The Role of Forensics in Intellectual Property Enforcement: Enhancing Legal Frameworks for IP Crime Investigation and Litigation

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Abstract

This paper explores the role of forensic techniques in the investigation of intellectual property (IP) crimes, which is an area that has not received enough attention despite being extremely important. The motivation behind this research is to provide a comprehensive view of how forensics can help in solving IP-related cases, particularly because formal/legal documentation and discussions around this topic are very limited. Recent data underscores the urgency of addressing IP crimes: enforcement actions against IP theft have risen sharply in the past year, with cases initiated up ***21%***, criminal arrests increasing by ***39%***, and indictments surging by ***99%***. This highlights the pressing need for innovative methods such as forensics to combat these violations.[1]

The paper primarily focuses on key areas like software piracy, copyright infringement, and trademark violations, and examines the potential of forensic methods in these fields. Through theoretical analysis and the inclusion of relevant case studies, it demonstrates how forensic tools can be effectively used to identify and prevent such violations, despite the lack of specific legal frameworks. It also addresses challenges in integrating forensic methods into IP law enforcement, particularly in countries like India, which has been ***flagged as problematic in the 2023 Special 301 Report by the United States Trade Representative.***[2]

Keywords: intellectual property, legal framework, forensics, copyright, software piracy, trademarks

Introduction

Intellectual property refers to creations of the mind such as inventions, literary and artistic works, symbols, names, images and designs used in commerce.[3] Protecting IP is vital for promoting innovation, providing incentives for research and development. As globalization has increased global trade, the occurrence of intellectual property crimes like counterfeiting and piracy has risen significantly. To effectively combat these threats, strong legal systems and enforcement measures are vital. The absence of strong intellectual property enforcement can have severe consequences for businesses, including decreased market value and a rise in counterfeit products and piracy. These issues can ultimately hinder economic growth. IP enforcement is crucial not only for safeguarding the

[1] IP Crime Statistics
[2] Office of the United States Trade Representative (USTR)
[3] WIPO

intellectual property of individuals and businesses but also for maintaining the integrity of global economies.

Forensic techniques are becoming increasingly essential in IP enforcement as they offer scientific methods to gather and analyze evidence. Forensic techniques empower law enforcement to more effectively identify counterfeit goods and locate their manufacturers, thus aiding investigations. Digital forensics is especially valuable in cases of online piracy and counterfeiting, providing authorities with essential digital evidence. Forensic analysis also plays a key role in legal disputes over product authenticity, and it's valuable in cases like bankruptcy and fraud. Possession of a diverse IP portfolio is critical for acquisition, market dominance, and general profitability and this makes their protection from infringement even more important.[4] By integrating forensics into IP law enforcement, the legal system can better address evolving challenges, especially with advancing technology. This ensures that IP protection keeps pace with modern counterfeiting methods. As technology advances with every passing day, it becomes crucial for the legal system to cope with it and come up with newer and more advanced methods for protecting intellectual property; and this is where forensics comes into picture. Recent laws in India, like the *Bharatiya Nyaya Sanhita and Bharatiya Sakshya Adhiniyam*, 2023, aim to modernize the criminal justice system and improve handling of digital evidence, paving the way for stronger IP enforcement.

Literature Review

Forensic science plays a significant role in the investigation of intellectual property (IP) crimes, which have increasingly impacted industries worldwide. IP crime can include offenses like counterfeiting, copyright infringement, and trademark violations. These activities not only harm businesses but, as Ahuja (2010)[5] noted, may also be linked to funding for criminal and terrorist organizations.

The Need for Forensic Tools and Frameworks One of the key aspects of forensic work in IP crime investigation is the use of digital forensics to gather and analyze evidence. Joshi (n.d.)[6] highlights how digital forensics is essential in identifying illegal activities that infringe on intellectual property rights. Large organizations, in particular, rely on automated forensic tools to efficiently collect and manage digital evidence, ensuring that investigations can proceed effectively (Nnoli et al., 2012)[7]. A

[4] CSIPR NLIU
[5] Ahuja, S. (2010, October 4). *Intellectual property crime: The urgent need for global attention*. Retrieved from https://onlinelibrary.wiley.com/doi/full/10.1111/j.1758-5899.2010.00023.x
[6] Joshi, & Deepak, I. (n.d.). *Digital forensics in intellectual property theft and ethical concerns*.
[7] Henry Nnoli; Dale Lindskog; Pavol Zavarsky; Shaun Aghili; Ron Ruhl; *"The Governance of Corporate Forensics Using COBIT, NIST and Increased Automated Forensic Approaches"*, 2012 INTERNATIONAL CONFERENCE ON PRIVACY, SECURITY, RISK ..., 2012.

well-structured forensic framework helps investigators to trace illegal activities back to the source, making the enforcement of IP laws stronger.

Challenges in Forensic Investigations Despite the effectiveness of forensics in IP crime investigations, challenges remain. A blog post by Truth Labs (n.d.)[8] discusses the various obstacles faced by forensic investigators, such as the lack of uniform standards across states and agencies. This inconsistency can lead to unreliable forensic results, affecting the overall outcome of cases. For instance, different states may use varied forensic protocols, causing discrepancies in the quality of evidence collected. These issues can hinder the collaboration between law enforcement agencies, slowing down investigations.

Trademark Infringement and Economic Impact Forensic specialists are particularly important in cases involving trademark infringement. Polishchuk (2018)[9] emphasizes that forensic experts focus on issues such as similarity between trademarks, consumer confusion, and the financial impact of such violations. Their work helps ensure that the rightful owners of trademarks can defend their rights in court and that the economic damage caused by these crimes is properly addressed.

