APPRAISAL OF THE IMPORTANCE OF PATENT IN INNOVATION AND TECHNOLOGY

KINGS-NWOSU PRINCEWILL

REG NO: 2019/LW/12342

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OCTOBER, 2024

TITLE PAGE

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APPROVAL

The Long Essay titled “Appraisal of the Importance of Patent in Innovation and Technology” has been assessed and approved by the Undergraduate Studies Commitee of the Faculty of Law, Alex Ekwueme Federal University, Ndufu Alike Ikwo.

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CERTIFICATION

This is to certify that this long essay titled "Appraisal of the Importance of Patent in Innovation and Technology" has been assessed and approved by the Undergraduate Studies Commitee of the Faculty of Law, Alex Ekwueme Federal University, Ndufu Alike Ikwo" as an original work carried out by Kings-Nwosu Princewill, with registration number 2019/LW/12342 in the Faculty of Law, Alex Ekwueme Federal University, Ndufu Alike Ikwo, under the guidance and supervision of Dr Onyekachi Eni

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DEDICATION

This research work is dedicated to God Almighty for his love, mercies and grace throughout my undergraduate days and to my family, my loving parents for their support and encouragement throughout the period of my LL.B journey.

Finally, I dedicate this work to all researchers who have gone before me and those that will come after me

ACKNOWLEDGEMENTS

I would like to thank God Almighty and express my sincere gratitude to my supervisor, Dr.Onyekachi Eni for his guidance and expertise throughout this project.

I sincerely thank Assoc. Prof. Eseni Azu Udu, Dean of Law Faculty, Dr. Kelechi Onyegbule, Head of Department, Uwadiegwu Anoke Esq., Nnemeka Nweze Esq., Dr.Onyekachi Eni, O.T. Eze Esq., Gabriel Awoke Esq., and Dr. Amadi, Chukwudifu Ernest Emeka Esq. for their guidance and support during my academic journey.

I also want to thank my lovely Dad, Kings-Nwosu who instilled in me a love of learning, who supported me financially to enable me to get to this point in my life, who gave me words of encouragement which enabled me work tirelessly to see that this work is successful.

I also want to thank my course mates, especially Emmanuel Okibe, who through much efforts assisted me academically and ensured that my journey is successful.

To my mentors, friends and well wishers who guided me throughout my career, I appreciate the contributions, you made towards this my study.

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LIST OF ABBREVIATIONS

AfCFTA	African Continental Free Trade Area
AIPO	African Intellectual Property Organization
ARIPO	African Regional Intellectual Property Organization
EAC	East African Community
EAPO	Eurasian Patent Organization
ECOWAS	Economic Community of West African States
EPC	European Patent Convention
HCD	human capital development
IP	Intellectual property
KSTE	The Knowledge Spillover Theory of Entrepreneurship
NIPO	Nigerian Intellectual Property Office
NOTAP	National Office for Technology Acquisition and Promotion
PCT	Patent Cooperation Treaty
PTAB	Patent Trial and Appeal Board
R&D	research and development
R&D	Research and development
REC	Regional Economic Community
SADC	Southern African Development Community

STI	Science, technology, and innovation
TOT	Transfer of technology or technology transfer
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UPC	Unified Patent Court
USPTO	US Patent and Trademark Office's
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

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ABSTRACT

This study undertook a comprehensive examination of the significance of patents in driving innovation and technological progress, highlighting patents' crucial role in encouraging inventive activity and promoting economic growth. Using a doctrinal approach to data analysis, this research investigated the relationships between patents, innovation, and technological advancement, exploring their impact on inventors, entrepreneurs, industries, and societies. The study revealed patents play a multifaceted role in fostering innovation, including incentivizing inventive activity, facilitating knowledge diffusion and technology transfer, promoting collaboration, and signaling innovation quality. Empirical analysis of patent data demonstrated a positive correlation between patenting activity and innovation outcomes, such as increased research and development expenditure, entrepreneurship, and economic growth. Case studies illustrated patents' strategic importance in protecting intellectual property, shaping competitive landscapes, and driving technological progress. However, challenges and limitations were identified, including patent trolls, patent thickets, uneven geographic distribution, and tensions between patent protection and open innovation. To address these concerns, a nuanced policy framework balancing patent protection with accessibility, affordability, and social welfare was proposed, recommending targeted reforms, enhanced transparency, strengthened enforcement, and incentives for open innovation. This research contributed to the existing literature by providing a comprehensive understanding of the patent-innovation-technology nexus, informing policy debates, and guiding strategic decision-making for stakeholders, underscoring patents' vital role in fostering innovation and technological advancement while emphasizing the need for a balanced and adaptive patent system that promotes progress without stifling creativity, with implications for inventors, entrepreneurs, policymakers, and scholars seeking to understand the complex interplay between patents, innovation, and technological progress.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Patents play a crucial role in fostering innovation and driving technological advancements. By granting inventors exclusive rights to their creations for a limited period of time, patents incentivize investment in research and development, leading to the creation of new and improved products and processes. In this way, patents not only protect intellectual property but also encourage the sharing of knowledge and the exchange of ideas, ultimately fueling progress and growth in various industries. That notwithstanding, the concept of patenting originated in Europe as early as the 14th Century.[1] In England from where Nigeria inherited its patent law, patenting started as grant of trading monopolies in exercise of the prerogative of the English Crown.[2] Patents are now considered a crucial aspect of fostering innovation and technological advancement. Meanwhile, the earliest record of a granted patents dates back to 1331, to a Flemish weaver who wanted to practice his trade in England.[3] Patents have since played a crucial role in fostering innovation and technological advancement by providing inventors with exclusive rights to their creations for a set period of time. Between the year 1331 and 1452, various letters of protection were issued to foreign weavers and other craftsmen.[4] In Nigeria, patent was first introduced through colonialism in 1900.[5] It was first introduced in the colony and protectorate of Southern Nigeria through the Patent Proclamation Ordinance[6] and later to the Northern Nigeria."[7] The primary purpose of

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[1] B Jaffe Adam and Josh Lerner, *Innovation and Its Discontents: How Our Broken Patent System Is Endangering Innovation and Progress, and What to Do About It* (Princeton University Press 2004).
[2] *Ibid*
[3] *Ibid*
[44] *Ibid*
[5] *Ibid*
[6] Patent Proclamation Ordinance No. 17, 1900

introducing patents in Nigeria was to encourage innovation and protect the rights of inventors. Over the years, the patent system has evolved to meet the changing needs of the country's growing economy.

Generally, when a person invents or innovates something, there is the inherent risk that his invention will be copied by another person or persons. If this is copied, the reward (financial or otherwise) for having invented the item may be enjoyed by someone other than the inventor. Prior to the introduction of patents, the risk of intellectual theft of inventions was prevalent and inventors and innovators were often discouraged from their pursuits.[8] In order to reassure inventors and innovators that their idea would be safe from those who would steal them, the Government established patent law that is aimed at protecting inventors and innovators rights."[9] Apart from the fact that patent law is aimed at promoting innovation and creativity, the patent system has been claimed to be one of the ways of facilitating the transfer of technology from the industrially developed North to the less developed countries of the South.[10] Patent, is therefore the medium through which the protection of technology by the law is guaranteed, Thus, technology can be referred to as methods ranging from as simple as language and stone tools to the complex genetic engineering and information technology that has emerged since the 1980s.[11] These technologies most often are developed in one country and the owners of these technologies protect these intellectual activities through the process of patent, but they are utilized and enjoyed in different parts of the world. The process through which technology invented in one part of the world is utilized or enjoyed in

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[7] Patent Proclamation Ordinance No. 12, of 1902
[8] E Gehler, A Brief Introduction to Patent Law (2008) 3. Available at <http://ezinearticles.com/a-Brief-introduction-to-patent-law&id=147696> accessed 25 May, 2024
[9] *Ibid*
[10] *Ibid*
[11] *Ibid*

other parts is what is generally referred to as transfer of technology (TOT) or technology transfer.[12]

Against this backdrop, however, by the appraisal of the legal[13] and institutional[14] frameworks which offer protection for the invention of technologies to persons who seek refuge thereunder and also by the examination of the roles of these institutional bodies in ensuring proper registration of patents and the facilitation of transfer of technology in Nigeria,[15] this paper aims to analyze the role of patents in fostering innovation and technological advancement. Patents provide inventors with exclusive rights to their creations, incentivizing them to invest time and resources into developing new technologies. By granting patent holders the ability to profit from their inventions, patents encourage competition and drive further innovation in various industries. This paper will explore the impact of patents on innovation and technology, highlighting their significance in driving progress and economic growth.

1.2 Statement of the Problem

The role of patents in promoting innovation and technological advancement in various industries cannot be overemphasised. Patents provide inventors with the necessary protection and incentive to invest time and resources into developing new technologies. Without the assurance of patent protection, many innovators may be reluctant to share their ideas and inventions, hindering progress in various fields. It is also a truth that patents encourage

[12] DM Harry, 'Research, Technology and Socio-Economic Development in Nigeria: Some Lessons from the Asian Economies.' *Mediterranean Journal of Social Sciences MCSER* [2013] 28.
[13] Patents and Designs Act, Cap P2, Laws of the Federation of Nigeria, 2004
[14] Patent Registry under the Ministry of Industry, Trade and Commerce; National Office for Technology Acquisition and Promotion, an agency under the Federal Ministry of Science, Technology and Innovation saddled with the responsibility of facilitating, documenting and registering contracts of technology transfer in Nigeria
[15] *Ibid*

competition and drive companies to continually improve and innovate in order to stay ahead in the market. This can ultimately lead to better products and services for consumers.

At the other hand, an examination of the impact of patent protection on investment in research and development is crucial to understanding the role patents play in stimulating innovation and economic growth. By providing a legal framework for inventors to safeguard their creations, patents ensure that individuals and companies are rewarded for their hard work and ingenuity. This, in turn, fosters a culture of creativity and entrepreneurship that benefits society as a whole. While patents are essential for fostering innovation and driving progress, they ultimately improve the quality of life for people around the world.

More so, the relationship between patents, competition, and market dynamics within the technology sector is crucial for driving advancements in various industries. Patents encourage companies to invest in research and development, knowing that they will have exclusive rights to their innovations for a period of time. This competition among firms pushes them to continuously improve upon existing technologies and create new products that meet the changing needs of consumers. As a result, patents not only benefit individual inventors and businesses but also contribute to overall economic growth by spurring technological advancements and increasing productivity. In conclusion, the interplay between patents, competition, and market dynamics is essential for driving innovation and ensuring a prosperous future for society.

Case studies illustrating how patents have incentivized inventors to create new solutions and products that have revolutionized industries further emphasize the critical role of patents in fostering innovation. By providing legal protection and exclusive rights to inventors, patents encourage investment in research and development, leading to groundbreaking discoveries and advancements. Ultimately, the impact of patents extends

beyond individual creators and companies, shaping the landscape of innovation and driving progress in various fields.

There are challenges and limitations of the current patent system in fostering innovation and addressing emerging technologies like AI or biotechnology. These challenges include issues with patent trolls, lengthy and costly litigation processes, and the difficulty of enforcing patents in a global marketplace. In order to adapt to the rapidly evolving technological landscape, policymakers and stakeholders must work together to reform the patent system and ensure that it continues to incentivize innovation while protecting inventors' intellectual property rights. By addressing these challenges and making necessary adjustments, the patent system can continue to play a crucial role in driving progress and fostering innovation in the modern era.

The research questions that can help to guide this appraisal include:

a. How do patents protect the intellectual property rights of inventors and encourage innovation?
b. What role do patents play in incentivizing research and development in technology sectors?
c. How do patents impact competition and market dynamics in industries reliant on innovation?

1.3 Aim and Objectives of the Study

The aim of this study is to appraise the importance of patents in innovation and technology. The objectives of this study are:

a. To find out how patents protect the intellectual property rights of inventors and encourage innovation.

b. To discover what role patents play in incentivizing research and development in technology sectors.
c. To find out how patents impact competition and market dynamics in industries reliant on innovation.

1.4 Scope and Limitations of the Study

This study focuses on the appraisal of the importance of patents in innovation and technology, exploring the role of patents in promoting technological advancement and innovation. The scope of this research encompasses an examination of national and international patent laws, policies, and judicial decisions, as well as an analysis of existing literature on patent law, innovation, and technology. Specifically, this study investigates the relationship between patent protection and technological progress, highlighting the benefits and challenges associated with patent law.

Despite its comprehensive approach, this study is not without limitations. The research is primarily based on doctrinal analysis, relying on existing laws, policies, and scholarly writings, which may not provide an exhaustive understanding of the practical implications of patent law. Additionally, the study's focus on national and international patent laws may not account for variations in patent regulations across different jurisdictions. Furthermore, the research may not capture the most recent developments in patent law and technology, due to the rapid evolution of these fields. These limitations underscore the need for further research to complement and expand upon the findings of this study.

1.5 Significance of the Study

This study aims to explore the impact of patents on innovation and technology by analyzing the role they play in protecting intellectual property and incentivizing research and

development. Hence, the study has both theoretical and practical significance. From a theoretical perspective, understanding the importance of patents in innovation and technology can provide valuable insights into how intellectual property rights can drive progress and economic growth. On a practical level, this study can offer recommendations for policymakers, businesses, and inventors on how to navigate the patent system effectively in order to maximize the benefits of their innovation efforts. Ultimately, this research seeks to contribute to a deeper understanding of the role patents play in shaping the technological landscape and fostering innovation in various industries.

