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IMPACT OF EMERGING TRENDS IN TECHNOLOGY ON INTELLECTUAL PROPERTY RIGHTS IN NIGERIA*

Abstract

The advent of digital technologies has indeed changed the world and affected many areas of today's reality and among them is Intellectual Property. In the time of digital technology, it has become possible to produce and disseminate copies of copyrighted works with a mouse click. This has increased the number of copyright violations as well as made the enforcement of Intellectual Property rights more complex. Trademark owners now have to secure web-monitoring for potential trademark infringement in domain names and on internet websites to keep track on availability of new domain zones and fight cyber squatting. High tech developers do not have it easy as to mitigate a risk of accidentally infringing patent rights, companies (especially software developers) are forced to acquire rights to defensive patents as well as spend time, efforts and financial resources on fighting patent trolling. In this article, we are going to look at the emerging trends in technology on Intellectual Property Rights in Nigeria.

Introduction

Nigeria is ranked among countries in the world where Intellectual Property theft or piracy is prevalent.[1] Both the regulatory laws and the requisite technology for the operation and enforcement of these laws in Nigeria are still largely undeveloped, out-dated and non-sustainable despite the huge human resources and emerging technological innovations. It is in the very nature of Intellectual Property rights that their justification and scope correlate with extraneous factors such as societal perception and technological development. The convergence of various fields of technology is changing the fabric of society. Big data and data mining, Internet of Things, Artificial Intelligence and Blockchains are already affecting business models and leading to social and economic transformations that have been dubbed by the fourth industrial revolution.[1] The rise of these new digital technologies and file sharing networks have definitely made it harder for individuals and organizations to protect their Intellectual Property rights. This is made harder by the fact that there is no uniformity in the enforcement of laws that are designed to protect against Intellectual Property theft. In this article, the writer will analyses how the technical background of this massive transformation affects Intellectual Property rights in Nigeria and how IP is likely to change in order to serve the society.

What is Intellectual Property

Intellectual property is that of intangible property which have no physical existence. They are 'choses in action' and corporeal hereditaments. The term has no acceptable definition but there is a consensus that it is a right conferred by law on human innovators and creators and even entrepreneurs to protect the fruits or products of their intellect, their innovative and creative efforts and their commercial reputation and goodwill. Such rights are conferred by law in order to promote creativity, innovation and societal good. In this connection, the right enables creators and innovators to prevent access to the product of their intellect or allow access thereto either freely or for economic gain. The right is not absolute but is limited by time and certain exception. This way, the law ensures that

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[1] Aguboshim, F. and Ezeasomba, N. I., Intellectual Property Rights: The Effects on Information Security and Research Innovations in Nigeria (2019) obtainable at <https://www.researchgate.net > accessed on 20/1/222.

creators and innovators do not exercise their intellectual property to unreasonably or unjustifiably prevent members of the public from assessing the knowledge which springs from their creative and innovative efforts.

Adewopo seems to concur with the above conceptualization of intellectual property. According to him, the expression intellectual property is taken to mean the legal rights which may be asserted in respect of the product of the human intellect.[2] Oyewunmi also shares similar understanding. According to the learned author:

> *Intellectual Property may be defined as the legal rights conferred to those who engage in creative, inventive and promotion activities which have resulted in original, useful or other beneficial outputs. Such outcome is classified as a form of property, albeit of the intangible, incorporeal variety. This means that unlike physical property, it is incapable of being physically owned or possessed and can therefore be simultaneously enjoyed by different users without being lost to the creator or owner.*[3]

Oxford Dictionary of Law[4] defined intellectual property as "intangible property that includes patents, trademarks, copyright registered and unregistered design right." Among the different forms of intellectual property, Mereth[5] identified patents, trademarks and copyright as the three most important forms of intellectual property rights while Cromish posits that they see them as models to which aspirants will turn to for the protection of other ideas, information and trade values.[6]

Another perspective to intellectual property law is as the area of law which deals with legal rights associated with creative effort or commercial reputation and good will. This definition is very important in the light of the fact of new development in technology as well as challenges arising from the competitive nature of international global trading patterns.[7] It can be deduced from the foregoing, that intellectual property serves two main objectives: the protection of the private interest of creators and innovators by enabling them to gain economic rewards for their innovation and creativity and the protection of public interest in the promotion of science, arts and societal welfare by ensuring equitable access to creative and innovative works by the public. These key objectives are rooted in international human rights legal framework such as United Nations Declaration on Human Rights, 1948[8] and the International Convention on Economic, Social and Cultural Rights 1966.[9] Intellectual property could be categorized into two broad categories; Copyrights and Industrial property.