Digital forensics is a powerful tool for fighting crimes related to intellectual property. It helps us find evidence of fake products and other illegal activities. Although there are some challenges, good plans and ethical practices can help us protect intellectual property rights.

Forensic Techniques in IP Crime Investigations

A. Overview of IP Crime Investigations

Before we dive into how these IP Crimes are usually investigated, let us understand the definition of an Intellectual Property Crime. Intellectual property crime is committed when someone manufactures, sells or distributes counterfeit or pirated goods, such as such as patents, trademarks, industrial designs or literary and artistic works, for commercial gain.[10]

[8] https://truthlabs.org/docs/what-challenges-do-forensic-investigators-face-in-solving-complex-cases/
[9] I. Yu. Polishchuk; *"EXPERT COMPETENCE IN FORENSIC EXPERT RESEARCH OF TRADEMARKS IN THE INVESTIGATION OF THEIR ILLEGAL USE"*, THEORY AND PRACTICE OF FORENSIC SCIENCE AND CRIMINALISTICS, 2018.

[10] IP EUROPOL

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The scope of IP Crime Investigations in India is broad and covers a wide range of offenses, which include:

- **Copyright infringement:** Unauthorized reproduction, distribution, or performance of copyrighted works (e.g., music, movies, software).
- **Trademark infringement:** Unauthorized use of a registered trademark (e.g., logos, brand names).
- **Patent infringement:** Unauthorized use, sale, or manufacture of a patented invention.
- **Pirated software:** Illegal copying and distribution of software.
- **Cybercrime:** Online activities that infringe on IP rights (e.g., hacking, phishing).

B. Traditional Forensic Methods Applied to IP Crimes

Traditional forensic methods applied to IP crimes involve techniques that have been used for a long period of time. Most of them are very generalized and techniques you would actually use for most of the crimes. Given below is the detailed explanation of these methods used in IP Crime Investigations:

1. Evidence Collection Techniques

[11] EUROPOL_Types of IP Infringement

1.1. Photographing Devices: Photograph devices that may be used in IP crimes and mark their specifications. [12] Forensic investigators begin by taking detailed photographs of devices that may be involved in IP crimes. The objective is to document the condition of the devices before they are collected for further analysis.

1.2. Seizing Devices: The next step involves seizing the evidence and objects found on crime scenes - like devices, financial records, documents, hard drives etc... to avoid tampering of evidence.

1.3. Document Review: This involves examining financial records, sales invoices, or shipping documents to find out the distribution of counterfeit goods (for example). Investigators usually look for unusual patterns to uncover the extent of the illegal activity.

2. **Witness Interviews**

Talking to witnesses is another traditional way of going about investigations. Employees working in companies suspected of IP crimes can provide firsthand information about the production processes and sales tactics. Customers who have been victims of such crimes can also offer insights as to where and how they bought the items (in case of counterfeit goods) or how they found out that their IP had been infringed. Talking to witnesses and victims usually provides investigators with first-hand information pertaining to the case, which can help them track back to the sources.

3. **Digital Forensics**

Digital Forensics has been one of the most instrumental forensics methods in investigating IP offenses for a long period of time. Traditional Digital Forensic methods include:

3.1. Data Recovery: Investigators may recover deleted files from computers or servers believed to contain information about IP crimes, such as distribution lists or marketing materials.

3.2. Cloning Hard Drives: Creating an exact replica of a computer's hard drive to preserve data for analysis without altering the original system.

[12] INFOSEC

3.3. Network Forensics: This method is especially useful in investigating cybercrimes and refers to monitoring and analyzing network traffic data to detect unauthorized access or data breaches.

4. **Forensic Accounting**

It is quite possible that a large sum of monetary transactions is involved in any step of committing an IP crime and getting to these routes proves to be a vital source of tracking down offenders. Forensic accountants examine financial statements and accounting records to identify fraud or illegal transactions, which can indicate the scale of IP crimes.

C. Advanced Forensic Technology in IP Investigations

As the digital landscape evolves, so do the methods of IP theft and misuse, making these technologies increasingly crucial for protecting intellectual assets. With rising complexities in dealing with Intellectual property, traditional methods of forensic technology need to be revamped into something more adaptable, flexible and powerful. Advanced forensic technology plays a crucial role in intellectual property (IP) investigations by providing powerful tools to detect, analyze, and prevent IP infringement.

Some of the key technologies under advanced forensic technology are listed below:

1. **Digital Forensics:** Digital forensics has a scope that is way beyond just traditional methodologies. It combines computer science, information technology, and traditional forensic science to ensure the reliability and authenticity of digital evidence.[13] While computer forensics is the base of Digital Forensics, it has branched into a wide range of applications including mobile forensics, network forensics, cloud forensics, and multimedia forensics.

1.1. Metadata Analysis: Metadata is basically "data about data". It is descriptive information about a digital file, document, image, or other data object that provides context and details about its creation, modification, and properties. Metadata analysis helps investigators reconstruct events, identify potential evidence, and track the origin and movement of digital data.

[13] Angelopoulou, O., & Vidalis, S. (2014). An Academic Approach to Digital Forensics. Journal of Information Warfare, 13(4), 57–69. https://www.jstor.org/stable/26487467

1.2. Network Forensics: Tools are used to monitor and analyze network traffic to identify data breaches, pirated software distribution, or unauthorized access to proprietary information.

1.3. Multimedia Forensics: Multimedia forensics plays a vital role in investigating IP (Intellectual Property) crimes, which involve unauthorized use, theft, or distribution of digital content. Methods like Digital watermarking (Identifying hidden watermarks to verify ownership), Image and video analysis (Examining visual content for tampering or manipulation), Audio analysis (Identifying copyrighted music or audio clips), Steganalysis (Detecting hidden messages or data within multimedia files) , all come under multimedia forensic methods.