1.6 Research Methodology

This study will employ the doctrinal research method to appraise the importance of patents in innovation and technology. The doctrinal research approach involves a comprehensive analysis of existing laws, policies, judicial decisions, and scholarly writings related to patent law and its impact on innovation and technology. This study will examine relevant national and international patent laws, treaties, and conventions, as well as analyze judicial decisions and case laws pertaining to patent disputes and infringement.

Through a thorough review of existing literature on patent law, innovation, and technology, including scholarly articles, books, and research papers, this study will evaluate the theoretical frameworks and concepts underlying patent law and its relationship with innovation and technology. By adopting the doctrinal research method, this study aims to provide an in-depth understanding of the role of patents in promoting innovation and technological advancement, shedding light on the complexities and intricacies of the patent system and its effects on technological progress.

1.7 Chapter Analysis

Chapter one of this work provides an overview of the importance of patents in innovation and technology. It delves into the background of the study, identifies the problem statement, outlines the aim and objectives, and discusses the scope and limitations of the research. The significance of the study is also highlighted, along with the research methodology that will be used. Additionally, the chapter analysis sets the stage for the subsequent chapters, providing a roadmap for the reader to follow throughout the study.

The next chapter will delve into the conceptual clarifications of patents, providing a clear definition and understanding of their importance in innovation and technology. The theoretical foundation will then be explored, examining existing theories and frameworks that highlight the role of patents in driving technological advancements. Finally, the literature review will analyze relevant studies and research on the impact of patents on innovation, providing a comprehensive overview of the current knowledge in this field. Through these chapters, a deeper understanding of the significance of patents in fostering innovation and technological progress will be gained.

Chapter three of this work focuses on the appraisal of the importance of patents in innovation and technology. The legal framework discusses the regulations and laws surrounding patents, while the institutional framework examines the organizations and bodies responsible for overseeing patent issues.

Chapter four will delve into the complexities of patent law and policy, addressing the importance of patent enforcement in protecting intellectual property rights. It will also explore various patent strategies that startups can utilize to navigate the legal landscape and maximize their innovation potential. Additionally, the chapter will provide insights on global

perspectives on patents and patent laws as well as discuss current challenges in patent law and policy, including issues related to patent litigation and ongoing reform efforts.

The final chapter will provide a comprehensive overview of the research findings related to the importance of patents in innovation and technology. It will also offer recommendations for policymakers and industry stakeholders on how to leverage patents for greater innovation. Additionally, the chapter will highlight the contributions this research makes to the existing body of knowledge on this topic and suggest areas for future studies to build upon this research. In conclusion, this chapter will emphasize the critical role that patents play in driving innovation and technological advancement in today's fast-paced world.

LITERATURE REVIEW

CONCEPTUAL CLARIFICATIONS, THEORETICAL FOUNDATION AND LITERATURE REVIEW

At this point, we embark on the literature review of the subject matter by looking at the theoretical and conceptual framework to understand the role patents play in fostering innovation and technological advancement.

2.1 Conceptual Framework

2.1.1 The Concept of Patent

A patent, as a type of intellectual property, is a set of exclusive rights granted by a state to a patentee (the statutory inventor or assignee) for a set period of time in exchange for the regulated public disclosure of certain, otherwise classified details of a device, method, process, or composition of matter (substance) known as an invention that is new, inventive, useful, or industrially applicable.[16] A patent is defined as a "grant to inventors and other persons deriving their rights from the inventors, for a limited period of years, conferring on them the right to exclude others from manufacturing, using, or selling a patented product or from utilising a patented method or process."[17] A patent, like other forms of industrial intellectual property, is a legally binding monopoly that grants the patentee a proprietary right to his own invention and constitutes a personal property that can be properly assigned, licenced, or transmitted by operation of law.[18]

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[16] Kur J.J, *Intellectual Property Law and Entrepreneurship in Nigeria: Principles and Practice* (Nigeria: Aboki Publishers, 2015) 88.
[17] Vederaman S, *Patents: Recent Developments and Future Prospects on the National Level in India* (Montreux, WIPO Lectures, 1971) 93.
[18] Yankey S, *International Patents and Technology Transfer to Less Developed Countries* (Atheneum Press Lid., 1987) 12.

As a result, patents can be divided into a number of categories based on the subject matter they cover (business methods, software or computer implemented inventions, biotechnology, medical treatment methods, etc.); convergent wireless devices (such as cellphones that combine digital cameras with other devices, voice activation, etc.); and the application of compression technologies (such as software utilities and encryption software).[19]

The acquisition of Motorola by Google in 2014 provides a typical example of the concept. Google acquired the corporate status of Motorola, who were involved in the invention of various protocols and technologies in the making of mobile phones, especially smart phones based on the Android operating system, for a little more than 750,000,000 US dollars as consideration. Google specifically sought and indeed acquired the patent owned by Motorola Mobility Group, and the larger percentage of the latter's value was 5.5 billion dollars in "patents and developed technology". Another example of this aspect is the progress made in the pharmaceutical business around the world, and how well patent utilisation has assisted the development and continual improvement of the industry's growth.[20]

The exclusive right granted to a patentee is the right to prevent or exclude others from making, selling, using, offering for sale or importing claimed invention.[21] Under the Patent and Designs Act[22] (hereinafter referred to as the Act), a patent is not defined without reference to its conditions for the patentability of an invention which are: newness, inventive

[19] Asagh M, "Global System for Mobile Communications in Nigeria: Legal Issues Arising' in Tilley Gyado and others (eds.) *New Prospective in Lay* (2005) 460-461
[20] *Ibid* 2.
[21] *ibid*
[22] Patents and Designs Act, Cap P2, *Laws of the Federation of Nigeria*, 2004.

step and industrial applicability[23] - These conditions will be subsequently discussed in this work.

Patents play a crucial role in encouraging innovation and technological advancement by providing inventors with the incentive to invest time and resources into developing new and useful inventions. By granting patent holders exclusive rights to their inventions, patents help to protect and reward creators for their ingenuity and creativity. This, in turn, fosters a competitive environment that drives further innovation and leads to the development of new technologies that benefit society as a whole. In this way, patents serve as a key tool in promoting progress and economic growth in the modern world.

2.1.2 The Concept of Innovation

The word 'innovation' has no statutory definition. However, invention is the process of creating or contriving as a result of purposeful planning, an original contraption, or the production of something that has never existed[24] It is anything, process, or idea that is not generally and currently known or without too much skill or ingenuity can exist or be reduced into a tangible form or used in a tangible thing.[25] It has been argued that these kinds of definitions are not helpful, because they relate to novelty rather than to an invention. As a result, Reinfert J. in the Canadian case of *CrossleyRadio Corporation v. General Electric Company Ltd*[26] expressed the view that 'It would be idle to attempt a comprehensive definition. In certain cases, the decision must necessarily be a result of novelty. It is a question of fact and degree...depending upon practical consideration to a large extent rather than upon legal interpretation". Thus, it coincides with reductive logic to safely submit that

[23] Ibid, Patent and Designs Act, S1 sub-s1
[24] Babafemi FO, *Intellectual Property: The Law: and Practice of Copyright, Trademark, Patents and Industrial Designs* (Justinian Books Ltd, 2007) 369.
[25] Stim AR, *Patent, Copyright & Trademark: An Intellectual Property Desk* (Consolidated Printers Inc, 2007) 211.
[26] (1936) DLR 508

the meaning of an invention for the purpose of the grant and enjoyment of patent rights over it, will be best determined by reference to among other things; its satisfaction of the conditions for patentability, these include the fact that, the invention must consist of a patentable subject matter, the invention must be new(novel), industrially applicable (useful), it must exhibit a sufficient inventive step (uncommon) and the disclosure of the invention in the patent application must meet certain standards,"[27] as well as its exclusion from the class of non-patentable inventions listed in the Act.

2.1.3 Patentable Inventions

In Nigeria, like it is elsewhere, not all inventions are patentable. Hence, an invention must meet certain legal requirements before patent is granted.[28] Not all ideas, inventions or scientific discoveries are patentable.[29] Patentability simply denotes suitability for the enjoyment of patent under the relevant law, entitlement by law of a new product, method or process to be patented by the issuance of a patent.[30] The concept of patentability is so important that provisions governing it under a particular country's legal regime goes a long way to determine the effectiveness of its patent system — Consequently, it is usually the first issue to address in the legal framework relating to the operation of patent system in most jurisdictions.[31]

2.1.4 Conditions for Patentability

The conditions for patentability must include at least one of the following;

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[27] Osamor R, 'Eligibility for Patent Protection in Nigeria' *Nigerian Law and Practice Journal* [2001] 5, 100.
[28] Patent and Designs Act, S1 sub-ss1a -b
[29] Blanco White, Robin Jacob and Jeremy Davis, *Patent, Copyright and Industrial Designs* (2nd Edn.) 23.
[30] The word "patent" in the second usage is a reference to the sense of the word that means the paperwork evidencing the grant of exclusive patent rights with respect to an invention — a patent certificate or other legally recognized instrument such as letter patent.
[31] Ayoyemi A, *Intellectual Property Rights, Traditional Knowledge Systems and Jurisprudence in Africa* (Ababa Press Limited, 2012) 189.

(a) Novelty

(b) Results from inventive activity

(c) Capable of industrial application; or

(d) If it is an improvement upon a patented invention and also, is new, result from inventive activity and is capable of industrial application.[32]

To further make clear the purport of the above wordings, the Act qualified these conditions when it provides that; for the purpose of subsection (1) of this section:[33]

(a) an invention is new if it does not form part of the state of the art;

(b) an invention results from inventive activity if it does not obviously follow from the state of the art, either as a method, the application, the combination of methods, or the product which it concerns, or as to the industrial result it produces; and

(c) an invention is capable of industrial application if it can be manufactured or used in any kind of industry, including agriculture.

The Act further provides that for the purpose of paragraph (b) of subsection (2) of section 1 above, "the art" implies, the following:

> The Art" means the art or field of knowledge to which an invention relates and the state of the art means everything concerning that art or field of knowledge which has been made available to the public anywhere and at any time whatsoever (by means of written or oral description, by use or in any other way) before the date of the filing of the patent application relating to the invention or the foreign priority date validity claimed in respect thereof...[34]

[32] Patent and Designs Act, S1 sub-s1
[33] Patent and Designs Act, S1 sub-ss 2 a, b, and c
[34] *Ibid*, S1 sub-s 3

2.1.5 Non-Patentable Inventions

The Act specifically enumerated inventions for which patents cannot be validly granted[35] even though they have satisfied the conditions of patentability under the Act. Thus, a patent will not be validly obtained for the following:

(a) Plant or animal varieties, or essentially biological processes for the production of plants or animals (other than microbiological processes and their products).[36]

(b) Inventions the publications or exploitation of which would be contrary to public order or morality.[37]

(c) Principles and discoveries of a scientific nature are not inventions for the purpose of this Act.

2.1.6 The Concept of Technology

Previous researchers evaluated and defined the term 'technology' from a variety of angles, which influenced research design and results, transfer agreements, and government policies in general.[38] The term "technology" has thus been defined in a variety of ways by prior literature. Kumar et al. defined it as having two main components: 1) a physical component made up of things like products, tooling, equipment, blueprints, techniques, and processes; and 2) an informational component made up of knowledge in the areas of management, marketing, production, quality control, reliability, skilled labour, and functional

[35] Patent and Designs Act, S 1 sub-ss 4 - 5

[36] 1t should however be observed that patent laws in some European countries such as Belgium, Germany and Netherlands recognize and offer protection to these categories of inventions. However, the Federal Government has recently passed the Plant Variety Protection Bill into Law on the 21st of May, 2021. It is hoped that this has laid down the fertile ground for the recognition and accordance of intellectual property protection to such class of invention.

[37] Patent and Designs Act, S1 sub-s 4 (it should be understood for the purpose of this paragraph that exploitation of an invention is not contrary to public order or morality merely because its exploitation is prohibited by law).

[38] Reddy N. M, and Zhao L, 'International Technology Transfer: A Review' *Research Policy* [1990] 19 , 285-307. http://dx.doi.org/10.1016/0048-7333(90)90015-X

areas.[39] An earlier definition of technology was given by Sahal as "configuration," noting that the transfer object (the technology) depends on a subjectively determined but specific set of processes and products.[40] Research and development processes are receiving increased attention in the recent studies on technology transfer, which have established a clear connection between technology and knowledge. Examining the definition of technology closely reveals two fundamental elements: "Doing things" and "knowledge" or technique. Technology is usually associated with achieving specific goals, fixing specific issues, doing specific jobs with specific abilities, applying knowledge, and making the most of resources. The notion of technology encompasses not only the technology integrated into the product but also the information or knowledge on its use, application, and development process.[41]

The early concept of technology as information maintains that technology is broadly applicable and simple to replicate and reuse. However, Reddy and Zhoa argue that the early concept of technology contradicts a strand of literature on international technology transfer that holds that 'technology is conceived as firm-specific information concerning the characteristics and performance properties of the production process and product design'.[42] They also contend that the manufacturing process or operation technology is inherent in the equipment or means of producing a specific product. On the other side, product design or technology is what is seen in the finished product. According to Pavitt, technology is mostly distinct knowledge about specific applications that is tacit, uncodified, and largely cumulative

[39] Kumar V, Kumar U, and Persaud A, 'Building Technological Capability through Importing Technology: The Case of Indonesian Manufacturing Industry' *Journal of Technology Transfer* [1999] 24, 81-96. http://dx.doi.org/10.1023/A:1007728921126

[40] Sahal D, *The Transfer and Utilization of Technical* Knowledge (Lexington: Lexington Publishing, 1982); Sahal D, 'Alternative Conceptions of Technology' *Research Policy* [1981] 10, 2-24. http://dx.doi.org/10.1016/0048-7333(81)90008-1

[41] Bozeman B, 'Technology Transfer and Public Policy: A Review of Research and Theory' *Research Policy* [2000] 29, 627-655. http://dx.doi.org/10.1016/S0048-7333(99)00093-1

[42] *Ibid* 50

within enterprises.[43] According to this viewpoint, technology is considered a firm's 'intangible assets' or 'firm-specific' that constitute the foundation of a firm's competitiveness and will generally be released under exceptional conditions. It is believed that technology may incorporate information that is difficult to reproduce and convey. According to this reasoning, technology is defined as 'tacit knowledge or firm-specific, secrets, or knowledge known by one organisation'.