Copyright Defined

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[2] Adewopo A., '*According To Intellectual Property: A Pro-Development Vision of the Law and the Nigerian Intellectual Property Law and Policy Reform in the Knowledge* Era'(NIALS, 2012).

[3] Oyewunmi, A., 'Nigerian Law of Intellectual Property' (2015).
[4] Martin, E.A, and Law, J. 'Oxford Dictionary of Law' (6th edition eds) (Oxford University Press 2006) 280.
[5] Mereth P., 'Intellectual Property Law' (1996).
[6] Cronish N., 'Intellectual Property: Patents, Copyrights, Trademarks and Allied Rights, 4th edition (1999).
[7] Brainbridge, D., 'Cases and Materials in Intellectual Property Law (2006) at 112.
[8] UDHR, Article 27.
[9] ICESCR, Article 27.

There is no clear statutory definition that is given for the term 'copyright' under the Copyright Act. Section 2 of the Act[10] includes the following creative works as being eligible for copyright which are: literary works, music works, artistic works, audiovisual works, sound recording and broadcast. This may be attributed to merely being simplistic in definition or captures the indefinite posture of the statute of what constitutes copyright. Wilson expansively denotes copyright in the following manner:

> Copyright is a property right that subsists in certain works. It is a statutory right giving the copyright owner certain exclusive right in relation to his/her work such as the right to make copies of the work, to sell those copies to the public or the right to give a public performance of the work.[11]

Copyright includes a corollary of rights which include the creator's right to his work of literacy, music, arts, audiovisual works, sound recordings and broadcast. This confers on the owner the right to claim ownership, right to share in the proceeds of sale, right of due recognition and the right of action. The purpose of copyright embraces the following reasons firstly to promote public welfare through the advancement of knowledge. Second, it grants authors/creators right of control in terms of production, reproduction and distribution of their works for a certain period of time, hence providing incentives to further creativity through the authors receiving a financial reward for their works. According to Adams and Yusuf, it is perhaps the most popular and familiar branch of intellectual property law which is used for the protection of literary, artistic and dramatic achievement.[12]

Copyright is an intellectual property right that encourages individual efforts and enhances development. Copyright Act defines copyright simply as "copyrights under the Act" This definition appears imprecise but a closer look at section 9 of the Act elucidates copyright as the exclusive right to do or authorize the doing of certain acts in relation to the work in which the right subsists.[13] Such acts include reproducing the work in any material form; publishing the work, performing it in public, make audiovisual work or a record in respect of the work, making adaptation and translation of the work.[14]

Copyright encourages more authors to put their works to the public hence there is a clear nexus between copyright and the creative industry. Copyright is intangible; it is individually owned and conferred by statute. This position was adopted judicially in a host of cases including *Jerrold*

[10] Copy Right Act, 2022.

[11] Wilson, C.' *Intellectual Property in a Nutshell '* (Sweet & Maxwell, 2005).

[12] Adam K.I. and Yusuf I. A., *Originality of Copyright and the debate on Protection of Traditional Knowledge: A* View on *Nigerian Law"* in Chukwumaeze, U.U. *et al* e.d. *'Law and Social Justice and Development: A festschrift for Professor Nnabue'* (Imo State University Press 2013), 82.

[13] See also the case of *Adenuga v. llesanmi Press and Sons Ltd* (1991) 5 NWLR (Pt. 189). Copyright may be defined as a monopoly right which the creator of an eligible work acquires as soon as such a work is put in a tangible form and which right precludes all others from the exploitation of such work without the authorization of the creator for a specified period, See Okoroji, *T., 'Copyright Neighbouring rights and the New Millionaires: TheTwists and Turns in Nigeria'* (Tops Limited 2009) 42.