2. **Artificial Intelligence and Machine Learning:** In recent years, AI and ML have led to significant advancements:

   2.1. Pattern Recognition: AI and ML algorithms are capable of analyzing vast scopes of data and identify hidden patterns of IP Infringement, such as illegal documentation or product counterfeiting.

   2.2. Automated Monitoring: It is a tedious task to have investigators constantly monitor crime scenes, online platforms or datasets for potential IP offenses that might occur or have already occurred.

3. **Big Data Analytics:** Big Data Analysis is the process of examining large, complex data sets to uncover hidden patterns, correlations, and insights. It involves using advanced tools and techniques to analyze datasets from various sources, which might be useful to uncover IP crimes.

   3.1. Data Mining: Data mining uses advanced algorithms to search through massive amounts of data and find hidden patterns or connections, just like AI and ML algorithms do.

   3.2. Social Media Analysis: It uses tools to monitor and analyze social media, looking for signs of IP misuse or people sharing secret information.

   3.3. Market intelligence: It uses big data analytics to understand market trends and what your competitors are doing, which can help you spot signs of IP infringement.

D. Chemical and Biometric Forensics in Counterfeit Detection

The Trademark Act, 1999 deals with the protection, registration and prevention of fraudulent use of trademarks. [14] Under the scope of this act, the use of forensic techniques to identify counterfeit goods bearing infringing trademarks is also covered.

CHEMICAL FORENSICS

By definition, chemical forensics involves the analysis of the chemical composition of products. It includes several sophisticated methodologies aimed at identifying counterfeit items, particularly medicines and financial items.

The kind of forensics that we have dealt with so far in the paper was particularly more inclined towards computerized techniques or digital methods. Here in this segment, a more tangible aspect of forensics will be introduced.

1. **Fingerprint Analysis**[15]: Chemical Fingerprinting is a forensic technique that involves analyzing the unique chemical composition of a sample to create a distinctive "fingerprint." This fingerprint is not in the literal sense, but is a unique chemical marker or profile that can be used to identify substances. In the context of counterfeit medicines, chemical fingerprinting can be used to differentiate genuine products from those that have been adulterated with inferior ingredients. By analyzing the presence and concentration of active pharmaceutical ingredients (APIs) and other substances, chemical fingerprinting can reveal the characteristics of counterfeit medicines, thus providing valuable evidence in investigations of drug counterfeiting.
2. **Spectroscopic Techniques**: Forensic spectroscopy helps reveal various body fluids' chemical makeup using electromagnetic radiation. [16] In simple language, Spectroscopy is like a detective using a magnifying glass to examine a crime scene. Instead of looking for clues with your eyes, spectroscopy uses light or other energy to "see" the tiny building blocks of a substance. Various spectroscopic methods such as Infrared (IR) and Nuclear Magnetic Resonance (NMR) spectroscopy are employed to analyze counterfeit pharmaceuticals. These techniques help in identifying gaps in the chemical structure of counterfeit products compared to original ones. For instance, ATR-FTIR (Attenuated Total Reflectance Fourier Transform Infrared Spectroscopy) is noted for

[14] ClearTax
[15] Fingerprint Analysis
[16] Spectroscopy Analysis

its effectiveness in classifying counterfeit Cialis and Viagra pharmaceuticals by analyzing their mid-infrared spectra.

3. **Chemometric Analysis:** Chemometrics has been recognised as a powerful tool within forensic science for interpretation and optimisation of analytical procedures.[17] It uses statistical and mathematical methods to identify patterns and differences between samples. One of the key observations here is that Spectroscopy is a very important pre-setup to implement the Chemometric Analysis. As already mentioned in the previous point, the chemical composition of the samples is measured using spectroscopic techniques, such as near-infrared (NIR) spectroscopy, Fourier-transform infrared (FTIR) spectroscopy, or Raman spectroscopy. The raw data collected from the spectroscopic measurements is then processed to remove noise and improve the quality of the sample for analysis. Post that, these chemometric models, such as Principal Component Analysis (PCA), Partial Least Squares (PLS), or Discriminant Analysis, are applied to infer valuable information.

   The results of the chemometric analysis are interpreted to identify differences between the genuine and counterfeit products. These differences may be related to the presence of counterfeit materials, altered formulations, or other factors indicative of IP infringement.

BIOMETRIC FORENSICS

While chemical forensics mostly dealt with the chemical composition of counterfeit goods and the original ones, biometric techniques utilize unique physiological or behavioral characteristics of people for identification and authentication. These methods are usually applied in security, access control, and personal identification systems.

1. **Fingerprint Authentication:** It is one of the most well-known and most basic techniques of biometric forensics that is widely used in the field of IP Crime Investigations. Biometric forensics heavily relies on matching fingerprints to verify the authenticity and reliability of documents. This, in addition with chemical analysis in fingerprint detection, provides an added layer of security, enabling the identification of altered or forged fingerprints.
2. **Spoof Detection:** One might have heard of IP Spoofing that is pretty much available on every malware prevention software's "wanted" list. It allows cybercriminals to infect your computer and steal all your data, without detection. The one we are talking about

[17] Chemometric Analysis

is similar, but in the sense of biometric analysis. With the rise of advanced spoofing techniques, wherein counterfeit fingerprints made from materials like silicone are created, the use of novel materials in biometric systems becomes critical.[18] We need to utilize technology to its fullest to create detection systems of spoofed fingerprints that involve advanced sensors that can differentiate between genuine and artificial prints based on both physical characteristics and chemical composition.