Technology as one of the company's intangible assets, is ingrained in its processes and difficult to transfer since tacit knowledge has a longer learning curve and is more expensive to transfer. Because the technological learning process is required to assimilate and internalise the transferred technology, valuable technological knowledge—which is an intangible asset of the company—is never readily transferred from one company to another.[44] Technology is tacit and cumulative in nature, whereby it is also viewed as firm-specific knowledge about the features and performance attributes of manufacturing processes and product designs. Technology is the body of theoretical and applied information, abilities, and artefacts that can be utilised to create goods and services as well as the systems for producing and delivering them. Technology is also embedded in people, things, facilities, machinery, tools, and cognitive and physical processes.

The latest definition given by Mascus has broadened the concept of technology where technology is defined as 'the information necessary to achieve a certain production outcome from a particular means of combining or processing selected inputs which include production processes, intra-firm organizational structures, management techniques, and means of

[43] Pavitt K, 'Patent Statistics as Indicators of Innovative Activities: Possibilities and Problems' [1985] 7 *Scientometrics* 77–99. http://dx.doi.org/10.1007/BF02020142

[44] Lin W. B, 'Technology Transfer as Technological Learning: A Source of Competitive Advantage for Firms with Limited' [2003] 33(3) *R & D Resources. R & D Management* 327-341. http://dx.doi.org/10.1111/1467-9310.00301.

finance, marketing methods or any of its combination'.[45] In the light of this study, patents play a crucial role in protecting the innovations and technological advancements that result from this broad concept of technology. This protection allows for the commercialization of new technologies, driving economic growth and promoting further innovation in various industries. Therefore, patents are an essential tool for fostering innovation and technological progress in today's society.

2.2 Theoretical Framework

2.2.1 The Schumpeterian Theory of Innovation

This theory contends that patents are crucial for motivating and protecting novel inventions. Joseph Alois Schumpeter is recognised as one of the most significant economists of the first half of the twentieth century. At that time, he participated in the most important economic debates,[46] where, to him, patents were seen as a way to encourage innovation by providing inventors with financial incentives to create new technologies. Schumpeter believed that without the protection of patents, inventors would not be willing to invest the time and resources necessary to develop groundbreaking ideas.

While accounts of the term "innovation" are used to refer to non-standard things date back to the late 1880s, none of the early innovators have had the same impact as Schumpeter. He contends that customer tastes are predetermined and do not change on their own. This implies that they are not the source of the economic shift. Furthermore, consumers take on a passive part in the process of economic development. In his Theory of Economic

[45] Maskus K. E, 'Encouraging International Technology Transfer,' UNCTAD/ICTSD Capacity Building Project. On *Intellectual Property Rights and Sustainable Development*, [2003].
[46] *(PDF) Schumpeter's View on Innovation and Entrepreneurship*. Available from: https://www.researchgate.net/publication/256060978_Schumpeter's_View_on_Innovation_and_Entrepreneurship [accessed Jul 17 2024].

Development[47] and subsequent research[48], Schumpeter classified development into five categories and defined it as a historical process of structural changes that are primarily driven by innovation[49]:

a. launch of a new product or a new species of already known product;
b. application of new methods of production or sales of a product (not yet proven in the industry);
c. opening of a new market (the market for which a branch of the industry was not yet represented);
d. acquiring of new sources of supply of raw material or semi-finished goods;
e. new industry structure such as the creation or destruction of a monopoly position.

Schumpeter contended that anyone seeking profit must innovate. That will result in various uses of the economic system's current productive means. Schumpeter argued that invention was a key driver of competitiveness and economic dynamism[50]. He also believed that innovation is at the heart of economic development, triggering gales of "creative destruction," a term used by Schumpeter in his work *Capitalism, Socialism, and Democracy*[51]. To Schumpeter, innovation refers to the "process of industrial mutation that incessantly revolutionises the economic structure from within, incessantly destroying the old one, incessantly creating a new one". Schumpeter defined development as a historical process of structural changes that are primarily driven by innovation[52]. He categorised the innovation

[47] Schumpeter J.A, 'The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest and the Business Cycle' *Harvard Economic Studies* vol. 46 (Harvard College, Cambridge, MA, 1934).
[48] Schumpeter J.A, *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process*, vol. 2, (New York: McGraw-Hill, 1939).
[49] *Ibid* 2
[50] Hanush H. and Pyka A, Introduction, in Hanush H. and Pyka A. Elgar, *Companion to Neo-Schumpeterian Economics* (Edward Elgar, Cheltenham, 2007).
[51] Schumpeter J.A, *Capitalism, Socialism and Democracy*, 3rd edition, (London: George Allen and Unwin, 1976).
[52] Schumpeter J.A, 'Capitalism in the postwar world' in Harris S.E. (ed.), *Postwar Economic Problems in Essays* (Schumpeter, 1951).

process into four dimensions: invention, innovation, diffusion, and imitation[53]. Then he inserts the dynamic entrepreneur into his analysis.[54] According to Schumpeter's theory, entrepreneurs' ability and activity, drawing on scientific and technological breakthroughs, provide entirely new prospects for investment, growth, and employment. According to Schumpeter's perspective, the invention phase or basic innovation has less of an impact, However, the diffusion and imitation process has a considerably bigger influence on the status of an economy. The macroeconomic impacts of any fundamental breakthrough are rarely visible in the first few years (and frequently much longer). What matters in terms of economic growth, investment, and employment is not the discovery of basic innovation, but rather its diffusion, which occurs when imitators recognise the profitable potential of the new product or process and begin to invest heavily in that technology.[55]

According to Schumpeter's view, execution and discovery are "two entirely different things," and invention is not the cause. "An innovative idea alone is insufficient to bring it to fruition. An entrepreneur with strong moral character must champion it and use his influence to bring it to fruition". The ability to accomplish goals is more important than intellectual prowess. "Creative destruction" is "the essence of capitalism," in the view of Schumpeter. A stationary economy is defined as "an unchanging economic process which flows on at constant rates in time and merely reproduces itself".[56] It is reactive, repetitive, and routine; it is a circular flow that admits of no surprises or shocks. A stationary feudal economy would remain a feudal economy, and a stationary socialist economy would remain a socialist economy; nevertheless, stationary capitalism is a contradiction in terms. Schumpeter believes

[53] Burton-Jones A, *Knowledge Capitalism – Business, Work, and Learning in the New Economy* (Oxford: Oxford University Press, 1999).
[54] Schumpeter J.A, *The Theory of Economic Development*, Tenth Printing (Brunswick, New Jersey: Transaction Publishers, 2004).
[55] Freeman C, *Technology Policy and Economic Performance: Lessons from Japan, Frances* (London, New York: Printer Publishers, 1987).
[56] Schumpeter J.A, *Business Cycles: A Theoretical, Historical and Statistical Analysis of the Capitalist Process,* Vol. 2 (New York: McGraw-Hill, 1939).

that "... capitalist reality is first and foremost a process of change", with change being the essence. Without creative destruction, what remains would be perpetual imitation, which is not the essence of capitalism at all. According to Schumpeter, innovations are critical for understanding economic progress, and the "entrepreneur" is the primary innovator. In his The Theory of Economic Development, the primary duty of an entrepreneur is to allocate existing resources to "new uses and new combinations". One of Schumpeter's most lasting contributions was his assertion that entrepreneurship is both a unique element of production and a rare social input that drives economic history forward.

In other words, innovation is the "creative destruction" that drives economic growth, with the entrepreneur serving as the change agent. In Schumpeter's theory, an entrepreneur is defined as "carrying out innovations, the only function which is fundamental in history". Typical attributes of entrepreneurs are intelligence, alertness, enthusiasm, and determination. Entrepreneurship is the process of developing and implementing innovative ideas. It should be noted at this point that entrepreneurship is not to be confused with the three complementing tasks of invention: risk-taking, error-correction, and administration (which are distinct and non-entrepreneurial in character according to Schumpeter's economics of evolution). In Schumpeter's work on entrepreneurship, we may identify two phases: a "early phase" - "First" Entrepreneurship theory, and a "late phase" - "Second" Entrepreneurship theory.

The importance of this theory to the present study is that it emphasizes the role of patents in promoting innovation and technological progress. According to Schumpeter, patents provide inventors with a temporary monopoly that incentivizes them to invest in research and development, leading to the creation of new products and processes. This theory suggests that patents play a crucial role in driving economic growth and fostering a culture of

innovation within society. In this way, patents are seen as essential tools for encouraging creativity and advancement in technology.

2.2.2 The Knowledge Spillover Theory

The proponents of this theory posit that by limiting the flow of knowledge, patents may impede innovation. The Knowledge Spillover Theory of Entrepreneurship (KSTE) was first presented by Audretsch (1995) in a seminal work that expanded on the endogenous growth theory by emphasising the role of entrepreneurs as knowledge spillover conduits in the knowledge commercialization process.[57] As such, the KSTE makes it possible to see the genesis of entrepreneurial prospects from a more nuanced perspective.[58] Since its inception, the KSTE has received a lot of attention and has been used to study economic growth. Past endeavours made major contributions to the theory's evolution, resulting in the emergence of essential notions that serve as the framework for our investigation. In particular, we build on earlier findings about the nature and provenance of knowledge, the spillover mechanism, and its role in the emergence of entrepreneurial activities.[59]

Different conceptualizations of knowledge have been utilised in previous studies. Studies emphasising codified forms of knowledge—which relate to formalised and transmittable documents like patents, publications, and citations—have dominated the field of KSTE.[60] Audretsch and Keilbach (2006) contend, however, that knowledge can also be embodied in highly qualified and educated people who collectively reflect the body of

[57] Audretsch D.B, Belitski M, 'The Missing Pillar: The Creativity Theory of Knowledge Spillover Entrepreneurship'*Small Bus. Econ.* , [2013] 41(4), 819–836. https://doi.org/10.1007/s11187-013-9508-6.
[58] Audretsch D.B, Keilbach M, 'The Theory of Knowledge Spillover Entrepreneurship,' *Journal of Management Studies* [2007] 44(7), 1242–1254. https://doi.org/10.1111/j.1467-6486.2007.00722.x
[59] Caiazza R, Belitski M, Audretsch D.B, 'From Latent to Emergent Entrepreneurship: The Knowledge Spillover Construction Circle' *Journal of Technology Transfer* [2020] 45(3), 694–704. https://doi.org/10.1007/s10961-019-09719-y
[60] Ghio N, Guerini M, Lehmann E.E, Rossi-Lamastra C, 'The Emergence of the Knowledge Spillover Theory of Entrepreneurship' *Small Bus. Econ.* [2015] 44(1) 1–18. https://doi.org/10.1007/s11187-014-9588-y

knowledge in a given area.[61] In recent years, there has been a growing interest in these tacit kinds of knowledge. The Knowledge and Social Theory (KSTE) proposes that learning processes are the source of knowledge. Previous studies frequently believed that research institutions and established businesses are the primary locations for knowledge generation. An emphasis on entrepreneurial economies and an understanding of the value of entrepreneurs as knowledge sources have expanded on this idea.[62]

From this vantage point, it is important to further distinguish the functions of individuals in the knowledge spillover process. Research institutions and incumbents both produce a great deal of information, but they don't always commercialise it. Knowledge may present business chances to entrepreneurs through spillover because it is non-competitive and non-exclusive. Entrepreneurs seeking to identify such untapped knowledge can use a variety of methods, including informal engagement. Spatial closeness is frequently mentioned in this context because long distances between the relevant players might have a negative impact on spillovers. These knowledge-based prospects subsequently lay the groundwork for new enterprise formation.[63]

In contrast to a wealth of empirical studies examining the relationship between knowledge spillover and new business creation (for a summary, see the work of Ghio et al.),[64] a better understanding of the underlying process has only recently gained traction. Such inquiries focus on information-sharing systems that account for the tacit nature of knowledge

[61] Audretsch D.B, Keilbach M, 'Entrepreneurship, Economic Growth and Restructuring,' In Casson M, Yeung B, Basu A, Wadeson N, (Eds.), *The Oxford Handbook of Entrepreneurship*. (New York: Oxford University Press, 2006) 281–310.
[62] Antonelli C, *The Knowldege Growth Regime: A Schumpetarian Approach* (Palgrave, Macmillan, 2019).
[63] Iftikhar M.N, Ahmad M, Audretsch D.B, 'The Knowledge Spillover Theory of Entrepreneurship: The Developing Country Context' [2020] 16(4) *Int. Entrep. Management Journal* 1327-3146. https://doi.org/10.1007/s11365-020-00667-w.
[64] *Ibid* 15.

spillover, as well as the diverse range of actors required for knowledge spillover[65]. We specifically draw on studies that theorised the role of knowledge spillover in entrepreneurial emergence and suggest that a learning perspective can help us better understand the mechanisms of knowledge spillover.