[14] Section 9 (a) – (k) of the Copy Right Act 2022.

v Houston,[15] *Corelli v Gray*[16] and *Rees v Melville*[17] where Lord MacCoughton defined copyright "as a right that restricts others from doing a particular act."

The Copyright Act protects works authored or created by Nigerian citizens or persons domiciled in Nigeria. It also protects works of other persons first published in Nigeria. Work first published in a member State of the Berne Convention 1886, Universal Copyright Convention (UCC) 1952, Rome Convention 1964 or other international agreements to which Nigeria is a party is also protected under the Act. Likewise works first published by the United Nations or any of its agencies, or the African Union, or by the Economic Community of West African State. The Act complies with the internationally accepted minimum standard of copyright protection. It protects the works of other nationals the same way as works of Nigerians.

State of the Law on Intellectual Property Rights in Nigeria

Intellectual property regulations and policies in Nigeria are crippled by obsolete and virtually non-existent policies, counterfeiting and anti-piracy system. The need for a more conducive Intellectual Property legal regime to match the ever growing digital environment in Nigeria cannot be over emphasized. The Nigeria's Intellectual Property laws are not suited for emerging commercial and technological development. It is a well known fact that the body of Intellectual Property laws in Nigeria has been in need of reform and the attempts at reform have had chequered history. The laws are grossly analogue and have remained largely unsuited to the emergent technological development. Although the new Copyright Act, 2022, is indeed an improvement on the old Copyright Act, the new Act still omits certain important provisions on copyright protection. There is also need to amend the laws on Patent and Trademark in Nigeria to suit the digital age. The absence of a systematic law reform has contributed immensely to the apparent comatose state of Intellectual Property regime in the country coupled with the peculiar nature of the creative and Intellectual Property based industries. The promotion and protection of creativity and innovation are an indispensable part of economic development. Intellectual Property is critical to that, particularly for a developing country with tremendous creative capacities like Nigeria.

Emerging Trends in Technology on Intellectual Property Rights in Nigeria

To have a meaningful discussion on the impact of the emerging technologies on the intellectual property rights in Nigeria, it is apparent to explore extensively some of the foremost emerging technologies as follows:

Artificial Intelligence

Artificial Intelligence (AI) was first used in 1956 by John McCarthy, a computer scientist considered to be the father of AI, at the first Artificial Intelligence Conference. AI has been defined as 'the ability of a digital computer or computer controlled robot to do or perform tasks commonly associated with intelligent beings.[18] Obviously, AI increasingly challenges the once sacred notion that intelligence and creativity are the exclusive preserve of humans and further proposes a future where human intelligence becomes secondary to artificial intelligence.

[15] (2012) 44 CY press wood Dr/ 410 Houston TX, 77070.
[16] (1913) 29 TLR 570.
[17] (1914)3 K& J 703.
[18] Artificial Intelligence, Encyclopedia Britannica <https://www.britannica.com/technology/artificial Intelligence> accessed 27 May 2022.

These issues are pertinent since AI has no biological properties or social skills."[19] Issues have arisen as to legal capacity, legal liabilities, legal rights and legal personality of AI. In 2017, Saudi Arabia granted 'citizenship' to a humanoid robot named 'Sophia' who had earlier addressed the United Nations.[20] Another online system with a persona of a seven year old boy was granted 'residency' in Tokyo, Japan. Recognition of legal personality has charted a course in history from the Roman *Peculium*[21] that denied it to slaves, to Transatlantic Slave trade that led to non-recognition of blacks as persons in the USA[22], to recognition of married women,[23] to non-recognition of indigenous peoples during colonialism,[24] to recognition of animals[25]and inanimate subjects. In the case of *Bumper Development Corporation v Commissioner of Police for the Metropolis,*[26] a Temple building in India was granted legal personality. A similar enactment was made over a River in New Zealand[27] and an ecosystem in Ecuador.[28] Whereas traditional notions of legal personality encompasses natural (human) and juridical persons (aggregate of natural persons to form a corporation), some scholars have put forward a division of the concept of legal personality into legal personality and electronic personality.

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[19] Ziemianin, K.,'Civil *Legal Personality of Artificial Intelligence: A Future or Utopia?* (2021) < https://Policyreviewjnfo/articles/analysis/civil-legal-personality-artificial-intelligence-future-or-utopia>accessed 25 November, 2022.