3. **Regulatory Compliance:** It is always better to prevent crime rather than solving it later. The integration of biometric verification systems in financial institutions and at borders aims to reduce counterfeit identity theft. Regular audits and the use of chemical analysis in making biometric scans can ensure compliance with regulations and enhance trust in the identification process.

Benefits of Forensic Techniques for IP Litigation in India

Although the role of Forensic Technologies is not explicitly mentioned in any of the books of law we have for IP Litigation, we must agree that it plays a vital role in supporting the investigation of these offenses. From examining a crime scene to uncovering mysteries behind the flow of counterfeit goods and data, forensics acts a guiding force for investigators to get through various challenges in reaching their final outcome.

Firstly, as already discussed above, forensic techniques play a crucial role in enhancing evidence collection for IP infringement cases. By analyzing digital files, chemical compositions, and identifying alterations or counterfeits, these techniques provide a more reliable and systematic approach to gathering evidence. The application of rigorous scientific methodologies in almost forensic methodologies and analysis lends credibility to claims made in IP litigation, increasing the chances of favorable outcomes. We can be more assured of the reliability of data we will find using forensic techniques. It also reduces significant amounts of repetitive manual labor, especially after the techniques have evolved into integrating AI and ML algorithms in them.

Digital forensics enables the recovery and analysis of digital evidence from computers, crucial for cases involving software piracy or digital content infringement. **Chemical analysis** can identify counterfeit goods by examining their materials, providing solid evidence in cases of trademark infringement or patent violations.

[18] Spoofing in IP Crimes

Finally, a successful litigation which is backed by forensic evidence can potentially discourage other infringers by demonstrating that violations like these are capable of being detected and prosecuted effectively.

Case Studies: Forensic Use in IP Enforcement in India

a) Digital Forensics in Software Piracy and Copyright Infringement Cases

Wipro's experience with a cyber-attack linked to software piracy gives us a detailed examination of the incident, its implications for digital forensics, and the subsequent legal proceedings.

Wipro, one of India's largest IT outsourcing companies, faced a significant breach in April 2019 due to an advanced phishing campaign that compromised employee accounts and led to unauthorized access to its IT systems. This incident allowed attackers to launch attacks on Wipro's clients, underscoring the potential risks associated with IT outsourcing and digital piracy. [19]

Overview of the Cyber-Attack

In April 2019, Wipro detected abnormal activity in some of its employee accounts due to a sophisticated phishing attack that targeted its systems. Wipro employees were tricked into clicking on malicious links, which gave the hackers access to the company's computers. The hackers stayed hidden for many months and used Wipro's computers to attack Wipro's customers. As the cyber-attack unfolded, Wipro's systems became a launchpad for phishing attacks aimed at its clients, affecting at least a dozen organizations[20]

Findings of the Forensic Investigation

The forensic investigation revealed that Wipro's IT systems had been attacked significantly through its employee accounts. The attackers used advanced phishing campaigns to gain initial access and employed sophisticated and luring techniques, such as “zero-day” exploits, to breach Wipro's security measures. They also leveraged remote access tools (such as ConnectWise

[19] Skip to content. (2019). *Experts: Breach at IT Outsourcing Giant Wipro*. krebsonsecurity.com. https://krebsonsecurity.com/2019/04/experts-breach-at-it-outsourcing-giant-wipro/

[20] Dan Swinhoe. (2019). *Wipro breach highlights third-party risk from large IT services providers*. CSO Online. https://www.csoonline.com/article/567161/wipro-breach-highlights-third-party-risk-from-large-it-services-providers.html

Control) to infiltrate client systems, leading to additional security loopholes and potentially enabling software piracy.

To address the breach, Wipro employed several digital forensic methods to track the attackers and contain the damage:

1. Network Monitoring and Traffic Analysis: Wipro identified abnormal activities within its network through heightened monitoring of network traffic. Wipro noticed suspicious messages being exchanged between the compromised employee computers and external systems.
2. Independent Forensic Investigation: Wipro hired external forensic experts to conduct a thorough analysis of the attack. This included reviewing system logs, identifying the point of invasion, and mapping the flow of the attack. Forensics mainly focused on detecting any malware that could have led to the attack, determining the attackers' infrastructure, and ensuring that customer systems were not further compromised. Containing the attack and safeguarding the company's data was one of the major responsibilities of the forensic experts.
3. Email System Auditing: Since the attack was suspected to have compromised Wipro's corporate email systems, forensic teams likely examined email logs and metadata to trace phishing email origins and how they were used to gain access to critical systems.

The Wipro incident marked a significant turning point in the field of digital forensics and intellectual property (IP) enforcement within India. The breach raised awareness among people about the loopholes in third-party services and especially regarding how hackers could get through all security and still be able to breach the database of such a huge company. This incident pushed companies to invest in more robust digital forensics methodologies, combining machine learning and artificial intelligence to track such patterns and eliminate possibilities of attack before it even happens.

b) Chemical Forensics in the Detection of Counterfeit Pharmaceuticals

Overview of the Case

In the largest drug safety settlement to date with a generic drug manufacturer,[21] (2013) Ranbaxy USA Inc., a subsidiary of Indian generic pharmaceutical company Ranbaxy Laboratories Limited, pleaded guilty to criminal charges related to the manufacture and

[21] Ranbaxy

distribution of adulterated drugs at its Indian offices in **Paonta Sahib** and **Dewas**. The company was found to have violated the **Food, Drug, and Cosmetic Act (FDCA)**, which requires that drugs must meet specific standards for safety, effectiveness, quality, and purity. Ranbaxy was fined a total of $500 million, including a $150 million criminal fine and a $350 million civil penalty for submitting false claims to U.S. government healthcare programs.