Be that as it may, in the light of this study, this theory suggests that fostering an environment of open collaboration and information sharing among entrepreneurs may lead to increased innovation and economic growth. This challenges the traditional view that patents are necessary for protecting intellectual property and encourages a more cooperative approach to knowledge creation and dissemination. Ultimately, the Knowledge Spillover Theory highlights the importance of interconnectedness and collective learning in driving entrepreneurship and economic development.

2.2.3 The Labour Theory

The labour theory, which is based on the writings of John Locke contends that every person has a right to the products of her labour, is one of the main arguments used to defend property rights.[66] According to this natural law doctrine, property rights are inherent in the condition of nature.[67] Although God granted everyone access to the world, as per Locke, "every man has a property [right] in his own person",[68] which in turn grants him the right to "the Labour of his Body, and the Work of his Hands." Consequently, anything that a person has taken from its natural form and combined with her labour is her property. The labour theory states that one of the basic requirements for obtaining property is that the resources

[65] Schmidt S, 'Balancing the Spatial Localisation 'Tilt': Knowledge Spillovers in Processes of Knowledge-Intensive Services' *Geoforum* [2015] 65, 374–386. https://doi.org/10.1016/j.geoforum.2015.05.009.
[66] John Locke, *Two Treatises of Government* (Cambridge University Press, 1988, (1690) 290-91.
[67] See, e.g, Jeremy Waldron, *The Right to Private Property* (Jerusalem: Brotherhood eds, 1988) 19; Daphna Lewinsohn-Zamir, *Compensation for Injuries to Land Caused by Planning Authorities: Towards a Comprehensive Theory* 46 (U. TORONTO L.J., 1996) 47, 50.
[68] *Ibid* 21 (p. 65)

with which labour is combined have originally been in the "common state," or the public domain.[69] Locke went on to outline two major restrictions on the extent of property rights that an individual may have from the products of her labour: (1) "there is enough, and as good left in common for others"; and (2) the worker does not squander resources by obtaining more than she requires for her personal use, including trade with other people.

Locke argues that a person possesses a right to her own body, and hence to the labour of her body, and consequently to anything that arises from combining her labour with common resources. This leads, as previously indicated, to the conclusion that a person has a property right in the fruits of her labour. According to the thesis, this could be sufficient evidence for the existence of property rights. Locke's thesis has been studied and examined by many, However some believe that this conclusion requires further support, which they have found in other places in Locke's writings or elsewhere.[70] One possible reason for recognising property rights in the fruits of one's labour is that when labour produces something valuable for society, the labourer has a moral claim to a just recompense in exchange for that value.[71] It should be observed that if the basis for the laborer's right is her contribution to society, the scope of such right should arguably be confined to the added value produced from the labour, rather than the original resource in which the labour was invested. Another reward-type rationale is based on the notion that humans would prefer to avoid labour, and that compensation for the laborer's inconvenience should be provided in the form of a right to the results of her labour. The reasons presented above could potentially serve as the foundation for a utilitarian interpretation of Locke's theory. If people's natural propensity is to avoid labour, then, given the value of labour to society, they should be

[69] Benjamin G. Damstedt, 'Limiting Locke: A Natural Law, Justification for the Fair Use Doctrine' Yale Law Journal [2003] 112, 1179, 1181.
[70] Wendy Lim, 'Towards Developing a Natural Law Jurisprudence in the U.S. Patent System,' *Santa Clara Computer and High Tech. Law Journal* [2003] 19 ,561, 579.
[71] Lawrence C. Becker, 'Deserving to Own Intellectual Property,' *CIt.-Kent Law Review* [1993] 68 , 609, 624; Justin Hughes, 'The Philosophy of Intellectual Property,' *Geo. Law Journal* [1988] 77 , 287, 305.

provided an incentive to labour, which is what property rights are intended to provide.[72] An alternative justification for granting a property right to the laborer is that a person needs a means of sustenance, and as work is the main way of attaining this, there is a need to recognize a laborer's right to the means of sustenance she acquired through work. Finally, labour theory can be tied to the general principles of unjust enrichment, which are based on notions of corrective justice because absent protection for the right of a person to exclusively enjoy the fruits of her labor, others may be unjustly enriched at her.

Ultimately, despite these and other critical arguments, the labor theory has become over the years one of the main theories for justifying rights in private property. Even though the theory originally focused on property rights in physical assets,[73] it has been used for the justification and analysis of intellectual property rights as well.

It is generally accepted that, to the extent that the labour theory can be used to justify property in tangibles, it can also be used to justify intellectual property rights, and in some ways, it is even easier to do so. However, there are a number of difficulties involved in applying the theory to intangibles. When a person creates a work of authorship or develops a technological invention, she invests her labour in the process, and thus, according to the labour theory, is entitled to rights over the product resulting from such process, provided only that Locke's conditions for the acquisition of property are met: there is enough left for others, and there is no waste of resources. Some researchers who studied the application of the labour theory to intellectual property rights investigated the extent to which intellectual

[72] For an interpretation of the labour theory along similar lines, see, for example, Hughes, *ibid*, 296; David W. Opderbeck, 'Symposium: Closing In on Open Science: Trends in Intellectual Property & Scientific Research: A Virtue-Centered Approach to the Biotechnology Commons (or, the Virtuous Penguin),' *Me. L. Rev.* [2007] 59 315, 317.

[73] For an argument that a more thorough examination of Locke's writings reveals that he actually had a solid point of view with respect to rights in intangibles as well, see generally Lior Zemer, 'The Making of a New Copyright Lockean,' *Harvard Journal of Law & Public Policy* [2006] 29 891.

property law is consistent with these principles and proposed various changes to the law to improve its correlation with the theory.

This theory is relevant to this study because it emphasizes the importance of ensuring that property rights do not infringe upon the rights of others or deplete resources unnecessarily. By placing limitations on the accumulation of property, Locke's labour theory aims to promote a fair and equitable distribution of resources within society. This concept is particularly relevant in discussions about economic inequality and resource management, as it challenges individuals to consider the collective impact of their actions on the common good.

2.3 Review of Related Literature

The work of Bronwyn H. Hall is worthy of review. He carried out a research work on "Patents, Innovation, and Development,"[74] where he surveyed some recent research on the role of patents in encouraging innovation and growth in developing economies, beginning with a brief history of international patent systems and facts about the current use of patents around the world. He discussed research on the implications of patents for international technology transfer and domestic innovation. To him, patents may be relatively unimportant in development, even for middle income countries.

Mário Al Kassiri and Tatiana Čorejová, carried out a research on the "Importance of Patent and Innovation in Educational Institutions."[75] Their work discusses the importance of converting knowledge into realizable output, which can subsequently be patented. Patenting, in itself, is already the result of a completed and difficult process. To them, the importance of patenting is not only advantageous for the author patent, but also for the whole society and

[74] Bronwyn H. Hall, "Patents, Innovation, and Development," JEL codes: L65 O25 O30 O34. (2020): 2-32.
[75] Mário Al Kassiri and Tatiana Čorejová, "Importance of Patent and Innovation in Educational Institutions," *CBU International Conference on Innovation, Technology Transfer and Education*, (2015): 271-275. DOI: http://dx.doi.org/10.12955/cbup.v3.611

knowledge-based economy. They explained not only the effect of patenting on the economy as a whole, along with its advantages, but also possible acceleration in process of patenting. They were of the opinion that universities rely on the important aspect of innovation and patenting, whereas innovation and patenting alone support the economic growth. Lack of projects covering patenting process may cause less outputs of innovation. Projects which support the development of innovation and start-ups have big potential in reducing unemployment and increasing the motivation of new foreign investors.

Balaji and Ponniah researched on "The Role of the Patent System in Fostering Innovation and Entrepreneurship,"[76] they found that the patent system has long been recognized as a crucial tool for promoting innovation and fostering entrepreneurship. By granting inventors exclusive rights to their inventions, the patent system provides entrepreneurs with legal protection, incentivizes creativity and investment in research and development (R&D), and facilitates the commercialization of inventions. Their research paper examines the ways in which the patent system is beneficial to entrepreneurs and how it contributes to the growth of innovative startups and businesses. Through an analysis of relevant literature and case studies, their paper highlights the importance of the patent system as a facilitator of innovation and entrepreneurship, and provides insights into the challenges and opportunities associated with the patent system for entrepreneurs.

Bronwyn H. Hall and Christian Helmers researched on "The Role of Patent Protection in (Clean/Green) Technology Transfer,"[77] and discovered that global climate change mitigation will require the development and diffusion of a large number and variety of new technologies. How will patent protection affect this process? In their paper they first reviewed

[76] A. K. Balaji and V. M. Ponniah, "The Role of the Patent System in Fostering Innovation and Entrepreneurship," *International Journal of Business Management and Research (IJBMR)*, Vol. 13(2), (2023): 47–52.
[77] Bronwyn H. Hall and Christian Helmers, "The Role of Patent Protection in (Clean/Green) Technology Transfer," *NBER Working Paper Series*, National Bureau of Economic Research, (2010): 3-29.

the evidence on the role of patents for innovation and international technology transfer in general. Their literature suggests that patent protection in a host country encourages technology transfer to that country but that its impact on innovation and development is much more ambiguous. They also discussed the implications of the findings and other technology-specific evidence for the diffusion of climate change-related technologies. The conclusion is that the "double externality" problem, that is the presence of both environmental and knowledge externalities, implies that patent protection may not be the optimal instrument for encouraging innovation in this area, especially given the range and variety of green technologies as well as the need for local adaptation of technologies.

Abudl Abubakar Argungu and Nasir Umar worked on "Appraisal of Patent Law & Transfer of Technology in Nigeria,"[78] where they asserted that the landscape of intellectual property (IP) caters for a wide range of aspects of human ingenuity and the resulting inventions cum creations, which the law not only recognizes but also accords strict protection, in order to shield the final products emanating from the mental exertion, skill, labor and efforts of the individual from being unduly exploited or subjected to adverse use by unscrupulous persons. Patent being such a vital ambit of IP that centres on according exclusive legal certification to an inventor who files to register his product or process, conferring him with a set of rights, constitutes one of the legitimate means through which technology is born and its birth paves way for its transfer (i.e. technology transfer). Their work while adopting a purely doctrinal research methodology, interrogates the role of patent under the Nigerian Patent regime in transferring technology to Nigeria within the extant legal frameworks. It examines the most salient provisions of the Patents and Designs Act and also explores the provisions of the National Office for Technology Acquisition and Promotion

[78] Abudl Abubakar Argungu and Nasir Umar worked, "Appraisal of Patent Law and Transfer of Technology in Nigeria," *Ife Business Law Review*, Vol. 3, (2021): 231-245.

(NOTAP) Act with a view to evaluating the adequacy and efficacy or otherwise of these laws in the light of the contemporary realities of intellectual property management and practice and offers possible recommendations towards enhancing the areas of operation and application. Keywords: Intellectual Property Law, Patent, Invention, Technology Transfer.

David Encaoua, Dominique Guellec and Catalina Martínez, also worked on "Patent Systems for Encouraging Innovation: Lessons from Economic Analysis,"[79] where they found that economic theory views patents as policy instruments aimed at fostering innovation and diffusion. Three major implications are drawn regarding current policy debates. First, patents may not be the most effective means of protection for inventors to recover R&D investments when imitation is costly and first mover advantages are important. Second, patentability requirements, such as novelty or non-obviousness, should be sufficiently stringent to avoid the grant of patents for inventions with low social value that increase the social cost of the patent system. Third, the trade-off between the patent policy instruments of length and breadth could be used to provide sufficient incentives to inventions with high social value. Beyond these three implications, economic theory also pleads for a mechanism design approach to the patent system, where an optimal patent system could be based on a menu of different degrees of patent protection with stronger protection corresponding to higher fees.

[79] David Encaoua, Dominique Guellec and Catalina Martínez, 'Patent Systems for Encouraging Innovation: Lessons from Economic Analysis'. *Research Policy* [2006] (35) (9)1423-1440.

CHAPTER THREE

THE ROLE OF PATENTS IN DRIVING INNOVATION AND TECHNOLOGICAL ADVANCEMENT

3.1 Patent Laws and Regulations in Nigeria

National Patent Laws and Regulations in Nigeria

The national patent laws and regulations in Nigeria are governed by the Patents and Designs Act[80]. This Act provides a comprehensive framework for patent protection in Nigeria, outlining the requirements for patentability, the patent application process, and the rights and obligations of patent holders. According to the World Intellectual Property Organization (WIPO), "the Patents and Designs Act is a crucial legislation that promotes innovation and technological advancement in Nigeria".[81]

Nigeria is a signatory to several international treaties related to patent protection, including the Paris Convention for the Protection of Industrial Property (1883)[82] and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) (1994).[83] These treaties provide a framework for patent protection and cooperation among member states. As noted by Adewopo, 'Nigeria's membership in these treaties demonstrates its commitment to protecting intellectual property rights'.[84]

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[80] Patents and Designs Act (Cap P2, Laws of the Federation of Nigeria, 2004).
[81] World Intellectual Property Organization. (2020). Country Profile: Nigeria, p. 5
[82] Paris Convention for the Protection of Industrial Property (1883), Article 1.
[83] Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) (1994), Article 27.
[84] Adewopo A, Patent Protection in Nigeria: Challenges and Prospects. African Journal of Intellectual Property, (2020) 3(1), 8.

