishing a principled and pragmatic patent framework that balances statutory fidelity, technological innovation, and public interest. As the digital economy expands, this evolving jurisprudence positions India to effectively manage the patentability of software-driven inventions while supporting both domestic and global innovation.