Journal of Legal Subjects
ISSN: 2815-097X
Vol : 04 , No. 02 , Feb-Mar 2024
http://journal.hmjournals.com/index.php/JLS
DOI: https://doi.org/10.55529/jls.42.13.23

Intellectual Property Rights and Plagiarism in Information Technology Research

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Received: 07 November 2023 **Accepted:** 25 January 2024 **Published:** 08 March 2024

Abstract: In present times, intellectual property rights are the central focus of international economies and global market competitions among enterprises due to their important role in fostering cultural prosperity, economic development, and progress in the field of information technology. The advancement in information technology has made the field even more complicated as firms struggle to protect their copyrights in the face of online data explosion, dynamic e-commerce environment, and rising disruptive technologies such as Machine learning and Artificial Intelligence. On the other hand, plagiarism is on the rise in recent times. Students knowingly or unknowingly practice plagiarism daily to meet their stringent academic demands. Information Technology Tools encouraging plagiarism have further aggravated the problem. Intellectual property rights and plagiarism awareness are relatively weak even among scholars. Do intellectual property rights protection and existing plagiarism trends have any effect on the field of information technology research? This paper discusses intellectual property rights and plagiarism with the mindset of information technology research. The paper seeks to shed light on aspects of intellectual property rights and how they affect academic research, in the field of information technology. If after reading this paper a researcher, can take intellectual property rights and plagiarism seriously, then, this research would have achieved its desired outcome.

Keywords: Intellectual Property Rights, Intellectual Property Protection, Plagiarism, Copyright, Industrial Property Rights.

1. INTRODUCTION

The concept of property was originally applied to land and chattel. However, this perception has changed over time, and today, the term property is also used to refer to the right to own intellectual creations such as inventions and expression of ideas with the central examples being patents, copyrights, trademarks, and rights to industrial design (Varelius, 2014). The past 30 years have witnessed an increase in technological innovations and granted patent numbers.

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Intellectual property rights breaches are a serious problem in modern society and have in some instances caused delays in the advancement of information technology research. The problems of intellectual property breaches occur through technology leakages and imitations which negatively influence innovative activities by firms and industries (Cho & Kim, 2017).

On the other hand, there lies the problem of plagiarism. The practice of plagiarism is on the rise in higher education and is a growing problem in academic institutions. Plagiarism is defined as the intentional or unintentional use of someone else's work as your own and for your benefit and has been aggravated by the rapid rise and advancement of information technology. Using a person's work without giving proper credit to the original author is known as plagiarism. Plagiarism can be extended to include computer program codes that are copied and used without the consent of the original programmer. (Vandana, 2018). The era of Information and Communication Technology (ICT) and rapid advancements in internet and network communication have created dynamic data-sharing platforms deeply worsening plagiarism prevalence.

Information technology has ensured easy access to information whose access is presently at the fingertips with a simple mouse click regardless of an individual's location across the globe. For this, we live in the copy-paste generation which has further worsened the problems with plagiarism (Vandana, 2018). The education sector is awash with many machine-learning tools that promote plagiarism. Such tools cast doubt on whether it is possible in modern times to enforce fairness in student learning outcomes evaluations. It is thus very important for instructors to understand and know these tools to be effective in their work and in performing student evaluations (Xiao et al., 2022).

2. RELATED WORKS

Kim & Jung, (2022), Saputra et al., (2023), Fan Yang et al., (2019), and Kossecki, (2022) Highlight Intellectual Property Rights (IPR) in their studies as the right of ownership over a piece of work or process that is useful for gaining a competitive advantage. Shmatkov et al., (2021), Varelius, (2014), and Vartumyan et al., (2023) state in their study that in the middle of intellectual property rights violation, lies the plagiarism problem.