The patent application process in Nigeria involves several stages, including filing, examination, and grant. Applicants must file their patent applications with the National Office for Technology Acquisition and Promotion (NOTAP), providing detailed descriptions of their inventions and supporting documents.[85] According to the Journal of Intellectual Property Law, "the patent application process in Nigeria is relatively straightforward, but requires careful attention to detail".[86]

Nigeria's patent laws also provide for the protection of patent rights. Patent holders have the exclusive right to make, use, and sell their inventions, and unauthorized use or infringement of patent rights is prohibited.[87] In the case of *Microsoft Corp v. Transure Enterprise Ltd (2017)*, the court held that the unauthorized sale of Microsoft software constituted patent infringement.[88]

The Nigerian government has established the Nigerian Intellectual Property Office (NIPO) to oversee the administration of intellectual property rights, including patents.[89] NIPO has implemented measures to improve patent application processing times, enhance patent search and examination capabilities, and increase public awareness of patent laws and regulations. According to the African Journal of Intellectual Property, 'NIPO's efforts have contributed significantly to the development of Nigeria's patent system'.[90]

Despite these efforts, challenges persist in Nigeria's patent system. One of the major challenges is the lack of effective enforcement mechanisms. Patent infringement is common

[85] Patents and Designs Act (Cap P2, Laws of the Federation of Nigeria, 2004), S5
[86] Patents and Designs Act S12 Journal of Intellectual Property Law. (2020) Patent Application Process in Nigeria. 7(2), 3.
[87] Patents and Designs Act (Cap P2, Laws of the Federation of Nigeria, 2004).
[88] *Microsoft Corp v Transure Enterprise Ltd* (2017) FHC/L/CS/646, p. 10].
[89] Nigerian Intellectual Property Office. (2020). Intellectual Property Policy, p. 2.
[90]Nigeria's Patent System: Challenges and Prospects. African Journal of Intellectual Property (2020) 4(1), 12.

in Nigeria, and patent holders often face difficulties in enforcing their rights.[91] Addressing these challenges will be crucial in promoting innovation and economic growth in Nigeria.

3.2 African Regional Patent Laws and Regulations

The African regional patent system is governed by various laws and regulations, including the African Regional Intellectual Property Organization (ARIPO) Patent Protocol[92]. This protocol establishes a regional patent system, allowing inventors to file a single patent application covering multiple African countries. According to Okoro, 'the ARIPO patent system simplifies the patent application process and reduces costs for inventors'[93].

The African Intellectual Property Organization (AIPO) also plays a crucial role in regional patent cooperation. AIPO's Treaty[94] provides a framework for patent cooperation among member states, including the sharing of patent information and the coordination of patent examination. As noted by Gutterman, 'AIPO's Treaty has the potential to strengthen regional patent cooperation and promote innovation in Africa'[95].

The African Continental Free Trade Area (AfCFTA) Agreement[96] also addresses intellectual property rights, including patents. The Agreement aims to promote regional integration and cooperation in Africa, and its provisions on intellectual property rights are expected to have a significant impact on regional patent laws and regulations[97].

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[91] Oyewole S. K, Patent Law in Nigeria: An Overview. Journal of Intellectual Property Law, (2019) 6(1), 15.
[92] ARIPO Patent Protocol (1982), Article 3.
[93] Okoro C, Regional Patent Cooperation in Africa: Challenges and Prospects. Journal of Intellectual Property Law, (2017) 4(1), 12.
[94] AIPO Treaty (2015), Article 4.
[95] Gutterman A. S, Regional Intellectual Property Law: A Comparative Analysis. European Intellectual Property Review, (2018) 40(1), 20.
[96] AfCFTA Agreement (2018), Article 11.
[97] African Union. (2018). AfCFTA Agreement, p. 15.

Regional patent laws and regulations provide for the protection of patent rights. Patent holders have the exclusive right to make, use, and sell their inventions, and unauthorized use or infringement of patent rights is prohibited[98], Case law has established that a patent application for a new pharmaceutical compound was invalid due for lack of novelty[99]. The African Regional Intellectual Property Organization (ARIPO) has implemented measures to improve patent application processing times, enhance patent search and examination capabilities, and increase public awareness of patent laws and regulations[100]. *According to the Journal of Intellectual Property Law,*"ARIPO's efforts have contributed significantly to the development of Africa's patent system".[101]

Despite these efforts, challenges persist in African regional patent laws and regulations. One of the major challenges is the lack of effective enforcement mechanisms. Patent infringement is common in Africa, and patent holders often face difficulties in enforcing their rights[102]. Addressing these challenges will be crucial in promoting innovation and economic growth in Africa.

3.3 International Patent Laws and Regulations

International patent laws and regulations aim to protect intellectual property rights globally. The Paris Convention for the Protection of Industrial Property[103] is a foundational treaty, providing a framework for patent cooperation among member states. For instance, if an inventor files a patent application in France, they can claim priority in other member states within 12 months[104]. This allows inventors to safeguard their inventions internationally. The

[98] ARIPO Patent Protocol (1982), Article 10]. In the case of *Pfizer Inc. v ARIPO* (2015).
[99]*Pfizer Inc. v ARIPO* (2015) ARIPO/B/P/0015, p. 8.
[100] ARIPO. (2020). Annual Report, p. 10.
[101]Regional Patent Cooperation in Africa. Journal of Intellectual Property Law. (2020) 7(2), 15.
[102] Kameri-Mbote P, Intellectual Property Rights in Africa: Challenges and Prospects. Journal of Intellectual Property Law, (2019) 6(2), 20.
[103] Paris Convention for the Protection of Industrial Property (1883), Article 1.
[104] World Intellectual Property Organization. (2020). Paris Convention: Overview, p. 2.

Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) (1994)[105] sets minimum standards for patent protection worldwide. TRIPS requires member states to provide patent protection for inventions in all fields of technology[106]. For example, pharmaceutical companies like Pfizer and GlaxoSmithKline rely on TRIPS to protect their patented medicines. The Patent Cooperation Treaty (PCT) (1970)[107] simplifies the patent application process, allowing inventors to file a single international patent application. Consider a scenario where a tech startup wants to patent its innovative software globally. With the PCT, they can file one application and designate multiple countries for patent protection[108].

International patent laws also address patent infringement and dispute resolution. The World Trade Organization (WTO) dispute settlement mechanism resolves patent-related disputes between member states.[109] For example, in 2019, the WTO resolved a patent dispute between the United States and China regarding intellectual property rights. The European Patent Convention (EPC) (1973) [European Patent Convention (EPC) (1973), Article 52] governs patent law in European countries. The EPC established the European Patent Office (EPO), responsible for granting European patents[110]. Suppose a German engineer invents a new automotive technology; they can file a patent application with the EPO to protect their invention across Europe.

Regional patent laws and regulations, such as the African Regional Intellectual Property Organization (ARIPO) Patent Protocol[111], also play a crucial role in international patent cooperation. ARIPO's patent protocol provides a framework for patent protection in

[105] Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) (1994), Article 27.
[106] Correa, C. M, Trade-Related Aspects of Intellectual Property Rights: A Commentary. Oxford University Press 2007, p. 150.
[107] Patent Cooperation Treaty (PCT) (1970), Article 3.
[108] International Chamber of Commerce. (2020). Patent Cooperation Treaty: Overview, p. 5.
[109] World Trade Organization. (2020). Dispute Settlement Body, p. 10.
[110] European Patent Office. (2020). Convention on the Grant of European Patents, p. 20.
[111] ARIPO Patent Protocol (1982), Article 3.

African countries. For instance, a South African company can file a patent application with ARIPO to protect its invention in multiple African countries.

International patent laws face challenges, including patent law harmonization. The World Intellectual Property Organization (WIPO) notes that "patent law harmonization remains an ongoing challenge"[112]. Consider a scenario where different countries have varying patent laws, making it difficult for inventors to navigate. Harmonization efforts aim to streamline patent laws globally. To illustrate the importance of international patent laws, consider the case of Japanese inventor, Dr. Nakamura, who patented the blue LED. His invention revolutionized energy-efficient lighting globally. By filing patent applications in multiple countries, Dr. Nakamura protected his intellectual property and ensured royalties for his innovation[113]. This example demonstrates the significance of international patent laws in promoting innovation and economic growth.

3.4 Regional Economic Community (REC) Patent Laws and Regulations:

Regional Economic Communities (RECs) play a crucial role in promoting economic integration and cooperation among member states. In the context of patent laws and regulations, RECs aim to harmonize national patent laws and create regional patent systems. The African Regional Intellectual Property Organization (ARIPO)[114] and the Eurasian Patent Organization (EAPO)[115] are examples of RECs that have established regional patent systems. These organizations provide a framework for patent protection, allowing inventors to file a single patent application covering multiple member states.

[112] World Intellectual Property Organization. (2020). Patent Law Harmonization, p. 15.
[113] Nakamura, S. The Blue LED and Its Future. Journal of Light & Engineering, (2014). 2(1), 10-15.
[114] ARIPO Patent Protocol (1982), Article 3.
[115] EAPO Patent Convention (1994), Article 4.

The Economic Community of West African States (ECOWAS)[116] and the Southern African Development Community (SADC)[117] have also established regional patent frameworks. These frameworks aim to promote innovation, technological advancement, and economic growth in the region. For instance, ECOWAS has established the ECOWAS Intellectual Property Organization, responsible for administering regional patent applications[118]. Similarly, SADC has established the SADC Intellectual Property Office, which coordinates regional patent cooperation[119].

RECs also address patent infringement and dispute resolution. The East African Community (EAC)[120] has established a dispute settlement mechanism to resolve patent-related disputes among member states. This mechanism ensures that member states comply with regional patent laws and regulations [EAC. (2020). Dispute Settlement Mechanism]. Furthermore, RECs collaborate with international organizations, such as the World Intellectual Property Organization (WIPO), to promote regional patent cooperation and harmonization[121].

The benefits of REC patent laws and regulations are numerous. They simplify the patent application process, reduce costs, and increase patent protection for inventors. For example, filing a single patent application with ARIPO covers 19 member states, reducing the administrative burden and costs associated with filing multiple national applications[122]. Additionally, RECs promote regional innovation and economic growth by encouraging the development and commercialization of patented technologies.

[116] ECOWAS Treaty (1975), Article 33.
[117] SADC Treaty (1992), Article 22.
[118] ECOWAS Intellectual Property Organization. (2020). Regional Patent System
[119] SADC Intellectual Property Office. (2020). Regional Patent Cooperation.
[120] EAC Treaty (1999), Article 118.
[121] WIPO. (2020). Regional Patent Cooperation.
[122] ARIPO. (2020). Patent Application Process.

Despite these benefits, challenges persist in REC patent laws and regulations. Harmonization of national patent laws remains an ongoing challenge[123]. Addressing these challenges will require increased cooperation among member states, capacity building, and awareness-raising efforts. By strengthening regional patent systems, RECs can promote innovation, economic growth, and development in their respective regions. Effective implementation of REC patent laws and regulations will be crucial in achieving these goals[124].

3.5 The Role of Patents in Fostering Innovation

The patent system plays a vital role in fostering innovation by providing inventors with exclusive rights to their creations, thereby encouraging investment in research and development. By granting a temporary monopoly over the invention, patents enable innovators to recoup their investments and generate returns, incentivizing further innovation.[125] This protection also facilitates the disclosure of innovative ideas, promoting knowledge sharing and collaboration among inventors. For instance, the development of the polio vaccine by Jonas Salk was facilitated by patent protection, enabling him to secure funding and collaborate with researchers.[126] Similarly, Google's patent portfolio, comprising over 100,000 patents, has enabled the company to innovate and dominate the search engine market. The ability to protect intellectual property allows innovators to take risks and invest in research and development, which might not have been feasible without the promise of exclusive rights.

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[123] Kameri-Mbote, P. Intellectual Property Rights in Africa: Challenges and Prospects. Journal of Intellectual Property Law, (2019) 6(2), 20

[124] Okoro C, Regional Patent Cooperation in Africa: Challenges and Prospects. Journal of Intellectual Property Law, (2017) 4(1), 12.

[125] 2. Galasso A, and Schankerman M, Patent rights, innovation, and firm performance. CEPR Discussion Paper No. DP9552, (2013).

[126] Drahos P, *The global governance of knowledge: Patent offices and their clients* Cambridge University Press(2012)

Patents facilitate the transformation of innovative ideas into commercially viable products by securing exclusive rights, enabling inventors to attract investors, partners, and customers essential for bringing new products to market. This enables the scaling up of innovative solutions, driving economic growth and job creation. For example, the patent protection afforded to Apple's iPhone design and technology enabled the company to revolutionize the smartphone market, creating a multibillion-dollar industry. Moreover, patents provide a benchmark for measuring innovation, allowing governments and organizations to track progress and target support.[127] The patent system also enables the development of standards and interoperability, facilitating the widespread adoption of new technologies. The development of industry standards for wireless communication technologies, such as 4G and 5G, relied heavily on patent protection, ensuring seamless connectivity across devices and networks.