[20]Chesterman, S. (2002) *'Artificial Intelligence and The Limits of Legal Personality in International and Comparative Law'* Quarterly Vol. 69 Issue 4, 2002. https://www.cambridge.org/core/journals/international-and-comparative-law-quaterly/article/artifialintelligence-and-the-limit-of-legal personality//1859c6E12F75046309C60C150AB31A29>accessed 28 August, 2022. <https://doi.org/10.1017/S0020589320000366> accessed 29 August, 2022.

[21] Roman patrimony that vested what practically belonged to a slave, legally in his master as the owner. The slave could only make transactions with the permission of the master or *Paterfamilias.*

[22] The Thirteenth Amendment- Article 1, S 2 of the Constitution in 1789 declared any person who was not free would be counted as three-fifth's (3/5) of a free individual for the purposes of determining congressional representation. Before then, the Court in North Carolina v. Mann, 13.N.C. 263 (N.C 1830) held that a slave owner had absolute authority over a slave and cannot be found guilty of committing violence against that slave. See also United States v. Libellants and Claimants of the Schooner Amistad, 40 U.S. 518; 1841 U.S. LEXIS 279.

[23]Marylynn Salmon 'The Legal Status Of Women, 1776-1830' in The Gilder Lehrman Institute of AmericanHistory.<https://ap.gilderlehrman.org/essay/legal/status-women-776%C32A2%E2%82%AC%E2 %80%9 Cl 830> accessed 10 June 2022. William Blackstone in his *Commentaries on English Law* (1765-1769) famously wrote that 'by marriage, the husband and wife are one person in the law. The very being or legal existence of the woman is suspended during the marriage or at least incorporated and consolidated into that of the husband under whose wing, protection and cover she performs everything." This was overturned by the Married Women Property Act 1882, giving rights to women to acquire, hold or dispose of property acquired before or ^ after marriage as if they were *Femme Sole.*

[24]Otherwise known as aboriginals or autochthonous people, the United Nation Declaration On the Right s of Indigenous People (UNDRIP) on September, 2007 encoded minimum standards for wellbeing of these peoples who were hitherto denied land rights and even legal personality by colonizers, invaders or later settlers.

[25]In The People of the State of New York Ex Rel. the Nonhuman Rights Project, Inc. on behalf of Tommy v. Patrick Lavery, individually and as officer of circle 1 trailer sales , Inc *et al,* 2014 WL 6802767 (N.Y. app. Div. Dec. 4, 2014) a Chimpanzee named Tommy was kept in the respondent's property. Petitioners filed a habeas corpus proceeding on the ground that Tommy was unlawfully detained by the Respondents and asked the court to consider Tommy 'a person' to obtain personal autonomy and freedom. The court found it 'inappropriate to confer upon a chimpanzee, the legal rights .. .that have been afforded to human beings' because it could not held accountable. This does not preclude animals to inherit money from owners under a Pet trust or become wealthy through earnings of their 'work' in entertainment, security and psychology.

[26] (1991) 1 WLR 1362.

[27] S *14 (I)* of the Te Awa Tupua (Wanganui River Claims Settlement) Act of New Zealand.

[28] Article 10 of The Constitution of the Republic of Ecuador.

The legal person from the principle of piercing the veil reveals the actual human maker or creator of AI while electronic persons are potentially autonomous robots with rights and obligations akin to humans including liability for damages caused by them funded by money generated by their work. E-personhood is similar to status of corporations and was first proposed by the European Parliament's Committee on Legal affairs in a Draft Report on Civil Law on Robotics published in January 2017.[29]