The works of Koriala et al., (2022), Kodali et al., (2023), and Humayoun et al., (2022) highlight the seriousness of plagiarism offense in the academic world and state that it compromises academic integrity. Further, Tripathi et al., (2015) state that the developments in Information and Communication Technology (ICT) have aggravated the problem of plagiarism. Plagiarism is grouped by some researchers into intentional and non-intentional plagiarism (Tripathi et al., 2015; Xiao et al., 2022; Vandana, 2018).

Different researchers also list different systems useful for the identification and deterrence of plagiarism. Vandana (2018), Xiao et al., (2022), and Yang & Wang (2010) propose JPlag, MOSS, Turnitin, Plaffie, URKUND, marble, and SIM, systems for plagiarism detection. Researchers agree that plagiarism detection approaches can be grouped into metrics-based, token-based, graph-based, and abstract-based techniques (Humayoun et al., 2022). For

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plagiarism detection in Music, Borkar proposes audio fingerprinting and segment matching method (Borkar et al., 2021)

3. METHODOLOGY

The paper takes on the approach of extensive desktop research. The researcher qualitatively analyzed data gathered from four online academic databases namely ProQuest, IEEXplore, Willey Online, and Google Scholar. Keywords such as "intellectual property", "Plagiarism in information technology research", and "Intellectual property protection laws" among others were applied to these databases. A total of 45 journal papers were derived and strictly analyzed for relevance after which the researcher remained with 27 relevant, coherent, peer-reviewed, and up-to-date journals. It is from this set that further analysis, study, and presumptions were derived that formed the foundation of this study. In the end, 15 of the 27 journals were used and properly referenced in this research work.

4. RESULTS AND DISCUSSIONS

Results

4.1 Intellectual Property Rights

An intellectual property right (IPR) is defined as any right relating to products intellectually created through creative knowledge, expression of thoughts and feelings, information, and technology. Intellectual property value can be realized through creative activities or human experiences (Kim & Jung, 2022). The World Trade Organization (WTO) defines intellectual property rights as exclusive rights that are given to a person for the labor of his mind for a specified time duration (Saputra et al., 2023). Intellectual property refers to property rights owned by an individual over his created achievements. They can include rights to literary and artistic works, names, and commercial signs (Fan Yang et al., 2019). Intellectual property is a product, work, or process that has been invented by a company to gain a competitive advantage (Kossecki, 2022).

IPR is the property rights resulting from his or her intellectual work and varies from inventions, designs, logos, names, images, and literary and artistic works used in commerce. IPR can be owned by an individual or an organization (Dhoot et al., 2021). Intellectual property rights protection not only protects but also improves the core competitiveness of products by protecting wisdom results in a way that markets are dominated and profits made. IPR helps prevent price wars and differentiates products. IPR also defends rights and provides the right tools for product marketing (Xin & Yan, 2021).

The source of IPR is human intelligence. IPR are property rights to works owned by those who created them. Due to differences in intellect, everyone cannot produce the same results. The accomplishments of the human intellect ensure the establishment of exclusive rights. Intellectual properties are unique in their nature and form. The principles governing intellectual property rights are the principle of natural fairness, the argument from cultural necessity, and the consensus reached by society. These principles were developed to balance individual interests and societal interests (Saputra et al., 2023).

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Intellectual property laws on the other hand are sets of strategies used by governments to respond to challenges posed by intellectual property rights (Shmatkov et al., 2021) Laws governing intellectual property rights are broad and vary through a range of topics such as books, literary work, genetics, and computer programs (Saputra et al., 2023). Technological advancements are threatening the traditionally known intellectual property service system and statistics indicate that the number of intellectual property disputes is increasing every year (Fan Yang et al., 2019). IPRs are intangible and protect intellectual creative products. They can be classified into two types namely Industrial property rights and Trademark rights also known as Copyrights (Kim & Jung, 2022; Dhoot et al., 2021).