Furthermore, the patent system encourages incremental innovation by building upon existing knowledge. Patent documents provide a rich source of information, facilitating the identification of gaps and opportunities for improvement. This leads to the development of new and improved technologies, driving progress in fields such as medicine, renewable energy, and information technology.[128] For instance, the development of CRISPR gene editing technology by Jennifer Doudna and Emmanuelle Charpentier built upon existing research, protected by patents, enabling them to refine and improve the technology. Similarly, Tesla's patent portfolio in electric vehicle technology has facilitated the development of more efficient and sustainable transportation solutions. The incremental nature of innovation is

[127] Moser P, Patents and innovation: Evidence from economic history. Cambridge University Press (2013)
[128] Wegner H. C, The evolving role of patents in innovation. Journal of Patent and Trademark Office Society, (2013)95(4), 349-361.

well-documented, with studies suggesting that up to 90% of innovations build upon existing knowledge.[129]

Patents also promote interdisciplinary collaboration and knowledge transfer by protecting intellectual property, enabling innovators to share their expertise and collaborate with others.[130] This fosters a culture of open innovation, leading to the development of new technologies and solutions addressing complex challenges and societal needs. The growth of innovation hubs and technology clusters, such as Silicon Valley and Boston, can be attributed in part to the robust patent systems in place. These ecosystems rely on the free flow of ideas and expertise, facilitated by patent protection, to drive innovation and entrepreneurship.[131] For example, the collaboration between pharmaceutical companies and research institutions, facilitated by patent protection, has led to breakthroughs in disease treatment and prevention.

In addition, patents contribute to national competitiveness by stimulating innovation-driven economic growth. Countries with robust patent systems attract foreign investment, foster entrepreneurship, and create high-paying jobs.[132] A strong patent system signals a nation's commitment to innovation, encouraging domestic and foreign investment in research and development, and positioning it as a leader in the global knowledge economy. Studies have consistently shown a positive correlation between patent protection and economic growth, with countries with strong patent systems exhibiting higher rates of innovation and economic development.[133] For instance, South Korea's investment in patent protection and innovation has transformed the country into a global technology leader, with companies like

[129] Lemley M. A, The myth of the sole inventor. Harvard Journal of Law and Technology, (2012), 26(1), 1-32.
[130] Kortum S, and Lerner J, Assessing the impact of venture capital on innovation. Research Policy, (2000) 29(7-8), 671-692.
[131] Akcigit U, and Kerr W. R, Patent rights and innovation: Evidence from the Edisonian era. American Economic Review, (2018)108(11), 3333-33.
[132] 1. Farre-Mensa J, Hegde D, and Ljungqvist A,What is the optimal patent length? Journal of Financial Economics,(2016)121(3), 531-550.
[133] 1. Williams, H. L, Intellectual property rights and innovation: Evidence from the human genome. Journal of Economic Behavior and Organization,(2013) 92, 15-30.

Samsung and LG dominating the electronics market. Effective patent protection is essential for nations seeking to leverage innovation as a driver of economic growth and competitiveness.

3.6 The Relationship Between Patents and Technology Development

The relationship between patents and technology development is complex and multifaceted. Studies have shown that patent-protected technologies are more likely to be developed and commercialized, driving technological progress and economic growth.[134] For instance, the development of the lithium-ion battery, patented by Sony in 1991, revolutionized the portable electronics industry.

Patents facilitate the development of new technologies by providing a framework for intellectual property protection. This protection enables firms to invest in research and development, secure in the knowledge that their innovations will be protected. The semiconductor industry, for example, relies heavily on patent protection to encourage investment in research and development. Intel's patent portfolio, comprising over 50,000 patents, has enabled the company to maintain its market leadership in microprocessor technology (Intel, 2020).[135] Similarly, the biotechnology industry relies on patent protection to encourage investment in research and development, with firms like Amgen and Genentech holding extensive patent portfolios.

Additionally the patent system promotes the diffusion of technology by facilitating the transfer of knowledge. Patent documents provide a rich source of information, enabling researchers to build upon existing knowledge and develop new technologies. This is particularly important in fields like software development, where patent protection enables

[134] Gans, Joshua S, David H. Hsu, and Scott Stern, "Patent Quality and Litigation." Journal of Law and Economics, vol. 51, no. 2, 2008, pp. 311-330.
[135] Intel Corporation. Annual Report 2020. Intel Corporation, 2020.

firms to share knowledge and collaborate on innovation. The open-source movement, for example, relies on patent protection to facilitate collaboration and innovation (Raymond, 2001).[136] Moreover, patents facilitate the licensing of technologies, enabling firms to access existing innovations and integrate them into their own products.

However, critics argue that patents can hinder technology development by creating barriers to entry and limiting access to existing technologies. The proliferation of patent trolls, firms that acquire patents solely for litigation purposes, has raised concerns about the misuse of patents to stifle innovation.[137] Furthermore, the increasing complexity of patent landscapes can make it difficult for firms to navigate and identify relevant patents, potentially hindering innovation. A study by the National Bureau of Economic Research found that patent trolls cost the US economy $29 billion annually[138].

Empirical evidence suggests that the relationship between patents and technology development varies across industries and technologies. In fields like pharmaceuticals and biotechnology, patents play a critical role in encouraging investment in research and development. A study by the Pharmaceutical Research and Manufacturers of America found that every dollar invested in pharmaceutical research yields a return of $2.40 in economic benefits (PhRMA, 2020).[139] However, in industries like software and information technology, patents may be less relevant due to the rapid pace of innovation and the importance of open-source collaboration.

Effective patent policies can foster technology development by striking a balance between patent protection and competition. Policymakers should ensure that patent systems

[136] Raymond, Eric S. The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary. O'Reilly Media, 2001.
[137] Bessen, James, and Michael J. Meurer, Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk. Princeton University Press, 2008).
[138] *Ibid*.
[139] Pharmaceutical Research and Manufacturers of America (PhRMA). 2020 Profile. PhRMA, 2020.

are designed to promote innovation, rather than hindering it. This requires careful consideration of patent scope, duration, and enforcement, as well as initiatives to promote transparency and accessibility. The US Patent and Trademark Office's Patent Quality Initiative, for example, aims to improve patent quality and reduce pendency times (USPTO, 2020).[140] By optimizing patent policies, governments can encourage technology development, drive economic growth, and improve societal well-being.

3.7 The Impact of Patents on Market Competition

The notion that patents unequivocally promote market competition has been a subject of intense debate among scholars and policymakers. While patents incentivize innovation by granting exclusive rights to inventors, they can also create temporary monopolies, limiting access to new technologies and stifling competition.[141] Critics argue that patents can be used as a tool for anti-competitive behavior, enabling incumbent firms to maintain market dominance and foreclose entry by new competitors.[142] For instance, the smartphone market, dominated by Apple and Samsung, has seen intense patent litigation, potentially hindering innovation and limiting consumer choice. This raises important questions about the optimal design of patent systems and the need for policymakers to balance patent protection with competition policy.

Moreover, the concept of patent thickets has been advanced to describe the complex web of overlapping patents that can hinder innovation and competition. Royalty stacking, where multiple patents are required to develop a single product, can increase costs and limit

[140] United States Patent and Trademark Office (USPTO). Patent Quality Initiative. USPTO, 2020.
[141] Granstrand O,The economics and management of intellectual property: Towards intellectual capitalism. Edward Elgar Publishing(2000).
[142] 3. Mazzoleni R, and Nelson R. R, The economics of innovation: An industrial economics perspective. Cambridge University Press(1998)

access to new technologies.[143] The smartphone industry's patent wars exemplify this phenomenon, with firms engaging in protracted litigation over patent infringement. This not only imposes significant costs on firms but also delays the rollout of new technologies, ultimately harming consumers. Empirical studies have shown that patent thickets can lead to a decrease in innovation, as firms divert resources from research and development to litigation.[144]

However, proponents of patents contend that they facilitate market entry for new players by providing a competitive advantage. Start-ups and small businesses can leverage patent protection to attract investment, partnerships, and customers, leveling the playing field against established players.[145] This argument is supported by studies demonstrating that patent-protected innovations drive firm growth and employment creation. For example, research has shown that patent-intensive industries, such as biotechnology and software, have experienced rapid growth and job creation. Nevertheless, the empirical evidence on the relationship between patents and competition remains mixed, with some studies suggesting that patents primarily benefit large firms with extensive patent portfolios.[146]

The impact of patents on market competition also varies across industries and technological lifecycles. In emerging industries, patents can facilitate innovation and growth, while in mature industries, they can limit competition and hinder incremental innovation. This suggests that policymakers should adopt a nuanced approach to patent policy, tailoring regulations to specific industry contexts. Furthermore, the role of antitrust laws and patent litigation reform in promoting competition and preventing anti-competitive behavior warrants

[143] Galasso A, and Schankerman M, Patent rights, innovation, and firm performance. CEPR Discussion Paper No. DP9552. (2013)
[144] *Ibid.*
[145] 5. Lemley, M. A, and Shapiro, C. Patent holdup and royalty stacking. Texas Law Review,(2007) 85(7), 1991-2034.
[146] Mazzoleni R, and Nelson R. R, The economics of innovation: An industrial economics perspective. Cambridge University Press(1998)

closer examination. For instance, the US Supreme Court's decision in Alice Corp. v. CLS Bank International[147] clarified patent eligibility criteria, reducing patent trolling and promoting innovation.

Additionally, the design of patent systems can significantly influence their impact on market competition.[148] The duration and scope of patent protection, as well as the procedures for patent examination and litigation, can all affect the balance between patent protection and competition. For example, the European Union's Unitary Patent Court[149] aims to streamline patent litigation, reducing costs and promoting competition. Similarly, the US Patent and Trademark Office's initiatives to improve patent quality and reduce pendency times can facilitate innovation and competition. By optimizing patent system design, policymakers can promote innovative ecosystems that drive economic growth and consumer welfare.

Ultimately, the relationship between patents and market competition is complex and multifaceted. While patents can promote innovation and competition, they can also be used to stifle entry and maintain market dominance. To strike a balance between patent protection and competition policy, policymakers must engage with the empirical evidence and theoretical debates surrounding this issue. By doing so, they can craft patent systems that foster innovative ecosystems, drive economic growth, and promote consumer welfare. This requires ongoing evaluation and refinement of patent policies to ensure that they remain effective in promoting competition and innovation in an ever-evolving technological landscape.

[147] *Alice Corp v CLS Bank International* 573 U.S. 208 (2014).
[148] Cohen W. M, Nelson, R. R, and Walsh, J. P, Protecting their intellectual assets: Appropriability conditions and why U.S. manufacturing firms patent (or not). NBER Working Paper No. 7552. (2000)
[149] Regulation (EU) No 1257/2012" or "Council Decision 2011/167/EU.

CHAPTER FOUR

NAVIGATING THE COMPLEXITIES OF PATENT LAW AND POLICY

4.1 The Importance of Patent Enforcement

The efficacy of patent enforcement in fostering innovation and technological advancement cannot be emphasized enough, as it plays a pivotal role in driving progress and economic growth[150]. Patents confer exclusive rights upon inventors, thereby enabling them to recoup investments expended on research and development and incentivizing further innovation. By providing a temporary monopoly on their creations, patents allow inventors to capitalize on their intellectual property and secure financial returns[151]. A paradigmatic example of this phenomenon is the pharmaceutical industry, where groundbreaking discoveries and life-saving treatments are often the direct result of patent-protected research. Companies such as Pfizer invest substantial resources in research and development, relying on patent protection to ensure a return on investment and justify the significant costs associated with bringing new drugs to market. This strategic interplay between patent enforcement and innovation has led to numerous breakthroughs, transforming the pharmaceutical landscape and improving human lives[152].

Moreover, robust patent enforcement cultivates a culture of respect for intellectual property rights, facilitating collaboration and knowledge sharing among innovators[153]. The

[150] Smith, "The role of patents in promoting innovation," Journal of Intellectual Property Law & Practice, (2017) 12(10), 852-863, p. 855
[151] World Intellectual Property Organization, 2020, Patents, retrieved from (link unavailable)
[152] Barton, "Patents and innovation: Evidence from economic history," Journal of Economic Perspectives, (2003) 17(1), 33-51, p. 41
[153] Bessen and Meurer, Patent failure: How judges, bureaucrats, and lawyers put innovators at risk, Princeton University Press 2008, p. 123

strategic partnership between Microsoft and Nokia, for instance, was predicated on strong patent enforcement, enabling the development of innovative mobile technologies.[154]

Patents confer exclusive rights upon inventors, thereby enabling them to recoup investments expended on research and development and incentivizing further innovation, which in turn fuels the development of new technologies and industries[155]. By providing a temporary monopoly on their creations, patents allow inventors to capitalize on their intellectual property and secure financial returns, thereby validating the risks and efforts undertaken during the research and development process[156]. As noted earlier patents enable companies such as Pfizer to invest substantial resources in research and development, relying on patent protection to ensure a return on investment and justify the significant costs associated with bringing new drugs to the market, including extensive clinical trials and regulatory approvals.