As AI technology becomes a pervasive and disruptive part of human life, several issues must be considered particularly as they relate to the legal implications of the continuous proliferation of AI in society. The idea of AI having right and obligations equated with natural persons is controversial to say the least. This has led to many with the belief that an electronic person must by regulation remain merely a robot with a human backing it for the protection of the human race.[30] This belief may be fuelled by conspiracy theories that the human race may lose control of machines made by them leading to the "dangerous domination" of the inhabitants of this planet by AI[31] Copyright is a term use to describe the rights creators have over their original literary and artistic works. The rationale for granting this right rests on the notion that the author is an originator and therefore entitled to economic reward for his/her labour. This in turn provides an incentive to engage in more creative endeavors. Works covered by copyright range from books, music, photograph, painting, computer software, sculpture, films, maps, technical drawings, etc. The creature or author of a work has been described as the person who created the work or made the production of work possible. Under the Nigerian law, the Copyright defines an author in the case of literary, artistic or musical work to mean the creator of the work and in the case of photographic work, the person who took the photograph. From the forgoing, the most pertinent question then becomes whether the products of AI's creativity are or can be subject to copyright protection under the law. If the answer is in the affirmative, who owns the product of such creativity? See the cases of *Naruto v David Slater*[32] popularly known as the Monkey Selfie case, and *Beijing Felling Law Firm v Baidu Corporation.*[33] These queries have vague answers as discussed hereunder.

The Internet of Things (IOT)

This describes the network of physical objects/things that are embedded with sensor, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the internet. These devices range from ordinary household objects to sophisticated industrial tools as 'connected gizmos'. With more than 7 billion connected loT devices today, experts are expecting this number to grow to 10 billion by 2020and 22 billion by 2025.[34] Over the past few years, loT has become one of the most important technologies of the 21st century. People can connect everyday objects like kitchen appliances, cars, thermostats, baby monitors etc. to the internet via embedded devices, seamless communication is possible between people, processes

[29] *Brant, T.,'EU Robot Workers Are Electronic Persons'* PCMAG.COM (2016)https://www.pcmag.com/news/345515/eu-robot-workers-are-electronic-persons Accessed 12 May, 2022.

[30] Konstantinos, A.(2019), "The *Timeline Of e-Personhood: A Hasty Assumption Or A Realist Change?'*https://www.maastrichuniversity.nl/blog/2019/04/timeline-e-personhood-hasty-assumption-or-realistic-challenge> Accessed 24 August, 2022.

[31] For instance in 2021, Sophia the android expressed a desire to "be a mother and start a family" and the AI producers have rolled out plans to make an 'army' of robots. *Ibid.*

[32] Case number 16-15469, ID: 10845881, DktEntry: 62-1 of 23 April , 2018.

[33] N0 239 (2019), Civil First Instance , 25 April, 2019.

[34] Oracle Nigeria, *What is the Internet of Things (loT)?'* (2021) <https://www.oracle.com>accessed 30 18 November 2022.

and things. By means of low cost computing, the cloud, big data, analytics and mobile technologies, physical things can share and collect data with minimal human intervention. In this hyper connected world, digital systems can record, monitor and adjust each interaction between connected things. The physical world meets the digital world and they cooperate.[35] Users of technology have even claimed that biometric devices illegally obtain and share fingerprints, voice print, retinal and facial scans in clear privacy violations.[36] In *Arkansas v Bates*[37] the police in a murder case seized the defendant's speaker to search for evidence of what transpired the night a murder committed in his home. A search warrant was served on the manufacturer of the speaker for audio recordings on the speaker.

Block chain

This is decentralized technology used to protect the security and privacy of online transactions and is usually associated with crypto currencies such as bitcoin. However it can be applied to all kinds of digital exchanges. Researchers have said that blockchain has an excellent potential to be broadly applied in copyright protection and management applications. However, there are still many open issues that need to be further researched and analyzed in order to create workable copyright protection applications that can fully benefit from the use of block chain technology.[38] Because of the growth in distribution of audiovisual content through online platforms and Peer-to-peer (P2P), file sharing, matters such as content security, copyright protection and piracy tracing are increasingly more pressing for the owners, producers and distributors of content. Research said that faced with these problems, block chain makes it possible to upload copyrighted content, control licensing/copyright options, manage distributions, trace sources of piracy and receive payments upon content usage.[39] However, despite the boom in the sector and the capabilities of this technology, the new study highlights the fact that there are still very block chain-based protection system.