4.1.1 Industrial Property Rights

Industrial property is generally used in intellectual achievements like inventions and distinct features in industrial production and distribution. In such cases, there are secret techniques employed to prevent stealing or leakage of intellectual property. In information technology, encryption and decryption are mostly employed. Systems can encrypt files, store them as ciphertext, and decrypt them when the right key is applied. This prevents the leakage of important information during storage and transportation. There are also special log files that monitor and record user operations to enforce accountability and enable audits (Dhoot et al., 2021; Cho & Kim, 2017)

Industrial property rights protect industrial developments through the structure, form, and technical solutions of industrial products while copyright protects cultural developments in the work of fine arts. For copyrights, the main mode of dissemination is the Internet (Xin & Yan, 2021; Dhoot et al., 2021). The types of industrial property are trademarks, design Patents, Utility Patents, inventions, and geographical indications of origin (Kossecki, 2022).

a) Trademarks

The most frequently registered intellectual property in the world are trademarks (Shmatkov et al., 2021). Trademarks are legal marks useful in distinguishing products and services from other similar brands in the same industry. The elements of a trademark are combined with words, graphics, colors, sounds, and numbers. Trademarks should be distinctively different to distinguish them from competitor's logos in the same industry. Trademarks are fundamental for the survival of an enterprise and are therefore protected by national laws. Trademarks enable enterprises to grow in the market and are known as the source of life for businesses. Businesses have to pass through rigorous application, examination, and approval legal processes before a trademark can be acquired. A trademark enables its holder to enjoy exclusive rights over a given brand and helps in getting an initiative into a given market (Xin & Yan, 2021).

b) Design Patents

Patents are used to mark a company's innovative and scientific potential. Design patents are part of industrial property rights in the same category as utility model patents. Design patents are meant to cover a new appearance design in terms of uniqueness, and creativity in color, shape, and pattern. A design patent's functional structure in some products determines product appearance (Xin & Yan, 2021). During registration, the aesthetic appeal and natural features

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are important. Legal Design rights are granted to companies to help them protect their attractive elements and gain a competitive advantage (Shmatkov et al., 2021).

The product packaging process has a pivotal role played by the packaging design. Presently, packaging design utilizes flat visual elements whose possibility of innovation is limited. Thus, due to the fierce market competition, firms with the core technology for the production of packaging designs must be safeguarded through intellectual property rights for a constant continuous innovation process that constantly impresses consumers (Xin & Yan, 2021).

c) Utility Patents

Utility patents are useful in helping enterprises increase the value of their shares for protection and licensing. Utility patents protect trade secrets and can potentially last longer as long as they remain confidential (Shmatkov et al., 2021). The World Intellectual Property Organization (WIPO) was founded in 1967 and regulates key conventions related to intellectual property to protect intellectual rights and propel innovations and creativity (Vartumyan et al., 2023).

4.1.2 Copyrights

Copyrights include literary property and neighboring rights. Copyrights are a means of protecting software products and literary rights (Shmatkov et al., 2021). Copyright protection is about the work and not the product. It protects unique intellectual achievements in the field of literature, science, and art which can be tangibly reproduced. The focus of copyright protection laws is on the originality and aesthetic value of any given work (Xin & Yan, 2021). Copyrights cover literary and artistic works such as software, paintings, sculptures, music, databases, television broadcasts, architectural designs, trade secrets, and creations in branches of commerce. Copyrights are enforced to guard the economic interests of artistic work creators. These rights entitle creators to be identified as the original owners of their work and protect against illegal modifications that may interfere with the reputation of their originators (Varelius, 2014; Kossecki, 2022).

In the field of information technology, in robotics, for example, copyright protection is useful because of its role in software protection (Shmatkov et al., 2021). Recent years have seen an increase in enforceability rights resulting from rising court cases on copyright violations. Sectors such as broadcasting, and telecommunication rely on fees paid for the use of copyright and are often gravely affected by copyright infringement (Kossecki, 2022).

