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DEVELOPING A ROBUST LAYOUT DESIGN OF INTEGRATED CIRCUITS LEGISLATION FOR NIGERIA: LESSONS FROM RWANDA

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Abstract

One miracle of the 21st century is the invention of Integrated Circuits, also called chips or semiconductors. It is a key component used in any electronic device or hardware and used to manufacture a wide range of products; from articles of everyday use such as mobile phones, televisions, cars automated cards, and automated machines to sophisticated computers, servers, space rockets, and so on. The importance of Integrated Circuits in daily life and business, including the heavy expertise and financial investment involved made it a target of chip piracy, chip counterfeiting, and other forms of infringement thereby undermining the industry. Seeing the importance of Integrated circuits in everyday life and business, technologically advanced nations enacted sui generis Intellectual Property law specifically targeted to protect the Layout Design of Integrated Circuit. In Africa, a few countries like Rwanda have taken the positive step of enacting a specific law for the Protection of Integrated Circuits while Nigeria, the proverbial giant of Africa with a population of over 200 million has no specific Intellectual Property law for the protection of integrated circuit, and no semiconductor industry, just an end-user consumer. This article analyzes the Semiconductor Layout Design legislation of Rwanda which incorporates specific provisions that not only protect innovators and their inventions from infringers; encourage reverse engineering; and create offenses and penalties; but also, control the unfair competition connected with contractual licenses that may be prejudicial to trade and hamper the transfer and dissemination of technology. The paper concludes by recommending that Nigeria draws lessons from Rwanda for the development of its layout design legislation.

Keywords: *Layout Design of Integrated Circuit, Sui generis, Semiconductor industry, Nigeria, Rwanda.*

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Introduction

We are in an era of unprecedented and rapid change in technology and innovation,[3] and it is likely to become a significant factor in determining patterns of global development and prosperity in the 21st century.[4]

Technological revolutions, from the Stone Age to the digital age, have always brought about economic growth and prosperity[5] and also determined world powers. However, throughout the various ages of technological advancement and innovation, the 21st century, more than any other time in history has experienced a quantum leap in technological advancement with the invention of Integrated Circuits (IC) in the 1950s.[6]

Since its invention, Integrated Circuits has made history and has had a far-reaching impact in revolutionizing the world. First, Integrated Circuits are used worldwide in many if not all fields and applications including biotechnology, communications, computers, banking, education, automobiles, defense computers, government, hospitals, medicine, nanotechnology, research, internet, travel, entertainment, and other daily life and business activities.[7]

Secondly, Integrated Circuits have also laid the foundation for a new technological age, characterized by technological breakthroughs such as Artificial Intelligence, Autonomous driving, the Internet of Things, Robotics, 3D printing, and others.[8] Innovation through these technologies is particularly important because they offer us opportunities to recreate our economies to better serve societal needs.[9]

Thirdly, the Integrated Circuits industry over six decades, has emerged as the world's largest industry.[10] This is due to increasing demand for high-quality electronic devices, such as laptops, desktops, and wireless communication equipment, the rise of cloud-based computing, and the rollout of 5G have necessitated the advancement of semiconductors that we are using today and the industry as a whole.[11] It is projected that the industry will be worth a trillion dollars by the year 2030.[12]

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[3]United Nations Conference on Trade and Development, Technology and Innovation Report 2018: Harnessing Frontier Technologies for Sustainable Development iii ((United Nations publication, Geneva, 2018) *available at:* https*://unctad.org/en/PublicationsLibrary/tir2018_en.pdf* (last visited on August 23 2024)

[4] *Ibid*

[5]Economic and Social Commission for Asia and the Pacific, *Frontier Technologies for Sustainable Development in Asia and the Pacific* iii (United Nations, Bangkok, 2018) *available at:* https*://www.unescap.org/sites/default/files/publications/Frontier%20tech%20for%20SDG.pdf* (last visited on August 23 2024)

[6]N.S. Arjun, *Invention of Integrated Circuits: Untold Important Facts* 29 (World Scientific Publishing Limited, Toh Tuck, 2009)

[7]*Ibid*

[8]*Supra* note 6 at iii

[9] *Ibid*

[10]S.Y. Kiat, K.T. Ng*, et.al. Intellectual Property for Integrated Circuits* 11 (J.Ross Publishing, Florida, 2010)

[11]R. Ram, "Fourth Generation Semiconductor Technology to Power Modern Computing" *EC* (2023)

[12]S. Ficon, "Microchips and Economic Dips – Fallout from The US Ban on Exporting Advanced Microchips to China" *MJE* 12 (2023).