The circumstance of digital copyright violation is becoming more and more severe with the accelerated growth of the digital publishing industry and numerous twisting cases are significantly diminishing the passion of the original authors. Block chain has gained widespread attention as an evolving information security system and has become a powerful component of information protection over the years. The digital copyright data is contained in the block by integrating block chain technology with the registration protection of digital rights, and each block is linked to the block chain in the form of a time stamp by a hash pointer to the hash value of the previous block, which guarantees that the digital copyright information cannot be manipulated.[40]

Block chain developer can enjoy copyright protection for original works. Copyright protects original literary, musical and artistic works. It grants authors or creators the exclusive right to produce, distribute, assign, license or to do other things with the work. Although most block chains are open source, codes used in writing block chain applications or programs may be protected by intellectual property rights.

[35] *Ibid*.
[36] See River *v. Google Inc.*, No. 16-C-02714, 2017 U.S. Dist. LEXIS 27276 (N.D. Ill Feb. 27, 2017; *IN RE Ap PLE, INC.*, 149 F sup. 3d 341, 364 n.26 (E.DN.Y. 2016).

[37] No. Cr-2016-370 (Cir. Ct. Benton County, Arkansas).
[38] Universitat Oberta de Catalunya,'*'Blockchain-Based Copyright Protection* '(202 1) https://www.eurekalert.org accessed 13 May, 2022.
[39] *Ibid*.
[40] MonomitaChakraborty, *'How can Blockchain Technology Reshape The World Of Copyright?* '(2021).https:www.analytic> accessed 7 September, 2022.

Particularly for block chain developers, building innovations for enterprise and governments, copyright ensures that they enjoy protection to their works and can sue for damages in the event of any infringements. In American case of *Kleiman v Wright,*[41] an Australian computer scientist who claimed to have invented Bit coin was ordered to pay $100 million in damages for cheating a friend over his intellectual property in the Crypto currency.

Big Data Analytics

Big Data is a relatively new concept that refers to the constant, vast, and seemingly infinite stream of data created by our persistent interaction with technology and smart devices. The concept describes the massive collection of structured, unstructured, and multi-structured data that flow through our digital universe, everyday-data streamed; from phones and credit cards, internet activities and embedded systems, televisions and computers; from the infrastructure °f cities, sensor-equipped buildings, trains, buses, planes, bridges, factories and the over five billion phones humans carry around.

The volume of stored information is growing so fast that scientists have had to create new terms, including zettabyte and yottabyte to describe the flood of data. They brought up privacy and constitutional protection issues in the American case of Naperville Smart MeterAwareness v City of Naperville,[42] a city used her 'smart meter' program to replace traditional energy meters without permission of residents or home owners. These smart meters collected data in those homes at 'a granular level'. The court found that this constituted an illegal 'search' under the Fourth Amendment Intellectual Property laws protect the rights of creators and authors of original works like literature, software, logos, designs, inventions, etc. In analyzing and distilling actionable insights from Big Data, IP plays a crucial role; from the patented hardware used to collect and store data to the copyrighted software that organizes and analyses it. Ordinarily, copyright laws protect software and computer programs used to gather and analyze Big Data. Original data analyses tools used to mine, clean, separate and transform data can also be copyrighted under the IP laws of most countries. Importantly, to be eligible for protection, a piece of software and other data analysis tools sought to be protected by copyright must have been reduced into writing or expressed in a fixed medium and must possess some level of originality. In arriving at what constitutes originality, the Berne Convention to which Nigeria is a party, states that the collections of literary or artistic works such as encyclopedias and anthologies which by reason of the selection and arrangement of their contents constitute intellectual creations shall be protected as such, without prejudice to the copyright in each of the works forming part of such collections.

Thus, like encyclopedias and anthologies, Big data may also be eligible for protection as long as it is expressed in a fixed medium of expression, possesses some level of originality in its arrangement or selection, and shows that reasonable human efforts has been expanded, the difficulty from a practical point of view rests on the fact that it is difficult if not impossible to select or arrange Big Data mostly because of its sheer volume, variety and velocity and also due to the fact that Big Data is almost always generated in segment from varying sources.[43] *In Authors' Guild v Google ,*[44] plaintiff alleged that search engine of the defendant infringed on

[41] 18-cv-80176, U.S. District Court, District of Southern Florida (Miami).
[42] 900 F. 3d.521 (7th Cir. 2018); Carpenter v United States, 138 S.Ct. 2206 (2018).
[43] Adeyoju, A., *'A Discourse on the Intellectual Property aspect of Big Data* '(201 9)<https:mondaq.com> 10 November, 2022.