Forensics Methods used in Investigations

We had looked at a range of Chemical and Biometric forensic methods to tackle such types of cases. Let us look at some likely methods that FDA would have used to investigate this case (since the methods actually used were not explicitly presented to the public):

1. Data Auditing and Analysis: The investigators likely looked at the company's computer records. They found that the company lied about the dates of tests and did not test the drugs as often as they were supposed to. They used special tools to find out when the company changed the records or deleted files. They also found problems with the test results.
2. Chemical and Stability Testing: The FDA likely used chemical forensics to test the quality, strength, and stability of drugs produced by Ranbaxy. They found that some batches of drugs were adulterated . Advanced chromatography and mass spectrometry methods likely played a role in detecting chemical inconsistencies.
3. Forensic Accounting: Investigators likely employed forensic accounting techniques to check if the company adhered to **cGMP (current Good Manufacturing Practices)** [22] and tracked fraudulent claims made to Medicare[23], Medicaid, and other programs.

Verdict of the Case

Ranbaxy was found guilty of three counts of making and selling adulterated drugs and four counts of lying to the FDA. The company admitted that its drugs contained unknown impurities and incorrect doses, which risked patient safety. As part of a settlement, Ranbaxy agreed to pay $500 million and promised to improve its manufacturing practices. Additionally, it was banned from selling certain drugs from its Indian factories in the U.S. until they met FDA standards.

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22 https://www.fda.gov/drugs/pharmaceutical-quality-resources/facts-about-current-good-manufacturing-practice-cgmp

23 What is Medicaid and Medicare?

c) Trademark Infringement and Patent Infringement[24]

Overview of the Case

This trademark infringement case involves Glenmark Pharmaceuticals Limited filing a suit against Galpha Laboratories Limited for using a misleading similar trademark, **Clodid-B,** to Glenmark's product **Candid-B,** an antifungal cream. Glenmark claimed that Galpha's act should be viewed as infringement and copying their registered trademark. Glenmark also said that this was not the first time that Galpha had copied their trademark ASCORIL, with a similarly deceptive product called ASCODIL. Hence, this was a case of Habitual Trademark Infringement.

Forensic Methods Employed

In cases such as this, forensic analysis is a common method used to assess the extent of the similarity between trademarks. The analysis usually focuses on elements like:

1. Visual and Phonetic Comparison: Forensic experts would compare the names Clodid-B and Candid-B to determine visual and pronunciation similarities that could mislead consumers.
2. Trade Dress and Packaging Analysis: The investigation most likely also included an evaluation of the color, design, and packaging to find out if Galpha tried to copy Glenmark's branding elements to confuse customers.
3. Market Research: Forensic investigations often interview consumers to see whether there has been any actual confusion in the market between the two products.

Although specific forensic techniques in the case are not clearly explained to the public, these general methods would have been crucial in providing the legal evidence for trademark violations.

Findings of the Legal Proceedings

The High Court of Bombay determined that Galpha Laboratories had a history of copying other companies' trademarks (habitual infringement). This showed that Galpha was intentionally trying to trick people into thinking their products were the same as other companies' products. The court also referenced that Galpha had previously sold fake products, which posed significant risks to public health.

[24] Glenmark Pharmaceuticals Ltd. v/s Galpha Laboratories Ltd.

The court concluded that Galpha's actions were not only damaging to Glenmark's trademark but also dangerous to consumers. The judgment imposed exemplary damages of **INR 1.5 crore** (over USD 200,000) on Galpha for their repeated infringements and the manufacturing of fake products.

This case highlights the importance of strong laws and forensic techniques to protect trademarks, especially in industries like medicine where people's health is on line.

Existing Legal Framework for IP Crime Enforcement in India

a) Overview of Indian IP Laws: Copyright, Trademark, and Patents Acts

Indian intellectual property (IP) laws offer a comprehensive framework for protecting various types of intellectual property, which includes copyrights, trademarks, and patents. Each of these laws play a vital role in safeguarding the rights of creators, inventors, and businesses. Below is an overview of these laws and their respective roles:

The **Copyright Act**, enacted in 1957, governs the protection of original literary, dramatic, musical, and artistic works, including computer programs and films. Copyright protects the expression of ideas and not the ideas themselves. This means that original works such as books, music, paintings, and software can be protected against unauthorized copying or reproduction. The right to reproduce the work in material form, to distribute copies, and to perform the work in public or communicate about it solely lies with the author.

The **Trade Marks Act** of 1999 governs the registration, protection, and enforcement of trademarks in India. Trademarks protect symbols, logos, words, or combinations of words that distinguish goods or services of one firm/entity from another. The main purpose of having such a law to safeguard these elements is to prevent confusion among consumers regarding the legitimate source of a product or service.

The **Patents Act**, enacted in 1970, provides a legal framework for the protection of inventions in India. This act grants inventors exclusive rights to their inventions, provided the invention meets certain "criteria": the invention must be new and not have been publicly disclosed or known before the date of filing the patent application, the invention must have an inventive step, meaning it must be a significant improvement over existing technology and that the invention must be capable of being used in industry.

b) Enforcement Mechanisms under the Information Technology Act, 2000

The Information Technology Act, 2000 (IT Act) in India contains several provisions pertaining to the enforcement of intellectual property (IP) rights in the digital domain. The key enforcement mechanisms under the IT Act that relate to IP are as follows: [25]

Adjudicating Officers (Section 46)

- The IT Act empowers the central government to appoint Adjudicating Officers to investigate cyber contraventions and impose penalties for violations, including those related to IP infringement.
- The Adjudicating Officers have the authority to summon and examine witnesses, require the production of documents, and pass orders imposing monetary penalties for contravention of the Act.