Another interesting aspect of the Integrated Circuits is that it defines geopolitics. Due to the reasons discussed above, many analysts, scholars, and industry watchers believe that Integrated circuits is the new oil- the scarce resource on which the modern world depends.[13] Just like oil in the 20th century, they are presently a central issue in global trade and diplomacy, with countries looking to control the supply and production of these vital components.[14]

Regardless of the above, the focal point of the thriving Integrated circuit industry is in the Layout Design of an integrated circuit. The layout design embodies the intellectual property of Integrated Circuits, so it is safe to say that the commercial success and maintained viability of the industry is founded on Intellectual property.

The Layout Design of an Integrated circuit is the core of an IC, and it is also the beginning of IC production. It defines the function and application scope of the IC.[15] Depending on its complexity, the design process of an Integrated Circuit chip can be costly, arduous, and lengthy. It can take several months or even multiple years to inch toward its successful completion. In general, IC design requires numerous iterative steps before the final chip design gradually takes shape.[16]

Using intellectual property to protect the Layout Design of an Integrated Circuit from piracy and counterfeiting has led created new integrated circuits that reduced the sizes of existing ones while simultaneously increasing their functions.[17]This has ensured further creativity and innovation, reduced cost of production, and allowed investors to recoup their investments.

Since the invention of Integrated Circuits, industry players have used Intellectual Property Law to protect Integrated Circuits from infringements initially using traditional Intellectual property laws of Patent and Copyrights. But by 1984, the United States of America (USA) introduced a *sui generis* regime for the specific protection of Layout design as the traditional rights had become inadequate. Since then, other technologically advanced countries have followed suit. In Africa, this trend was been picked up by Rwanda in 2009. They adopted a *sui generis* regime to protect the layout design of Integrated circuits, first to develop its semiconductor industry and second, to domesticate the Agreement on Trade-Related Aspects of Intellectual Property (TRIPs Agreement).

This article will analyze the Rwandan integrated circuit law that came into force in 2009 with the sole aim of drawing lessons from it for the development of robust a layout design legislation for the protection of integrated circuit in Nigeria.

[13]C Miller, Chip War: The Fight for the World's Most Critical Technology (Scribner, New York, 2022)
[14] T Hussein, "The Geopolitics of the New Oil: Semiconductors" *The Geopolitics available at:* https*://thegeopolitics.com/the-geopolitics-of-the-new-oil-semiconductors/* (last visited August 23, 2024)
[15]Y. Li, J. He, *et.al.,* "Frontier development of chips design and production"139 Procedia Computer Science 557 (2018) *available at:* https*://www.sciencedirect.com/science/article/pii/S187705091831901X?via%3Dihub* (last visited on August 23, 2024)
[16]*Supra* note 10 at 58
[17]World Intellectual Property Organization, "Patent Expert Issues: Layout Designs (Topographies) of Integrated Circuits" *available at:* https*://www.wipo.int/Patents/en/topics/integrated_circuits.html* (last visited on 14 January 2022

History, Meaning, and Concept of Integrated Circuit

Integrated Circuit is a fundamental concept of electronics.[18] "An Integrated Circuit is a combination of interconnected circuit elements inseparably associated on or within a continuous substrate".[19] Leon Radomsky,[20] defines an integrated circuit as "usually a single substrate that contains thousands or millions of interconnected semiconductor devices".