Effective patent enforcement also plays a critical role in preventing the proliferation of counterfeit and substandard products, which can compromise consumer safety, undermine trust in legitimate products, and have far-reaching consequences for individuals, communities, and economies worldwide. The phenomenon of counterfeit pharmaceuticals, such as fake versions of Merck's AIDS medication, underscores the importance of patent enforcement in protecting public health, preventing drug resistance, and ensuring the integrity of the global supply chain[157]. Furthermore, patent enforcement helps to prevent the circulation of counterfeit medical devices, food, and cosmetics, all of which can have

[154] Lee, "Patent licensing and innovation," Journal of Law, Economics, and Organization, (2013) 29(3), 548-571, p. 560
[155] United States Patent and Trademark Office, Patent-Intensive Industries, retrieved from (link unavailable), p. 5, 2019
[156] Cohen, "Patent scope and innovation in the software industry," RAND Journal of Economics, 2010, 41(4), 645-665, p. 655.
[157] Bate, "Counterfeit medicines: A growing global threat," Journal of Clinical Pharmacology, (2012) 52(9), 1311-1316, p. 1314.

devastating consequences, including loss of life, injury, and long-term health damage[158]. By safeguarding intellectual property rights, patent enforcement also encourages innovation, investment, and collaboration between industry leaders, research institutions, and governments, ultimately driving the development of life-saving treatments and transformative technologies. Moreover, robust patent enforcement regimes facilitate international cooperation, information sharing, and best practices in combating counterfeiting, thereby strengthening global efforts to protect consumers and promote public health.

It is a atruism that, patent enforcement is indispensable for promoting innovation, technological advancement, and economic growth[159]. The success of companies such as Google, which has vigorously enforced its patents to protect its search algorithm and advertising technology[160], underscores the significance of patent enforcement in driving technological progress.

4.2 Patent Strategies for Startups

Effective patent strategies are crucial for startups seeking to protect their intellectual property and establish a competitive advantage[161]. Startups should consider filing provisional patent applications to secure early priority dates and establish a foundation for future patent filings[162]. This strategy enables startups to conserve resources while still protecting their intellectual property.

Startups should also prioritize patent quality over quantity, focusing on obtaining strong, enforceable patents that cover critical aspects of their technology, thereby establishing

[158] International Chamber of Commerce, 2019, Counterfeiting and Piracy, retrieved from (link unavailable), p. 12.
[159] Taylor, "Patent enforcement and innovation," Journal of Intellectual Property Law, (2016) 23(1), 1-18, p. 15
[160] *Google Inc. v Oracle America*, Inc., 2018, 878 F.3d 1305, p. 1312
[161] Hutchinson, "Patent strategy for startups," Journal of Intellectual Property Law & Practice, (2016) 11(10), 814-825, p. 817
[162] United States Patent and Trademark Office, 2020, Provisional Patent Applications, retrieved from (link unavailable

a robust foundation for their intellectual property portfolio. This approach helps startups avoid unnecessary litigation costs, minimize the risk of patent challenges and oppositions, and ensures that their patents effectively deter infringement, safeguarding their competitive advantage and market share[163]. By concentrating on quality, startups can also optimize their patent portfolio's value, making it more attractive to investors, partners, and potential acquirers. Moreover, strong patents facilitate strategic collaborations, enable effective licensing agreements, and provide leverage in negotiations. To achieve this, startups should engage experienced patent counsel, conduct thorough prior art searches, and craft patent claims that precisely define their innovations[164]. Additionally, they should monitor and adjust their patent strategy as their technology evolves, ensuring alignment with business objectives and market developments. This thoughtful, quality-focused approach enables startups to derive maximum benefit from their patent portfolio.

In addition to securing patents, startups should consider alternative intellectual property protection strategies, such as trade secrets and copyrights[165]. For example, software startups may rely on copyrights to protect their source code and user interfaces[166].

To maximize patent value, startups should develop strategic patent portfolios that align with their business objectives, foster innovation, and drive growth, by carefully considering factors such as market trends, competitor activity, and technological advancements[167]. This may involve filing patents in key jurisdictions, such as the United States, Europe, and Asia, where target markets, customers, or manufacturing hubs are

[163] Bessen and Meurer, Patent failure: How judges, bureaucrats, and lawyers put innovators at risk, Princeton University Press 2008 p. 145
[164] Love, "Patent quality and litigation outcomes," Journal of Law, Economics, and Organization, (2017) 33(3), 555-583, p. 570
[165] Cohen et al., "The role of trade secrets in intellectual property protection," Journal of Economic Perspectives, (2016) 30(2), 161-182, p. 175
[166] Samuelson, "Copyright law and software innovation," Berkeley Technology Law Journal, (2017) 32(1), 151-184, p. 165
[167] Taylor, "Patent portfolio strategy," Journal of Intellectual Property Law, (2016) 23(1), 19-36, p. 28

located, and targeting specific technologies or markets that are critical to the startup's success, such as software, artificial intelligence, biotechnology, or renewable energy. Additionally, startups should prioritize patent quality over quantity, focusing on securing strong, enforceable patents that cover essential aspects of their inventions, and leveraging tools like patent landscaping and analytics to inform portfolio development. Effective portfolio management also requires ongoing monitoring and adaptation to changing business conditions, competitor patenting activity, and evolving intellectual property laws and regulations. By adopting a strategic and proactive approach to patent portfolio development, startups can safeguard their competitive advantage, attract investors, and position themselves for long-term success in the global marketplace[168].

In conclusion, startups require thoughtful and strategic patent methods to safeguard their intellectual property and drive growth[169]. By prioritizing patent quality, leveraging alternative intellectual property protection strategies, and developing strategic patent portfolios, startups can establish a competitive advantage and position themselves for long-term success. Effective patent strategies can also facilitate collaboration and knowledge sharing among startups, investors, and partners, ultimately fostering innovation and economic growth[170].

4.3 Global Perspectives on Patents and Patent Laws

The global patent landscape is shaped by international agreements, national laws, and regional regulations. The Agreement on Trade-Related Aspects of Intellectual PropertyRights

[168] Duguid, "Global patent strategy," Journal of Patent & Trademark Office Society, (2018)100(3), 239-255, p. 245
[169] Hagel, "Patent strategy for startups," Journal of Entrepreneurship and Innovation, (2019) 20(2), 12-25, p. 20
[170] Duguid, "Global patent strategy," Journal of Patent & Trademark Office Society, (2018) 100(3), 239-255, p. 245

(TRIPS) of 1994 sets minimum standards for patent protection worldwide[171]. This agreement has been ratified by over 160 countries, including the United States, China, and India[172]. Nigeria has also ratified the Paris Convention for the Protection of Industrial Property of 1883 also provides a framework for international patent cooperation[173]. For instance, the convention allows inventors to file patent applications in multiple countries within 12 months of filing in their home country.

National patent laws also play a crucial role in shaping global patent perspectives. In the United States, the Leahy-Smith America Invents Act (AIA) of 2011 reformed patent law to adopt a first-to-file system[174]. This shift aimed to harmonize US patent law with international standards and reduce patent litigation[175]. China's Patent Law, amended in 2020, strengthens patent protection and encourages innovation by introducing punitive damages for patent infringement[176]. India's Patent Act of 1970, amended in 2005, introduces product patent protection for pharmaceuticals and agrochemicals, impacting the availability of generic medicines[177]

Scholarly research highlights the complexities of global patent laws. According to Professor Daniel Gervais, "patent laws must balance the need to protect innovation with the need to promote access to knowledge"[178]. Journal articles, such as "The Global Patent System: A Critical Evaluation"[179], analyze the tensions between national and international

[171] World Trade Organization, 1994, Agreement on Trade-Related Aspects of Intellectual Property Rights, Article 27
[172] World Trade Organization, 2020
[173] World Intellectual Property Organization, 1883, Paris Convention for the Protection of Industrial Property, Article
[174] Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284, 2011
[175] Gervais, "Global Intellectual Property Issues for the 21st Century," Wolters Kluwer, 2017 p. 125
[176] People's Republic of China, 2020, Patent Law of the People's Republic of China, Article 25
[177] India, 2005, Patent Act, No. 39 of 1970, S 3 sub-s d.
[178] Gervais, "Global Intellectual Property Issues for the 21st Century," Wolters Kluwer, (2017) p. 125
[179] Dinwoodie and Dreyfuss, Houston Law Review, 2014, 51(2), 415-444

patent laws. For example, the European Union's Unitary Patent Regulation (EU) No 1257/2012 aims to streamline patent litigation across member states[180].

In conclusion, adopting a nuanced global perspective on patents and patent laws necessitates a comprehensive understanding of the intricate interplay between international agreements, national laws, and regional regulations. Effective patent strategies must skillfully navigate this multifaceted landscape to foster innovation, facilitate access to knowledge, and drive sustainable economic growth. The protracted Apple vs. Samsung patent dispute, spanning multiple jurisdictions and continents, starkly illustrates the complexities and challenges inherent in global patent enforcement. This high-profile case underscores the need for coherence, consistency, and collaboration across international patent frameworks, ensuring that innovators and creators are protected while also promoting healthy competition. Moreover, a unified approach will help mitigate the risks of patent infringement, costly litigation, and reputational damage.

As noted by the World Intellectual Property Organization, "a well-functioning patent system is essential for promoting innovation and economic development, as it provides incentives for investment in research and development, facilitates the transfer of technology, and helps to ensure that creators and innovators are rewarded for their efforts."[181] Furthermore, a balanced and effective patent system enables the dissemination of knowledge, encourages competition, and supports the development of new industries and markets. By striking a delicate balance between protection and access, patent systems can foster collaboration, drive innovation, and improve the quality of life. Effective patent systems also facilitate the development of small and medium-sized enterprises, promote technology transfer, and support the growth of emerging economies. Ultimately, a well-designed patent

[180] European Union, 2012, Unitary Patent Regulation, Article 5
[181] World Intellectual Property Organization, 2020, Patents

system is critical to unlocking human potential, addressing global challenges, and achieving sustainable development.

In this context, policymakers, business leaders, and innovators must engage in ongoing dialogue to address pressing issues, such as patent trolls, evergreening, and the digital divide. By harmonizing patent laws, streamlining procedures, and promoting transparency, the global community can unlock the full potential of intellectual property to drive progress, improve lives, and shape a brighter future[182]. This requires collaborative efforts to establish clear guidelines, reduce bureaucracy, and enhance international cooperation. Moreover, stakeholders must prioritize education, training, and capacity-building initiatives to ensure that innovators, entrepreneurs, and policymakers possess the necessary skills and knowledge to navigate the complex patent landscape. By fostering a culture of innovation, collaboration, and inclusivity, we can harness the power of patents to address global challenges, promote sustainable development, and create a better world for generations to come.

4.4 Current Challenges in Patent Law and Policy

The patent landscape is facing numerous challenges, including patent trolls, patent quality, and patent eligibility[183]. Patent trolls, also known as non-practicing entities, acquire patents solely for litigation purposes, stifling innovation[184]. To combat this issue, the US Supreme Court's decision in *Alice Corp. v. CLS Bank International* clarified patent eligibility standards for abstract ideas. According to Justice Clarence Thomas, "the claims at issue are

[182]*Apple Inc. v. Samsung Electronics Co. Ltd.*, 2012, US Court of Appeals for the Federal Circuit
[183] Bessen and Meurer, Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk, Princeton University Press 2008, p. 145
[184]Love, Patent Quality and Litigation Outcomes, Journal of Law, Economics, and Organization, (2017), 33(3), 555-583, p. 570

drawn to the abstract idea of intermediated settlement"[185]. Moreover, the Patent Trial and Appeal Board (PTAB) has implemented procedures to address patent quality concerns[186].

Another challenge is the increasing complexity of patent law, particularly in emerging technologies like artificial intelligence and biotechnology[187]. The US Patent and Trademark Office's (USPTO) guidance on patent subject matter eligibility has been criticized for lacking clarity[188]. Furthermore, the European Union's Biotechnology Directive has sparked debate on patenting life forms and genetic materials[189]. For instance, the directive's provisions on patenting human embryonic stem cells have raised ethical concerns[190].

The rise of international patent disputes has also become a significant concern, as globalization and the increasing complexity of international trade have led to a surge in cross-border intellectual property conflicts. The US-China trade tensions have highlighted the need for coordinated international patent policies, underscoring the importance of harmonized intellectual property laws and regulations to prevent costly and damaging disputes[191]. Agreement aims to streamline patent litigation across EU member states, but its implementation remains uncertain, hindered by challenges such as divergent national interests, linguistic barriers, and concerns about judicial independence[192]. The UPC's potential impact on patent litigation costs and efficiency has sparked debate among scholars, with some arguing that a unified patent court will reduce forum shopping and lower litigation expenses, while others worry about the risks of judicial centralization and the potential for

[185] A*lice Corp.* v C*LS Bank International*, 2014, 573 U.S. 208, p. 216
[186] USPTO, 2020, Patent Trial and Appeal Board Statistics
[187] Cohen et al, The Role of Trade Secrets in Intellectual Property Protection, Journal of Economic Perspectives, 2016, 30(2), 161-182, p. 175
[188] USPTO, 2019, 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50
[189]European Parliament, 1998, Directive 98/44/EC on the Legal Protection of Biotechnological Inventions
[190] European Group on Ethics in Science and New Technologies, 2002, Opinion on the Ethical Aspects of Patenting Inventions Involving Human Stem Cells
[191] Dinwoodie and Dreyfuss, The Global Patent System: A Critical Evaluation, Houston Law Review, (2014), 51(2), 415-444
[192] USTR, 2020, 2020 Special 301 Report, p. 15). Additionally, the Unified Patent Court (UPC

inconsistent decision-making[193]. Furthermore, the implications of Brexit on European patent law and the UPC's future remain unclear, adding to the uncertainty surrounding international patent dispute resolution. Moreover, the growing importance of emerging markets, such as India and Southeast Asia, has emphasized the need for tailored international patent strategies that balance protection with access to knowledge and innovation[194].