Cyber Regulations Appellate Tribunal (Section 48)

- Appeals against the orders of the Adjudicating Officers can be filed before the Cyber Regulations Appellate Tribunal, which is a specialized body established under the IT Act.
- The Tribunal has the power to either dismiss the appeal or modify the order passed by the Adjudicating Officer, providing an additional layer of review for IP-related disputes.

Reporting of Cyber Incidents (Section 67A)

- This section requires any person who has knowledge of a cyber incident to report it to the Indian Computer Emergency Response Team (CERT-In).
- CERT-In, as the national nodal agency for cybersecurity, plays a crucial role in coordinating and responding to cyber incidents. By collecting, analyzing, and disseminating information on these incidents, CERT-In can help to identify and address threats to IP rights in the digital domain.

Blocking of Infringing Content (Section 69A)

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[25] Government of India, Ministry of Information Technology. (2000, October 17). *Notification G.S.R. 788(E) and G.S.R. 789(E), Information Technology Act, 2000*. Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i).

- The IT Act empowers the central government to direct intermediaries, such as ISPs and web platforms, to block access to any information that infringes intellectual property rights.
- This provision enables the government to take swift action to remove or disable access to pirated or counterfeit content hosted on digital platforms.

Penalties and Compensation (Section 66B and 63)

- The IT Act prescribes monetary penalties for various cyber contraventions, including the unauthorized access, transmission, or publication of copyrighted digital content.
- Additionally, the Act provides for compensation to be awarded to aggrieved parties whose IP rights have been violated in the digital realm. The court can award damages, including compensation for loss of profits, injury to reputation, or any other loss suffered by the aggrieved party.

c) Analyzing the existing Indian legal framework that deals with IP Crime enforcement

In India, unfortunately, there is no specific law that deals with the use of forensics in IP Crime investigations.

Sections of the Copyright Act:

Section 13 and 14: According to **section 13** of the Copyright Act, Copyright is granted to original literary, dramatic, musical, and artistic works, including films and sound recordings.[26] Further, for published works, copyright applies if the work is first published in India or, if published abroad, the author must be an Indian citizen or was an Indian citizen at their time of death, for unpublished works, the author must be a citizen or domiciled in India and for architectural works, the structure must be located in India. **Section 14** further elaborates on the specific rights of copyright owners. These include the exclusive right to:

1. Reproduce the work in any form, including electronic storage.
2. Distribute copies of the work to the public.
3. Publicly perform or communicate the work.
4. Create translations or adaptations of the work.

[26] Copyright Act

5. In the case of cinematograph films and sound recordings, to make copies, sell, commercially rent, or communicate them to the public.

Analysis:

1. Both of these sections outline the **eligibility criteria** for copyright protection and the specific **exclusive rights** granted to copyright owners to control the use and distribution of their works.
2. However, there is no mention of **forensic methods** for investigating copyright violations. Moreover, they do not mention any provisions related to investigations or enforcement mechanisms.
3. The lack of mention of **investigative measures and protocols** in these sections is significant because, while they provide the legal framework for protecting intellectual property, they do not address the practical aspects of enforcement, such as the role of law enforcement agencies, the use of forensic tools, or the processes involved in IP crime investigations.

Section 63: Section 63 of the Copyright Act, 1957[27] outlines the penalties for copyright infringement. It states that anyone knowingly infringing or aiding the infringement of copyright or other rights conferred by the Act shall face imprisonment of six months to three years, along with fines ranging from ₹50,000 to ₹2,00,000. For repeat offenses, the penalties may increase. The section treats copyright infringement as a criminal offense, making it punishable under law.

Analysis:

1. The section does not include any explicit mention or guidelines regarding the use of digital forensics in investigating copyright infringement, especially for cases involving online piracy or digital media theft.
2. With the rise of digital infringement, the section does not address how electronic evidence should be collected, preserved, or presented in court.
3. The section penalizes anyone who **"knowingly infringes"** or "knowingly abets the infringement" of copyright. The word "knowingly" means the prosecution must prove that the accused was aware they were infringing on copyright. **In digital and online copyright infringement cases, this raises a major challenge because individuals can claim ignorance or may not be directly involved in the act** (e.g., in cases of automatic downloads, shared IP addresses, or hacked devices). In this case, forensic investigators can also

[27] Section 63

analyze emails, chat logs, and other forms of communication to establish whether there was knowledge of the infringement. This could include messages that suggest the person knew they were sharing or downloading illegal content. However, none of this is explicitly mentioned in the scope of the law.

4. Without incorporating forensic practices into IP crime investigation, the section remains outdated and ineffective against modern copyright crimes.

Section 64: Section 64 of the Copyright Act allows law enforcement officers, with a warrant, to search premises and seize any infringing copies of copyrighted work. If a police officer believes that infringement is occurring, they are permitted to conduct searches and make seizures to prevent further violations.

Analysis:

1. Although the law provides the power to police officials to conduct search and seizure even before a formal conviction, it does not provide detailed guidelines on how forensic investigations should be integrated into these searches and seizures. Without structured investigation guidelines, it only becomes more confusing for officers to deal with such cases and understand till which point they are allowed to interfere.

Section 66: Section 66 specifies that certain copyright infringement offenses are cognizable. This means that law enforcement can take immediate action upon receiving a complaint or upon their knowledge of the offense.

Analysis:

1. The language of the Act is very general. Though it specifies cognizable offenses and the authority of police, it does not outline specific methodologies, tools, or technologies that should be used in the investigative process, including forensics.