Recognizing the importance of integrated circuits, various legislations across the world have also defined Integrated Circuits. The IPIC Washington Treaty, and by extension, the TRIPs Agreement defines an Integrated Circuit as **"**a product, in its final form or an intermediate form, in which the elements, at least one of which is an active element, and some or all of the interconnections are integrally formed in and/or on a piece of material and which is intended to perform an electronic function."[21]

The history of Integrated circuits can be traced to discoveries that showed that semiconductor devices especially transistors can perform the functions of vacuum tubes.[22]

Werner Jacobi in 1949, invented and patented an integrated circuit like amplifying device consisting of five transistors on a common substrate arranged in a 2-stage amplifier arrangement.[23]The effect of his creation was that, it showed that devices such as hearing aids can reduce in size, and in turn, cheaper to produce.[24]

Three years later, Geoffrey Dummer in his lectures theorized the idea of integrated circuit, however was unable to successfully build one.[25] But by 1958, Jack Kilby, using different integrated components i.e. resistors, capacitors, distributed capacitors, and transistors was able to successfully build an oscillator Integrated Circuit.[26] Although his integrated circuit was revolutionary, it was not without problems as it was made on a germanium substrate which caused overheating.[27] By 1959, Robert Noyce, seeing the limitations of germanium made his chip from silicon.[28] He had the idea to evaporate a thin metal layer

[18]Jimblom, "Integrated Circuits" *available at:* https*://learn.sparkfun.com/tutorials/integrated-circuits/all* (last visited on 22 May 2022).
[19]*Supra* note 12 at 36
[20]L Radomsky, "Sixteen Years after the Passage of the U.S. Semiconductor Chip Protection Act: Is International Protection Working"15 *BTLJ* 1090 (2000)
[21]Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), art 35
[22]All Answers ltd, "Examining the Evolution of Integrated Circuits Information Technology Essay" *available at:* https*://www.ukessays.com/essays/essays/information-technology/examining-the-evolution-of-integrated-circuits-information-technology-essay.php* (last visited on 24 May 2022)
[23] *Id* at 17.
[24]Any Silicon, "The History of the Integrated Circuit" *available at* https*://anysilicon.com/history-integrated-circuit* (last visited on 25 May 2022).
[25] *Ibid*
[26]MM University, "Integrated Circuit Fabrication Technology: History" 3(1999) *available at:* http://*www.mmumullana.org/downloads/files/n54744abb84200.pdf* (last visited on 28 May 2022).
[27] *Ibid*
[28]*Ibid*

over the circuit, then connect it down to the silicon dioxide. This process laid the foundation for more complex integrated circuits and it still being used today in the semiconductor industry.[29]

In 1963, Frank Wanlass originated and published the idea of Complementary Metal Oxide Semiconductor (CMOS). Most high-density ICs manufactured today depend on the CMOS. [30]

Since the 1960s till date, the progress of the IC industry has continued to soar at a tremendously fast pace with the cramming of more components on the integrated circuits.[31] This tremendous progress has been attributed to the predictions of Gordon Moore. In 1965, he predicted "a doubling every year in the number of components per integrated circuit, and a growth rate that would continue for at least another decade."[32]

In a paper for Electronics entitled "Cramming more components onto integrated Circuits." He observed that "The complexity for minimum component cost has increased at a rate of roughly a factor of two per year".[33] By 1975, he revised the initial forecast, to "a doubling every two years, at a compound annual growth rate (CAGR) of 41%."[34] Moore's predictions have held true, and it has since become a "law."[35]

Moore's prediction is still used in the IC industry for planning and to set targets for research and development.[36]

Legal Regime for the Protection of Integrated Circuits in Rwanda

In 2009, Rwanda ratified and domesticated several international treaties which included the TRIPs Agreement.[37] The essence of this, according to its 2009 Intellectual Property policy is for Rwanda to have a "functioning intellectual property system that allows people to realize the full value of their creations, and to allow them to access the creations of others."[38] Consequently, The Protection of Intellectual Property Law No. 31/2009 of 26/10/2009 was promulgated. The Law was developed alongside its IP Policy and it set out detailed requirements for the provision, enforcement, and administration of Intellectual Property Rights.[39] The Law amongst other Intellectual Property rights made provisions for the protection of layout designs of Integrated Circuits under Chapter IV of the Law. The Layout Design legislation of Rwanda will be discussed under the following subheadings:

[29] *Id* at 4
[30] *Id* at 10.
[31] Depending on the wafer size, IC may number tens, hundreds, thousands, and ten thousand of IC. Each IC may have millions or even over a hundred million circuit elements. Memory ICs now in production have over a billion transistors and two billion capacitors on a single IC.
[32] *Supra* note 24 at 10
[33] *Ibid*
[34] Wikipedia, "Moore's law" *available at:* https*://en.wikipedia.org/wiki/Moore%27s_law* (last visited on 2 November 2022).
[35] *Ibid*
[36] *Ibid*
[37] G Iribagiza "Rwanda: Registrar General Richard Kayibanda on Intellectual Property Protection in Rwanda" *All Africa* Apr. 26, 2022 *available at:* https*://allafrica.com/stories/202204260076.html* (last visited on 13 February 2024)
[38] Ministry of Trade and Industry Rwanda, *Rwanda Intellectual Property policy* (Kigali, 2009)
[39] *Ibid*

Protection Requirements

For a layout design of Integrated Circuits to be eligible for protection under the Rwandan Protection of Intellectual Property Law (PIPL), it must meet certain criteria. By a combination of Article 108 and 109, the Law provides for the protection requirements as follows;

i. It must be a layout design of integrated circuits
ii. It must be original
iii. Registration

Layout design: By Article 108, the subject matter of protection must be a layout design of Integrated circuits. The Law defines a layout design as "a three-dimensional arrangement –in whatever form– of the elements, at least one of which is active, and of all or part of the interconnections of an integrated circuit, or such a three-dimensional arrangement, prepared for an integrated circuit intended to be manufactured".[40] Therefore any layout design or arrangement not intended or prepared for the manufacturing of an integrated circuit[41] will not be protected under the Law. The Court in *Alterra Corp v. Clear Logic, Inc*[42] held that "the placement of transistors on the chip is not an abstract concept but embodied in the chip and affects the chip's performance and efficiency."

Originality: After establishing the subject matter of protection as the layout design, the Law went further by stating that the layout design, which "consists of a combination of elements and interconnections that are common, is protected only if the combination, taken as a whole, is **original**" (*emphasis mine*) within the meaning of paragraph 1 of the article.[43] Therefore, what is considered an original layout design can only be construed within the definition provided under the Law. By the PIPL 2009, A layout design is considered to be original, "if it is the result of the intellectual effort of its creator and if, at the time it is created, it is not known among the creators of layout designs and the manufacturers of integrated circuits."[44] This standard of "originality" is the essence of the *sui generis* protection system. Copyright and Patent require a very high standard of originality or inventivenes and

[40] Protection of Intellectual Property Law (PIPL), art 2
[41] PIPL art5(4) defines integrated circuits as product, in its final or an intermediate form, in which the elements, at least one of which is active, and all or part of the interconnections form an integral part of the body or surface of a component which is intended to carry out an electronic function;
[42] 424 F.3d 109 (2005)
[43]PIPL, art 109(2)
[44]PIPL, art 109(1)

using this standard, will mean layout design of integrated circuit will remain unprotected under traditional rights.[45]

Registration/ Formality: Enjoying the Layout Design Rights granted under the Law, requires that; the layout design must be registered.[46] According to Article 186(6), industrial property title means 'the registration certificate for a layout-design of integrated circuit'. Therefore, for a creator of layout designs to enjoy the Rights conferred under the Law, he or she must go through the formal process of applying and registering the layout design of integrated circuits provided under the Law.[47]

However, applying for registration comes with a condition. The Law provides that the application for registration of the layout design can only be filed, if the layout design has not been commercialized, or been the subject of such use for a period not more than two (2) years, anywhere in the world.[48]

Ownership of Layout Design

"Intellectual property is a non-physical property that is the product of original thought",[49] therefore, just like tangible properties, it can be owned, leased, sold, and gifted. Under Art 110, the rights protected by the layout design are owned or belong to the creator of the layout design.[50] The Law further states that where two or more persons have created a layout design jointly, the right will jointly belong to them.[51] However, Article 10(2) creates an exception to the layout design being owned by the creator. It provides that where the layout design has been created under contract, ownership belongs to the project manager or the employer except otherwise stated in the contract.