4.2 Plagiarism

Plagiarism is defined as the act of copying an individual's work and presenting it as your original work or stealing someone's idea, and not giving credit to the original owner of the idea. Plagiarism is a serious academic offence and if proven, may result in disqualification or dismissal of a student or previously given academic award. The most serious form of plagiarism is copying and presenting someone else's work as your own (Koirala et al., 2022; Kodali et al., 2023). Undoubtedly, a critical component in the evaluation of academic works such as thesis, research papers, and project reports is academic duplicity. To maintain academic integrity, papers must be scanned and analyzed for plagiarism which must be detected, managed, and stopped (Vandana, 2018; Tripathi et al., 2015).

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4.2.1 Types of Plagiarism

Textual plagiarism threatens the very foundation of education by challenging the honesty and legitimacy of a student's work. When practiced, textual plagiarism will lead to unfair grading and students completing courses without achieving their intended objectives. As a result, students will not be able to perform well in their future duties in various industries once they have completed their studies (Kodali et al., 2023). There are four types of plagiarism with the first being direct plagiarism. In direct plagiarism, someone copies someone else's work word for word without citations. The second type of plagiarism is self-plagiarism where someone utilizes his paper partially or fully by reproducing it in a new assignment without permission. The third type of plagiarism is accidental plagiarism. In accidental plagiarism, a person changes words in other papers while maintaining the structure and the whole meaning of the paper. Finally, the fourth type of plagiarism is Mosaic plagiarism where a person either forgets sources, misquotes sources, or even rewrites a paper without giving due credit to the author (Vandana, 2018).

4.2.2 Plagiarism Detection Tools

In plagiarism detection, tools that examine the percentage of plagiarism in a student's work are used. Such tools are mostly availed on the online platform by many companies from across the globe. Essay Plagiarism detection tools can examine the semantics, syntactic, and stylometric features of an essay. Measurements for behavior similarity, text similarity, or in-code similarity are performed by this tool through numerical values based on either the binomial score, the K-index score, the Hamming distance, the Max N-gram length, and the Levernshtein score (Xiao et al., 2022).

There are two ways of plagiarism detection: manually or through the use of plagiarism detection software. Manual detection occurred before the rise of information technology adoption and use. Manual detection requires a physical check of a given physical document against present documents. Needless to say, this is exhausting and needs unparalleled memory. (Vandana, 2018).

The methods used to detect plagiarism are fingerprinting which is done through matching strings in a document based on a commonly known fingerprint ratio, citation-based detection which is the evaluation of citation similarity, stylometry which is the use of statistical analysis of different writing styles, term occurrence analysis which uses either string matching or bag of words analysis, string matching approach which is common in computer science and helps in getting problems with pattern occurrence within strings. Today, the presence of electronic documents calls for electronic methods of plagiarism detection. Using plagiarism detection software involves tools, e-documents, and software that compare documents simultaneously. Some of the available plagiarism detection software are JPlag, MOSS, Plaffie, Turnitin, URKUND, SIM, and marble (Vandana, 2018).

JPlag is a plagiarism detection tool created by Guido Malphol and supports the scheme, C++, C, and Natural language texts. Jplag can identify similarities among multiple source code files and display the results in HTML format. On the other hand, the Measure of Software Similarity (MOSS) is an open-source code plagiarism detection software tool created by Ales Aiken.

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MOSS supports C++, C, JAVA, PHP, and Perl. MOSS uses the string-matching similarity methods (Vandana, 2018; Xiao et al., 2022; Yang & Wang, 2010).

Plaggie is used to detect plagiarism in source codes and only supports the JAVA programming language. Plaggie works in the same manner as JPlag through a similar comparison of algorithms. SIM was developed by a Dutch Scholar named Dick Grune in 1989 and supports C, Pascal, Modula, Lisp, Miranda, and Natural language processing. SIM is useful in the identification of duplicate code fragments in large software segments (Vandana, 2018; Yang & Wang, 2010).