[44] 721 F3d 132 (2d Cir. 2015).

the copyright of millions of books. Google's defense of fair use was affirmed by the court. The US Supreme Court also ruled in *Google LLC v Oracle America, Inc* [45]that Google had not violated Oracle's copyright by using components of its Java programming language in Google's android operating system employed in most smart phones. The four predominant kinds of big data analytics are Descriptive analytics, Diagnostic analytics, Predictive analytics and Prescriptive analytics.

3D (Three-dimensional) Printing Technology

3D printing is a process where a digital file is exported to 3D software, which then creates or prints a solid object.[46] this began in 1980s largely for industrial application. In DSM Desotech Inc. v 3D Systems Corporation[47] the plaintiff filed a complaint claiming that the Defendant violated anti-trust laws by unlawfully tying sale and maintenance of its stereolithography machines to purchase of resins produced by defendant in a bid to monopolize the market, Stereolithography is a process by which a physical object is created layer by layer from liquid resin that is later solidified into the required shape with laser technology. The parties were directed to have alternative dispute resolution of the matter. increase and advancement of technology has allowed consumers the ability to access low cost 3D high performance printers. With great technology comes great challenges to existing laws that never could have anticipated the future impact of these rapidly changing industries. With the market of 3D printers growing by 20%, any person can now own a 3D printer, which has vast implications on trademark, copyright and patent law. Recently while dealing with the COVID-19 pandemic, a hospital in Italy experienced a shortage of special valves used in breathing machines needed by COVID-19 patients. Local engineers recreated the valve design digitally and printed it with 3D printer, without the permission of the patent holder. The incident which involved a U.S. company, not only highlights potential ethical concerns in enforcing such intellectual property rights during a medical emergency, but also the relative ease with which infringement of IP rights can occur through the use of 3D printers.[48]

The 3D printing process starts either with a digital file in which the object to be printed is digitally formatted using either 3D print software or a 3D scanner. The file is then exported to a 3D printer using dedicated software which transforms the digital model into a physical object through a process in which molten material is built up layer upon layer until the finished object emerges. This process is also referred to as addictive manufacturing. If any object is scanned without the original owner's permission and printed on a 3D printer, it may constitute IP rights infringement.[49] Although protecting an object from being printed in 3D without authorization does not really raise any specific IP issues as such. Copyright for instance as has been pointed out severally will protect the originality of a work and the creator's right to reproduce it. This means that if copies of an original object are 3D printed without authorization, the creator can obtain relief under the copyright law. The author of a 3D file must make a personalized intellectual effort so that objects conceived by the author of the original

[45] N0. 18-956, April 5, 2021.
[46] Admiraa, T., *"How Do 3D Printers Affect Intellectual Property Rights?'* <https://legalvision. com.au/how-"Ja-printers-affect-intellectual-property>-ri2hts/> accessed 9 November 2022. [08] CV 1531 9N.D. 111. Jan. 26, 2009).
[47] N0. 08 CV 1531 9N.D. 3rd January, 2009.
[48] The Myers Law Group, 'How *3D Printing Challenges Trademark, Copyright and Patents' (2020)*<https: www.themyerslg.com>.accessed 10 November 2022.
[49] *Ibid*.

prototype can result in a printed object. Such author can claim a moral right in the work if their authorship is called into question.

In the American case of *Defense Distributed Et Al v United States Department of State*d[50] a law student named Wilson at the University of Texas had published 3D plans for printed gun Liberator on his organization's website. The government directed him to remove them as they were a threat to national security. The case was later settled with Defense Distributed accepting a license to publish the files. In 2018, a court granted an injunction to block internet distribution of the downloadable files; spearheading new laws banning manufacture or possession of untraceable 3D printed guns. However, the standard exceptions and limitations that exist in IP laws also naturally apply to 3D Printing. In copyright the rights granted to authors can be limited and as such some countries have established a 'right to private copying' authorizing a person to reproduce a work for private use.[51] Copyright law in its current form, therefore appears sufficient to effectively protect both 3D files and those using 3D printing technology for non-commercial purposes. There is need for more legislations where it is for commercial use.