Application and Registration of Layout Design

To enjoy the protection afforded by a layout design by being granted the certificate of registration, there must first be an application submitted to the empowered Authority

After the application has been submitted, the law provides that "the Empowered Authority shall then examine whether the application satisfies the requirements contained in Article 111. If it observes any irregularities, it shall notify the applicant and invite him or her to correct them within thirty (30) days. If

[45]T. Hoeren, "Chip Protection in Europe" in C. Prin, A.P. Meijboom (eds.), T*he Law of Information Technology in Europe: A Comparison with the USA* 3 (Kluwer Law and Taxation Publishers, Deventer, 1992).
[46] PIPL, art 87(1)
[47] PIPL, arts 112- art 115, art 111(4)
[48] PIPL art 108(2)
[49] M. Adam, K. Himma, "Intellectual Property" *available at:* https://*plato.stanford.edu/entries/intellectual-property/* (last visited on 18 January 2024).
[50]Inferring from PIPL art 109, a creator of a layout design is a person whom through intellectual effort created a layout design that is new or novel
[51]PIPL, art 110

the irregularities are not corrected by a prescribed deadline, the application shall be deemed withdrawn."[52]

However, where the application satisfies the requirements under Article 113 of the Law, the Empowered Authority is mandated to do the following:

i. record the layout design in the register of layout designs, without examining the originality, the right of the applicant to protection, or the accuracy of the facts detailed in the application;
ii. publish a reference to the registration of a layout design;
iii. issue to the applicant a registration certificate for the layout design."

From the above provisions of the Law, the recording of the layout design in the register of layout design and the issuance of the registration certificate of layout design does not guarantee the validity of the Rights granted under the Law as the layout design rights was granted without examining the originality, the right of the applicant to protection or the accuracy of the facts detailed in the application as required under the Law in Articles 19(4), 108 and 109.

To curb issues that might arise from the lack of guarantee of validity, the Law makes provision for the withdrawal of layout design from the register where it is discovered that the layout design is not original and has been imported, sold or distributed anywhere in the world before the application for registration was filed.

Rights and Limitations of Layout Designs

Rights

Subject to some exceptions under the Law, the registered owner of the layout design has the exclusive right to control the use and exploitation of a registered layout design in the manner specified under the Law. Under Article 116, the Rights granted to the owner include reproducing, selling, importing, or otherwise distributing, for commercial purposes, the registered layout design.

The Law also provides that the registered owner, apart from other rights, remedies, or actions, available to him, has the right to commence a legal action in a civil proceeding against any person who infringes or carries out an act that might lead to the infringement of his registered layout. [53]

[52]PIPL, art 113
[53]PIPL, art 117 (2)

Limitations to Rights

The Rights granted by the owner of a layout design are not absolute. There are limitations to these Rights provided under the Law. These limitations are as follows:

1. Exhaustion of Layout Design: Article 118, the Law provides for a National level of Exhaustion for a registered layout design. National Exhaustion means that the IP owner loses his right to determine the distribution of his product within a country at the first sale of the product within the country. The advantage of National Exhaustion is that it allows manufacturers sell their products at different prices in different countries with bouyant countries paying more.[54] In this context, the Law limits the registered owner from acts such as importation, selling, and distribution of his products that have been put lawfully in the market, in Rwanda, with his consent. In the case of *Boesch v Graff*,[55] "the question as to whether a dealer residing in the US could buy patented products from a legitimate seller in another country (from a licensee) and import and sell them in the US (where there was an existing patent on such product) without any further license or permission from the US patent holder. The Court opined that foreign law could not control US patents. Hence, following the territoriality principle, it decided that if an existing patent in the US protected a product, the US dealer could not import and/or sell the patented product without permission or license from the US patent holder."

   This was a clear case of limiting exhaustion within the national boundaries thus establishing the mode of national exhaustion.

   However, for the rights of the owner to be deemed exhausted in Rwanda, the Minister, based on the recommendation of the Empowered Authority, has the power to declare the rights of a layout-design exhausted, and also to authorize others to import the protected layout design based on certain conditions. This is an interesting aspect of the Rwandan Law that makes it unique. It points to a deliberate effort by the Law and Government to ensure that rights holders fully enjoy the rights granted and are not taken undue advantage of, thereby spurring innovation.
2. Reverse Engineering: "Reverse engineering is a process used to analyze the design, structure, and operation of a product, object, or system obtained from public channels. It involves dismantling or disassembling a product, object, or system to understand the technology that makes it work."[56]