Turnitin is the most commonly used type of plagiarism detection tool in undergraduate and postgraduate classes. It examines literary works using algorithms, cross-referenced papers checked against thousands of others availed in databases across the internet. Turnitin was Developed in 1996 by UC Berkeley. Turnitin sends originality reports via mail to instructors with indicators of plagiarized texts (Vandana, 2018; Xiao et al., 2022). Turnitin can be integrated into products such as Moodle, making seamless plagiarism checks (Kodali et al., 2023).

Grammarly is also a tool that though goes beyond plagiarism detection, checks on students writing against online sources and warns of plagiarized sections within their work to prevent plagiarism detection (Xiao et al., 2022).

4.3 The Problems of Digitization

Information technology has significantly contributed to the growth of copyright-related lawsuits (Shmatkov et al., 2021). Thanks to Information Technology, the world is full of negative impacts of intellectual property leakages. There are countless counterfeits and shoddy products. In all these, the most serious problem faced is IPR infringements. The internet presents to the world opportunities for free access and control of information. Information technology has made it extremely difficult to define who protects copyright in the digitized world as it makes the process of creation, use, and distribution of literary works very complex. Information technology also makes it difficult to determine authorship and draw the legal line between copyright holders, users, and other participants (Vartumyan et al., 2023; Dhoot et al., 2021).

Information technology has become a great threat to intellectual property owners. The rise of the photocopying machine caused heated debates on the issue of articles. The digital recorder had a great impact on the multimedia industry whereas the emergence of big data has completely trampled upon intellectual property rights (Dhoot et al., 2021). Piracy and illegal distribution of copyrighted materials are now common in the online environment. There are numerous illegal pirate sites and file-sharing sites where users can download and upload works without the express permission of copyright owners (Vartumyan et al., 2023).

4.3.1 Abuse of AI Models

AI is an uprising field in information technology that has delivered several models and tools capable of completing different types of tasks (Xiao et al., 2022). AI creates new unforeseen

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challenges to intellectual property rights and leads to the need for the development of proper regulatory and legal solutions against the impacts of AI on the creation and determination of authorship. The rapidly developing AI technology is an important factor in the abuse of Intellectual property rights. In early 2023, a 5th-year undergraduate student named Alexander Shadan wrote a diploma using a Generative Pretrained Transformer tool called Chat-GPT. Chat GPT can learn how to generate coherent information and correctly answer questions (Vartumyan et al., 2023). AI tools that have been used to infringe intellectual property rights include Open AI's Playground Chat-GPT and GitHub CoPilot.

a) OpenAI Playground

The OpenAI Playground, released in November 2021 has been a platform used by students to perform many necessary tasks without being caught in the net of plagiarism. Open AI's auto-completion features are used by students to generate modify and enrich answers to short essay questions in such a manner that graders don't detect plagiarism. The natural language processing capabilities of AI have brought about the introduction of models such as Chat GPT-3 which though complex, is capable of performing many Natural language Processing tasks after a few settings. Chat GPT which is a form of OpenAI playground tool, and others such as GitHub Copilot3 can potentially be used in plagiarism and thus cause harm to fair evaluations (Xiao et al., 2022).

b) GitHub Copilot

This is another tool of great concern as it attacks fairness in the evaluation of coding assignments. Copilot was released in June 2022 as an experimental feature of GitHub and helps in the automatic completion of programming functions. Copilot runs on many development tools, plugins, and extensions and is powered by OpenAI. The only input a user needs to provide to the copilot is a function name, and comments for functions if needed. The user orders the copilot to offer a list of solutions to problems and then accepts, rejects, or modifies the given solution. This eradicates problem-solving skills evaluation on student assignments. Tutors also cannot assess the student's ability to convert ideas into code as Github Copilot does that (Xiao et al., 2022)