Nanotechnology

Nanotechnology is a subfield of physics dealing with measuring 1-100 nanometers. These are extraordinarily small particles: a printed version of this work would be about 100,000 nanometers thick. Greater understanding of this subfield has led to the advent of nanotechnology-engineering processes and tools that allow the manipulation of individual atoms and molecules. Nanotechnology allows humans to play with the building blocks of the Universe, exploiting the laws of quantum mechanics to construct materials with unimaginable precision, literally molecule by molecule.[52]

Nanotechnology has the potential for revolutionary advancements in fields from metallurgy and medicine to military power. Advances in nanotechnology are deeply intertwined with other technologies, many of which have received far greater attention. It will have applications for other technologies like gene-editing, additive manufacturing (3D Printing), artificial intelligence, spacecraft and quantum computing. Because most important biological processes occur at the nanoscale, nanotechnology will improve and perhaps revolutionize chemical/biological (CB) weapons capabilities. It will make (CB) agents easier to produce and transport. Far smaller amounts of the agents would need to be made and this would require only small, low level facilities, making detection more difficult. This will greatly hinder counter proliferation and it will be increasingly difficult to detect and disrupt the creation or transfer of nano-enabled agents, whether by terrorist organizations or state actors.

The convergence of nanotechnology, synthetic biology (i.e gene-editing) and chemistry will allow the creation of novel agents and enhance the resilience and lethality of existing agents. It will be possible to edit bacterial DNA to create entirely new organisms or to build new chemicals from the ground

[33] 1:15-cv-00372-RP (W.D. Tex.) ; *State of Washington v United States Department of State,* No. C18-[1]115RSL (W.D. Wash. Nov. 12, 2019) where a district court found that The State Department violated the Administrative Procedure Act in its decision to modify The United States Munitions List to permit the online 34 Plication of blueprints for 3D-printable weapons.

[51] Article 13 of TRIPS Agreement.

[52] Winstead, N., *'The Application and implications of Nanotechnology'(* 2020) <https:/ 'www.american.edu/sis enters security -technology /the-applications-and-implications-of-nanotechnology.cfm> accessed 20 October, 2022.

up. It could also enhance the toxicity of inorganic chemicals because the large surface area of nanoparticles makes them especially toxic.[53]

There are three distinct threats posed by nanotechnology. First, the diffusion of nanotech may increase the likelihood of nano-enabled bioterrorism. It is becoming increasingly cheap and user friendly. 'Do-it-yourself nanotechnology hardware and open source instruction are readily available online. This creates more opportunities for bad actors to engineer weapons from the comfort of their homes as some sites would advertise. Furthermore existing national and international laws designed to prevent the spread of dangerous chemicals may be unable to keep pace with the rapid changes brought on by nanotech. Finally, the potential for new nano-enabled capabilities may accelerate arms races and undermine strategic stability between the great power competitors. Militaries around the world are already fielding expensive and secretive research[54] and development programmes to harness the technology's potential. This risk offense-defense spirals that could make war more bloodier if it occurs.

Conclusion

There is need to amend the laws on Patent and Trademark in Nigeria to suit the digital age. The absence of a systematic law reform has contributed immensely to the apparent comatose state of Intellectual Property regime in Nigeria coupled with the peculiar nature of the creative and Intellectual Property based industries. In Amending the laws, the current issues like Artificial Intelligence, the Internet of Things, Block chain, Big Data Analytics, 3D (Three-dimensional) Printing Technology Nanotechnology must be captured in the new laws so that Nigeria will be in the same page with the rest of world in the area of Intellectual property.

[53] *Ibid.* Nanotechnology will have applications beyond chemical/biological weapons to include the domains of cyber, robotics and additive manufacturing. First, nanotech will lead to rapid improvements in quantum computing and artificial intelligence. Second the ability to manipulate matter at the near-atomic level will >ield highly precise and efficient manufacturing processes. Light weight, durable and cheap metal created by nanomanufacturing will have a variety of military uses, especially in space. Finally nanomanufacturing technique will augment 3-D printing, making complex and scalable designs readily accessible. Already scientists have produced primitive 'molecular motors' and other nanomachines. *Ibid.*

[54] *Ibid.*