Sections of the Trademark and Patents Act:

Both Trademark and Patents Act are similar in structure to the Copyrights Act. All of these acts only provide a legal framework as to what kinds of crimes are included under the scope of the act, what are the rights of the victim, what are the punishments/penalties for infringing these IPs. However, it does not explicitly incorporate forensic science into the investigation process.

Sections of the Indian Evidence Act, 1872:

Section 65B: Section 65B deals with the admissibility of electronic records. It mandates that any electronic evidence must be accompanied by a certificate of authenticity under Section 65B(4), signed by a person who is in a responsible position regarding the working of the electronic device. Without this certificate, the electronic evidence may not be admissible in court.

Analysis:

1. In many cases of IP infringement, such as digital piracy or online counterfeit goods, critical evidence may be found online in the form of emails, websites, transaction logs etc... If the certificate is not properly prepared, the court may **reject the evidence**, even if it is crucial to proving the infringement.
2. It might even be possible that the offending parties may try to destroy the digital evidence. Even if it is recovered through forensic techniques, the court may not accept it on the grounds of this law, if the certificate is not properly prepared. This reduces the effectiveness of forensic evidence.

Section 62 and 63: Section 62 defines primary evidence as the original document itself, while Section 63 defines secondary evidence as copies or other forms of evidence that are not the original.

Analysis:

1. Mostly in IP crimes like digital piracy or online counterfeit goods, most evidence comes in the form of digital records, which are often considered secondary evidence.
2. Since Section 63 defines secondary evidence admissible only under certain conditions, it might create a hurdle for forensic evidence that may involve digital copies, logs, or recovered files.

d) Gaps in Indian Legal Framework Related to Forensic Use in IP Crimes

While researching the use of forensic techniques in Indian IP infringement cases, it became evident that there is a lack of specific legal provisions explicitly addressing this matter. It is to agree that the Indian legal framework provides a general framework for IP protection and enforcement. However, there is a lack of clarity and guidance regarding the specific application of forensic techniques in these cases. This ambiguity leads to an unavailability of guidance as to what specific methods of forensic techniques can be used for which crimes, how should the evidence be presented, what are the do's and don'ts while collecting evidence for forensic analysis and analyzing it and so on.

- **Lack of Specific Provisions:** There is no dedicated legislation or section within existing laws that clearly outlines the procedures and guidelines for the use of forensic techniques in IP infringement investigations. This can result in inconsistencies and difficulties in the acceptance of forensic evidence in legal proceedings. (in accordance with the Indian Evidence Act, 1872)
- **Limited Guidance on Admissibility:** The **Indian Evidence Act, 1872**, provides general principles for the admissibility of evidence. Basically, it provides guidelines regarding evidence allowed to be presented in the court. However, this Act lacks specific guidance on the admissibility of forensic evidence in particularly IP infringement cases.
- **Lack of Dynamic Adaptability of the Legal Framework:** There needs to be some serious amends made in our legal framework to compensate for the rapid growth of technological advancements across the world. We need to have a more structured framework that effectively deals with the evolving nature of IP crimes, and one which acknowledges the advanced forensic methods as a potential support to overcome IP investigation challenges.

In several high-profile IP infringement cases, forensic methods have been crucial for tracking and analyzing digital evidence. However, companies have faced difficulties proving intent due to gaps in the legal framework, making it harder to fully leverage forensic findings in court.

For instance, there is this trademark infringement case concerning **Mumbai's iconic Taj Mahal Palace**, which is noteworthy for being the ***first structure in India to obtain trademark registration under the Indian Trademarks Act***. The Delhi High Court recently imposed a fine on an individual who infringed the trademark of Taj hotels. ***The Taj Mahal Palace Hotel had to rely on forensic experts to prove that its architectural design was being misused.*** This is a very unique case for the reason being that the case emphasized the intersection of trademark and cultural heritage. The legal interpretation of this case raises questions about how trademarks can apply to non-traditional marks, such as shapes or designs, particularly in the context of buildings and their aesthetic value. This challenges conventional notions of what can be trademarked. The act did not cover all elements of "trade dress," thus causing disputes about whether a building's design could be protected as a trademark. The verdict and proceedings of this case exposes the need for broader IP protections for non-traditional trademarks, such as architecture, and the need for more sophisticated forensic methodologies in trademark infringement cases.

This leads us to a very critical question: **are IP laws only for people who have money to pay for forensic investigation?**

Although it shouldn't be the case, unfortunately it seems like it is. Forensic investigations, whether digital, physical, or financial, are often expensive, and small companies may not have the resources to employ private forensic experts. The reason being very simple - the judiciary does not offer any affordable forensic support, which it should be.

Companies with deeper pockets can afford to employ private forensic experts to prove fraud, but what about small businesses and SMEs? Small and medium-sized enterprises (SMEs) often find themselves at a disadvantage when it comes to IP enforcement because they cannot easily afford the forensic and legal services required to prove infringement or fraud. This highlights the disparity in access to justice. The laws may be impartial, but the path to get yourself in front of the law is not.

Best Practices for IP Crimes Across the World

Looking around the world, there are some great practices in how countries protect intellectual property (IP) that India can learn from. For instance, the **United States** has specialized IP courts that speed up cases and make things clearer for everyone involved. **Germany** has a quick patent examination process and offers tax breaks for research and development, which encourages innovation. Over in the **UK**, they run public awareness campaigns about IP rights, helping people understand their importance. **Singapore** engages with startups to help them navigate IP protection, while **Sweden** provides user-friendly online databases for easy access to IP info. **Japan** collaborates with both the government and private sectors to strengthen enforcement. **Switzerland** balances IP rights with public access, especially in healthcare, ensuring that essential services remain affordable. Finally, **Finland** promotes partnerships between universities and businesses to foster innovation. By adopting similar strategies—like creating specialized IP courts, enhancing public awareness, supporting small businesses with affordable forensic services, and encouraging collaboration between academic institutions and industries—India can build a stronger, more innovative environment that supports creativity and growth.