   Under Article 119, the right of a registered owner is also limited by Reverse Engineering. The Law provides that reproducing a registered layout design for the purpose of evaluation, analysis, research, education or private purposes and the incorporation, in an integrated circuit, of a layout

[54]E. Otumala, "The Doctrine of Exhaustion of Rights in Trademark", *available at:* https*://lawpavilion.com/blog/the-doctrine-of-exhaustion-of-rights-intrademark/#* (last visited on 13 February 2024)
[55]133 US 697(1890).
[56]Asia IP "Reverse Engineering" *available at* https*://asiaiplaw.com/section/in-depth/reverse-engineering-disassembled* (last visited on 4 February 2024)

design created based on such an analysis or evaluation that exhibits originality will not be considered an infringement. However, In *Altera Corp's* case[57] the Ninth Circuit noted that a second mask work must of course not be "substantially identical to the original" and there must be sufficient evidence of "substantial toil and investment" often shown by a paper trail by the second firm showing its investment in creating a non-mask work of its own.

3. Innocent Infringement: Another limitation to the right of a holder of a protected layout design, is when an innocent infringer carries out acts deemed unlawful under Art 116 of the Law. An "innocent infringer" in this context is defined as a person who acquires a layout design product (either incorporated in an integrated circuit or an article) and does not know that the product is protected by a layout design right.[58] The Law provides that an innocent infringer who reproduces or commercially exploits (i.e., imports, sells, and distributes) a protected layout design product will only do so to the products in stock or which he had ordered before knowing about the infringement but has to "pay, the owner an amount equivalent to the reasonable fee which could be demanded under freely negotiated contract for such a layout design."[59] In *Brooktree Corp. v. Advanced Micro Devices*[60] the US Court of Appeals, Federal Circuit held that "even where the infringer had not yet begun to sell the infringing product, "losses incurred upon announcement by [the infringer] of the infringing activity may be included [in lost profits damages] when the losses are found to be reasonably related to the infringing activity."
4. Commercial Exploitation of an original identical layout design created independently by a third party.

Commencement and Duration of Protection

The protection granted to a layout design is for a period of ten (10) years starting from the date of first use of the layout design, anywhere in the world, by the owner or with his consent[61] or from the filing date assigned to the application for registration of the layout- design, if the layout design has not been used for commercial purposes anywhere in the world.[62]

[57] [2005] 424 F.3d 109
[58] *Supra* note 47 at 5
[59] PIPL, art 119(3)
[60] 977 F.2d 1555 (1993)
[61] PIPL, art 120(1)
[62] PIPL, art 120(2)

Licenses

Licensing is defined as "the permission granted by the licensor to the licensee to use his intellectual property rights under defined conditions".[63] It is one of the unique features of the Rwandan Law on Intellectual property because it is very particular about licensing and especially anti-competitive practices that have prejudicial effects on trade and distort industrial or commercial activities. The Law provides that "any limitations imposed on the licensee that is not derived from the rights conferred by the registration of the right, and not necessary to safeguard that right, shall be deemed abusive or, if they have anti-competitive effects, anti-competitive."[64] The Law makes provision for 3 different kinds of licenses namely Contractual, Compulsory, and Ex-Officio compulsory licenses.

Contractual Licenses

Article 5(12) of the Law defines contract license as "a contract through which the industrial property right holder (licensor) grants any natural or legal person (licensee) the authorization to carry out, in the Republic of Rwanda and with regard to the industrial property right, any one of the acts that constitute the use of the industrial property right as referred to in this Law". It further states that the license contract may be exclusive, semi-exclusive or non-exclusive.

For a layout design, the Law provides that "the owner of a registered layout design may, by contractual arrangement, grant a license to use his layout- design to another natural or legal person." The license agreement must be in writing and must be signed by the parties to the contract.[65] The signed License Agreement is to be submitted to the Empowered Authority, who after examining it should record it in the register of layout designs.

To control unfair competition in connection with contractual licenses, the Law grants the Empowered Authority the power to take necessary measures to prevent or control license issuing practices such as coercive grouped license regimes, exclusive reassignment clauses, or conditions preventing the dispute of validity of the layout design recorded in the register. Consequently, the Empowered Authority is to examine before registration whether a license contract contain anti competition clauses that may affect trade and transfer of technology.