Discussions

Intellectual Property rights protection increases people's enthusiasm to creatively engage in scientific research. IPR protection ensures the safety of enterprise investments and can effectively improve the added value of a product in the market. IPR enables enterprises to improve their corporate image, enhance the status of an enterprise in a joint venture, strengthen the stand of an enterprise in a business negotiation, enhance competitiveness in the market, increase corporate assets, financing, and licensing, and help an enterprise gain a pricing power (Dhoot et al., 2021)

Not everyone accepts the concept of intellectual property rights. Critics argue that since IPR limits access to cultural products, they are incompatible with other rights such as the right to freedom of action, the right to conscience, and the right to speech. Critics also argue that there is no relationship between IPR protection and technological innovation in a country's growth and technological developments. Some studies even suggest that an increase in IPR protection

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hurts an enterprise's innovation and leads to economic losses in a country. Some researchers strongly believe that stronger IPR protection increases monopoly in the markets and distorts competition and by so doing, makes a firm lose innovation incentives. Arguments are also rife that IPR hinders learning and impoverishes culture (Cho & Kim, 2017; Varelius, 2014).

Intellectual property Rights (IPR) protection has been stronger in recent years. However, there are great variations between countries on how intellectual property is perceived. Developed countries bear strong regulations and laws on IPR while developing countries have weak IPR protection channels. The differences are likely to cause international trade conflicts (Cho & Kim, 2017).

On the other hand, some research studies suggest that IPR is strongly correlated to innovation and some researchers hold to the thought that IPR protection gives room for innovation and boosts economic growth. There is a positive relationship between IPR and innovation as long as markets are open to all and competitive in every sense. In competitive markets, IPR protection enhances innovation (Cho & Kim, 2017).

Information Technology has brought about rapid development and added value to the need for intellectual property rights. Intellectual property is the lever between the inventor and the public interest through legal means. A perfect legal system can stimulate innovation and protect the wisdom of the inventor. However, too much protection of inventions may bear market economies and prevent socio-economic development (Xin & Yan, 2021). When discussing IPR, it is important to strike a balance between IPR protection and free access to information. A compromise that protects copyright holders while at the same time fostering access to knowledge and cultural values to benefit innovative developments in the field of science and information technology (Vartumyan et al., 2023). It is, therefore, necessary to consider an integrated approach when dealing with IPR protection to ensure effective but fair protection of copyright holders in the era of the Information technology explosion.

On plagiarism, Koirala in his study on teacher-student relationships' effect on academic integrity states that students who admitted to plagiarism generally disliked teacher's behavior as compared to students who did original work. The main reason why students practice plagiarism is failure to practice correct referencing. Other studies cite a lack of awareness, lack of understanding, and lack of competence being behind students' indulgence in plagiarism. Other studies indicate the freedom provided by information technology and the internet in accessing privileged works (Koirala et al., 2022). The widely used methods for evaluating students' learning outcomes are exams, assignments, projects, research papers, and essays. These are particularly vulnerable to plagiarism. Existing plagiarism detection tools are not smart enough or advanced enough to detect such infringements because they fall behind in development. Plagiarism checkers can easily be fooled by AI-based tools (Xiao et al., 2022).

5. CONCLUSION

Intellectual property rights and plagiarism awareness are relatively weak even among those considered as learned. The field of IPR protection is still thinly veiled to many scholars,

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providing an easy proliferation of IPR crimes such as plagiarism. More to this, the field is dynamically affected by the advances in Information technology. Digitization presents real problems, especially on ways to manage IPR infringements through the use of disruptive technologies such as machine learning and artificial intelligence. More to this, there is low supervision for IPR by administrators and incomplete regulatory mechanisms. IPR infringement cases are not well handled and are becoming difficult to define in the world of information technology's big data, and virtual realities. Thus, more work is still needed for IPR protection and for proper plagiarism control and management. It must always be noted that all technological advancements possess a strong duality. They make it easy for dissemination of news, communication, and social interaction but it is also easier to steal IPR through technology.

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