Recommendations

Throughout the paper, we have seen why and how forensics plays such an important role in investigating IP crimes. However, the scope and application of this topic has not been discussed as much as it should have been. Also, there are several challenges related to the legal framework and enforcement. Addressing these issues can improve the investigation and prosecution of IP crimes.

1) **<u>Strengthening Forensic Infrastructure and Expertise</u>**

One of the main problems in Indian IP crime investigations is the limited availability of specialized forensic expertise within law enforcement agencies. Many officers do not have enough knowledge and specialized training to exclusively handle IP crimes through forensic methods.

a. **Invest in specialized IP forensic labs:** Establish new forensic labs and investigation units in at least major cities with a good connectivity to other major towns of the state, or at least within state and national IP crime branches. These labs should be equipped with cutting-edge digital tools like data mining, blockchain verification, and cyber forensics for tracking counterfeit operations and piracy rings. to investigate counterfeiting, software piracy, and other IP violations.
b. **Training Programs:** Focused training modules which clear instructions should be implemented in every forensic education institution to begin with, and then to all the officers who work frequently under IP crimes division. Not just limited to that, these modules should be taught to facilitators of law enforcement (like police and judiciary) too, to promote a smooth functioning of the investigation. Some of the topics covered include digital evidence handling, data recovery, and forensic accounting for IP infringement cases.
c. **Public-Private Partnerships:** Although it might look risky, partnering with established private tech companies to bring in advanced tools and resources to support forensic work in IP crimes, is actually a really good idea. However, extensive research and monitoring should be done before engaging any private entity in this field.
d. **Establish a National IP Crime Task Force:** We need a specialized task force dedicated to IP crimes, incorporating forensic experts skilled in digital forensics and forensic accounting, to track online piracy and counterfeiting networks. As of now, the establishment of an *Intellectual Property Division* in the **Delhi High Court** in April 2022 further underscores this reform. We will need an IP Division in all the high courts of the country along with one primary institution to coordinate and supervise all the IP Divisions in the country - and that will be the National **IP Crime Task Force.**

2) **<u>Implementation of a Standardized Forensic Framework for IP Crimes</u>**

The lack of a standardized forensic protocol leads to inconsistencies in how forensic evidence is collected, processed, and presented in courts. To tackle these:

a. **Develop a national forensic framework for IP crimes**: As IP crime cases are evolving over time, it becomes important to acknowledge that we need to have a

framework which is uniform and consistent so that we will not have any confusions while looking at forensic inferences. Hence, a unified forensic guideline specific to IP crimes should be implemented across states, outlining the proper procedures for evidence collection, preservation, and analysis.

b. **Certification for forensic investigators**: Implement a certification system for experts and establish forensic practitioners/investigators who handle IP crimes. This creates a uniformity in expertise.

3) **<u>Enhancing Cross-border Collaboration for IP Crime Investigations</u>**

When IP crimes happen in more than one country, it is hard for Indian officials to coordinate and convict the offender, because different countries have different laws about how to investigate crimes.

a. **Global agreements on communication of forensic evidence:** Establish stronger legal frameworks and agreements with other countries to help in the timely exchange of forensic evidence whenever required in cases of international IP crimes. This creates a clear framework on how to deal with IP offenders who are outside our jurisdiction.

4) **<u>Reforming Legal Frameworks to Accommodate Forensic Evidence</u>**

Intellectual Property laws in India do not have specific rules/sections for using forensic evidence in court. This makes it harder to use forensic evidence in actual court proceedings for such crimes.

a. **Legal reforms for admissibility of forensic evidence:** Update the existing laws to make it clear how forensic evidence can be treated in court. This includes evidence from computers (digital forensics) and other methods of forensic investigation. Each of the methods under forensic investigation should have clearly written under them the scope, method of procurement of evidence, what evidence can/cannot be used in court and so on.

b. **Establishment of forensic experts' panels:** Since forensics has a role to play in investigations of almost all types of crimes, it is imperative to have a dedicated panel of certified forensic experts within the judiciary system. The panel can be further branched into teams with experts specializing in each type of forensic methodology. These people serve as an advisory committee during IP litigation to help courts better understand the technical aspects of forensic evidence.

5) **<u>Alternate Approaches for Small Businesses and Individuals</u>**

Given the disparity in access to justice for small businesses, particularly their inability to afford private forensic services, a recommendation to address this issue is necessary.

a. Establish **government subsidized forensic services** for IP Crimes stating clear policy framework, outlining eligibility criteria, types of services covered, and application procedures.
b. The funding mechanism for the same is through budgetary provisions allocations within the Ministry of Commerce and Industry to fund the subsidized forensic services program.

6) Partnerships from private forensic firms at reduced rates in exchange for government support.

Conclusion

This paper has explored the crucial role of forensic techniques in enhancing intellectual property (IP) enforcement in India. By examining various forensic methods, including traditional techniques and advanced technologies, we have ascertained their effectiveness in combating counterfeit goods, software piracy, and other IP infringements. The paper has also highlighted the importance of a robust legal framework and the need for addressing challenges such as limited forensic expertise and jurisdictional complexities. Additionally, India must focus on implementing a clear framework and guidelines on how forensics should and should not be used in courts to ensure consistency and reliability in legal proceedings.

While India has made significant developments in IP protection, there is still room for improvement. By investing in forensic training, adopting advanced technologies, and strengthening the legal framework, India can further enhance its ability to combat IP crimes and protect the rights of innovators and businesses.

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