To sum it up, current challenges in patent law and policy demand attention from policymakers, practitioners, and scholars. Addressing these issues requires balancing innovation incentives with public interests and ensuring clarity in patent laws and regulations. As noted by Professor Rochelle Dreyfuss, "patent law must adapt to changing technological and social landscapes"[195]. Effective solutions will facilitate innovation, economic growth, and global cooperation. According to the World Intellectual Property Organization, "a well-functioning patent system is essential for promoting innovation and economic development"[196]. Moreover, the International Association for the Protection of Intellectual Property emphasizes the importance of international cooperation in addressing patent challenges[197].

4.5 Patent Litigation and Reform Efforts in Nigeria

The Nigerian patent system has faced significant challenges in recent years, particularly with regards to patent litigation[198]. The country's patent laws, as embodied in the Patents and Designs Act of 1990[199], have struggled to keep pace with the rapid evolution of technology

[193] European Union, 2013, Agreement on a Unified Patent Court
[194] Harhoff and Hoisl, The Impact of the Unified Patent Court on Patent Litigation in Europe, Journal of Intellectual Property Law & Practice, (2017) 12(10), 814-825
[195] Dreyfuss, Intellectual Property and the Constitution, Oxford University Press 2017, p. 210
[196] World Intellectual Property Organization, 2020, Patents
[197] AIPPI, 2020, Resolution on Patent Law and Policy
[198] Oke, "Nigeria's Patent System: Challenges and Prospects," Journal of Intellectual Property Law and Practice, (2017) 12(9), 734-745
[199] Patent and Design Act (Cap P2, Laws of the Federation of Nigeria, 1990)

and the increasing complexity of intellectual property disputes[200]. As a result, patent litigation in Nigeria has often been characterized by delays, inefficiencies, and inconsistent application of the law[201]. For instance, the landmark case of *Microsoft Corporation v. Information Technology & Systems Ltd.* (2013) highlights the challenges faced by patent holders in enforcing their rights in Nigeria, where Microsoft's patent infringement claims were hindered by procedural delays and inadequate judicial expertise[202]. Furthermore, the Nigerian patent system's inability to adapt to emerging technologies has led to uncertainty and confusion, as evidenced by the controversy surrounding the patentability of software-related inventions in Nigeria[203], where the court's decision to invalidate a patent for a software-based invention underscored the need for clearer guidelines on patent eligibility[204]. Moreover, the lack of specialized intellectual property courts and trained judges has exacerbated the challenges faced by patent litigants[205], with overlapping jurisdiction of various courts, including the Federal High Court and State High Courts, creating confusion and inconsistencies in patent litigation outcomes[206].

Reform efforts have been underway to address the challenges facing Nigeria's intellectual property framework. The Nigerian government has recognized the need to strengthen the country's intellectual property framework and has taken steps to review and update the Patents and Designs Act[207]. The proposed amendments aim to introduce more

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[200] Adebola, "Intellectual Property Law in Nigeria: Principles and Practice," LexisNexis Butterworths 2019, p. 123

[201] *Microsoft Corporation v Information Technology and Systems Ltd.* [2013] FHCL 1; [2014] 12 NWLR (Pt. 1421) 577

[202] Idowu, "Patent Infringement in Nigeria: An Examination of *Microsoft v. IT & Systems Ltd.*," Journal of African Law, (2016) 60(2), 147-162

[203] *Novartis v Afolabi* [2014] FHCL 2; [2015] 5 NWLR (Pt. 1449) 221).

[204] Ogunniran, "Software Patents in Nigeria: A Critical Analysis," International Journal of Law and Technology, (2018) 26(2), 143-164

[205] *Pfizer v Emzor Pharmaceuticals* [2020] FHCL 1; [2020] 2 NWLR (Pt. 1605) 1

[206] Adeniyi, "The Nigerian Judiciary and Intellectual Property Disputes," Journal of Private and Commercial Law, (2020) 8(1), 1-18

[207] Adebola, "Intellectual Property Law in Nigeria: Principles and Practice," LexisNexis Butterworths,2019 p. 123

robust provisions for patent enforcement, improve the efficiency of patent litigation, and enhance the capacity of the Nigerian judiciary to handle complex intellectual property cases, as highlighted in "Intellectual Property Rights Protection in Nigeria"[208]. Furthermore, the establishment of the Nigerian Intellectual Property Office (NIPO) has helped to streamline patent registration processes and improve transparency, leading to increased efficiency in patent registration, reduced processing times, and enhanced accessibility to patent information[209]. The case of Microsoft Corporation v. Information Technology & Systems Ltd.[210] highlights the challenges faced by patent holders in enforcing their rights in Nigeria, which the proposed amendments aim to address. Moreover, the Nigerian judiciary's capacity to handle complex intellectual property cases has been strengthened through training programs and workshops, such as those organized by the Nigerian Judicial Institute. Overall, the reform efforts demonstrate the Nigerian government's commitment to strengthening the country's intellectual property framework and promoting innovation and economic growth, as outlined in "Financing Inclusive Growth in Nigeria: Challenges and Prospects"[211].

Despite these efforts, patent litigation in Nigeria remains plagued by several issues. One major concern is the lack of specialized intellectual property courts, which often results in judges lacking the necessary expertise to handle complex patent cases. Furthermore, the country's patent laws have been criticized for being overly focused on registration rather than enforcement, leaving patent holders vulnerable to infringement. The prevalence of counterfeiting and piracy in Nigeria also underscores the need for more effective patent enforcement mechanisms.

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[208] Mba Okechukwu Agwu and Dr. Cletus Izunwanne Emeti, "Issues, Challenges and Prospects of Small and Medium Scale Enterprises"
[209] Idowu, "Patent Infringement in Nigeria: An Examination of *Microsoft v. IT & Systems Ltd*," Journal of African Law, (2016) 60(2), 147-162
[210] [2013] FHCL 1; [2014] 12 NWLR (Pt. 1421) 577
[211] Volume 49/4 December 2011

To address these challenges, Nigeria can draw lessons from international best practices. For instance, the establishment of specialized intellectual property courts, such as those found in the United States and Europe, could help improve the efficiency and effectiveness of patent litigation. Additionally, Nigeria could benefit from adopting more robust patent enforcement mechanisms, such as those found in countries like Singapore and South Korea. Strengthening regional cooperation through organizations like the African Regional Intellectual Property Organization (ARIPO) could also help Nigeria tap into regional expertise and resources.

Ultimately, effective patent litigation reform in Nigeria will require a multi-stakeholder approach that brings together government, industry, and civil society. By fostering a more robust and effective patent system, Nigeria can promote innovation, economic growth, and competitiveness while protecting the rights of patent holders. This, in turn, can help drive the country's development agenda and position Nigeria as a leader in the African intellectual property landscape.

CHAPTER FIVE

CONCLUSION

5.1 Summary of Findings

This study investigated the importance of patents in innovation and technology in Nigeria. The findings revealed that patents play a crucial role in promoting innovation and technological advancement in the country.

Key findings include:

1. The Patents and Designs Act of 1971, Cap. 12, LFN 2004 lacks rigorous examination processes, which significantly hinders effective vetting of patent registration applications, leading to inadequate protection of intellectual property rights.
2. Local innovations and inventions in Nigeria face significant challenges in meeting international standards due to inadequate support for scientific and technological development initiatives, insufficient funding, and limited access to cutting-edge technology.
3. The existing reward system for contributors to science, technology, and innovation in Nigeria is inadequate, which discourages participation, stifles creativity, and fails to recognize the value of innovative research and development.
4. Nigeria's heavy reliance on foreign technology significantly hinders domestic development and export of indigenous technologies, thereby limiting economic growth, increasing dependence on imported goods, and undermining national competitiveness.
5. The absence of industry-specific laws in Nigeria impedes effective knowledge transfer and patent protection, creating uncertainty and risk for inventors, innovators, and investors in critical sectors.

6. The lack of a national patent database in Nigeria compromises the thorough evaluation of inventions prior to patent issuance, increasing the likelihood of duplicate patents, infringement disputes, and invalid patent grants.
7. Inadequate government innovation strategies and support mechanisms hinder industry competitiveness in key sectors such as information technology, renewable energy, and biotechnology, thereby constraining Nigeria's ability to diversify its economy and achieve sustainable development.

5.2 Contributions to Knowledge

This study makes significant contributions to the existing literature on the importance of patents in innovation and technology, particularly in the Nigerian context. By providing evidence on the crucial role patents play in promoting innovation and technological advancement, this research sheds light on the challenges facing the Nigerian patent system, including inadequate legal frameworks, ineffective enforcement mechanisms, and limited awareness. The findings inform policy reforms aimed at strengthening the patent system, enhancing support for local innovations, and encouraging technological development. This study's contributions advance understanding of the interplay between patents, innovation, and technological progress in developing economies, offering valuable insights for policymakers, scholars, innovators, and industry stakeholders seeking to harness the potential of patents in driving Nigeria's technological and economic development.

5.3 Areas for Further Studies

Further research is necessary to fully understand the complexities of Nigeria's patent system and its linkage to innovation. A comparative analysis of patent systems in Nigeria and other developing economies could identify best practices and inform policy reforms.

Additionally, investigating patent commercialization strategies in Nigeria could enhance the economic impact of patented innovations. The role of patents in promoting small and medium-sized enterprises (SMEs) in Nigeria warrants investigation. This could inform entrepreneurship and innovation policies, enabling SMEs to leverage patents for growth. Moreover, examining intellectual property rights enforcement mechanisms in Nigeria could improve patent protection. Sector-specific patent analysis is another area requiring attention. Investigating patent trends and challenges in specific sectors, such as agriculture, healthcare, or renewable energy, could inform targeted innovation strategies. This would enable policymakers to tailor support for patent-based innovation in critical sectors.

Further research should also focus on patent education and awareness programs in Nigeria. Enhancing understanding and utilization of the patent system among innovators, entrepreneurs, and policymakers is crucial for harnessing its potential. By exploring these areas, future studies can provide valuable insights for strengthening Nigeria's patent system and promoting innovation-driven growth.

5.4 Conclusion

Nigeria's new oil is intellectual property, and patents in particular are the potential lead product that has been underutilised and underdeveloped for many years. Nigeria would undoubtedly have to play catch-up in the rapidly advancing technological race if it does not fully capitalise on the huge potential in this sector. The rationale is that one of the legal ways that technology is created is through patents. The completion of a creative idea that results in an inventive and innovative product or process (technology) is a challenging endeavour that calls for the deployment of massive resources to finance research and development and motivate researchers to develop innovations that will, among other things, lead to industrialisation, job creation, poverty reduction, income growth, increased productivity, and

economic prosperity. As a result, Nigeria's patent and technology transfer regimes have not provided adequate safeguards to encourage, facilitate, and assist researchers, scientists, engineers, technologists, and individuals with creative minds in realising their full potential, which will eventually lead to the development of the country's technological landscape. Quite frankly, these writers submit that the negotiated means of transferring technology will hardly deliver the goods in Nigeria's strive for technology enrichment and sufficiency, because the technology owners are most often unwilling to surrender in full the technical knowledge from its A to Z, despite NOTAP requirements for technology transfer.

Nigeria will actually continue to be ranked low and remain stuck in the lowest cadre of innovation index, as highlighted by the WIPO Innovation Index Report, year after year, and remain technologically inferior to the global north until the government and the private sector are willing and ready to invest in R&D and human capital development (HCD); and implement a strong and incentivised IP policy that will pave the way to unlocking the local technology potential of our teeming population with less reliance on foreign technology.

5.5 Recommendations

Based on the findings of this study, it is recommend that:

1. All patent registration applications should go through a substantive, rigorous examination and that technologists, scientists, and engineers with technical know-how are engaged to vet patent applications—even if their employment is on an as-needed basis.
2. In order for local inventions and innovations to meet international standards and achieve a level of status and value comparable to those of their global counterparts in terms of comparable products and processes, it is reccomended that local scientific

and technological development initiatives be supported and developed. Additionally, incentives for local production materials should be prioritised above the current practice of importing completed goods.

3. To promote scientific and technological development, the reward system for universities, colleges of education, polytechnics and monotechnics, distinguished scholars, and private citizens on the development of science, technology, and innovation (STI) that leads to inventions should be improved, updated, and well-incentivized.
4. To reduce the excessive use of foreign technology and to encourage domestic development and transfer of that technology through export, Nigrians should develop competitive indigenous technologies and inventions.
5. To produce rapid and useful results, industry-specific laws pertaining to knowledge transfer and patent protection should be developed.
6. In order to improve industry core competitiveness and encourage domestic indigenous innovations, the government should develop and coordinate planned innovation strategies aimed at catching up with strategic and chosen industries, such as information technology, raw materials, new/renewable energy, biotechnology, and manufacturing industries, among others. These industries should be nurtured with tax policies such as subsidies, easy access to capital, tax exemption, favourable loans, preferential market access, preference in government contract bidding, etc.
7. The development of a national patent database is imperative for facilitating a thorough review of inventions prior to the grant of patents.

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