[63]B.J. Mariadoss (ed.), *Core principles of International* (Press Books, Montreal, 2017) *available at*: https*://opentext.wsu.edu/cpim/chapter/7-3-licensing/* (last visited on 13 February 2024)
[64] PIPL, art 124(8)
[65]PIPL, art 123(1)

Compulsory License

The Law defines Compulsory license as "the authorization to use a patented invention, industrial design, or layout design, granted to a third party by the Minister without the agreement of the right owner."[66] Compulsory license also constitutes a limitation to the rights granted under the Law, however for the Government to grant a compulsory license to a third party as regards a registered layout design there must be proof that there is a lack of or insufficient industrial or commercial use, in the Republic of Rwanda, or to remedy an abusive practice.[67]

Ex-Officio Compulsory License

Ex-Officio Compulsory license is the authorization to use a patented invention by public authorities or granted to a third party by the Rwandan Government without the agreement of the right Owner. [68]The Government of Rwanda will only grant a compulsory license for the use of a registered layout design to a state department or a third party for reasons of national security, public health and environmental protection, or in a proven case of anti-competitive practices carried on by the registered owner.

Criminal Offences and Penalties

Forgery: Article 261 provides that any person that uses a layout design for commercial and industrial purposes without the consent of the registered owner in the Republic of Rwanda, will be guilty of the offense of forgery. The penalty for the offense is a fine of not more than fifty thousand Rwandan Francs (50.000) to five hundred million Rwandan Francs (500.000.000) or a jail term of not more than five years, or one or both of penalties.[69]

In addition, the Law provides that a competent tribunal may also order the seizure, confiscation, and destruction of the incriminating items and of all materials or instruments used mainly for the crime to be committed.[70]

Developing A Robust Layout Design of Integrated Circuits Legislation for Nigeria: Lessons from Rwanda

Nigeria and Rwanda are similar in some ways. Both are developing countries located in Sub-Saharan Africa.[71] They were both colonized by European powers in the 1800s.[72] While Nigeria gained its independence on October 1, 1960 from Britain, Rwanda became independent on July 1, 1962, from

[66]PIPL, art 5(12)
[67]PIPL, art 125(1)
[68]PIPL, art 5(13)
[69] PIPL, art 263(1)
[70]PIPL, art 263(3)
[71] J.I. Anekoson, "A Comparative Analysis of Health Indicators of Nigeria and Rwanda: A Nigerian Volunteer's Perspective" 1(7) *AJPHR* 177 (2013)
[72] A. Oluwashakin, "Nigeria-Rwanda Relations: Strengthening Partnership for Development" 4(1) J*CIRD* 656 (2023)

Belgium.[73] In terms of language, English is the official language in Nigeria (the indigenous Yoruba, Hausa, and Igbo languages and dialects do not serve administrative purposes), so also in Rwanda, English is the primary medium of instruction in secondary and tertiary education though Kinyarwanda is the national language.[74]

Nigeria can draw lessons from Rwanda for the development of its layout design of Integrated circuits legislation in the following ways:

1. Enact a *sui generis* legislation like Rwanda for the protection of integrated circuits. Apart from fulfilling its obligation to the TRIPs Agreement, a *sui generis* legislation for the protection of integrated circuits is apt for Nigeria, because it has the advantage of being flexible and particularly recognizes the special issues posed by new technologies such as Integrated circuits and other emerging technologies.[75]
2. To achieve the desired impact, Nigeria like Rwanda, should incorporate in its *sui generis* law, provisions and structures that ensure that integrated circuit is adequately protected. The Nigerian *sui generis* law should include amongst others
   i. less stringent conditions or criteria for the grant of protection as opposed to the high standard requirements of patent and copyright.
   ii. streamlined procedures for obtaining licenses. Specifically, the law should have measures that control unfair competition. Anticompetitive practices and conditions should be regulated.
   iii. Criminal prosecution of willful infringement of protected layout designs. Penalties including fines and imprisonment are to be imposed. Providing criminal sanctions for intentional acts of infringement is usually an effective deterrent.[76]
   iv. Limited duration of protection, so that the semiconductor industry and the public can benefit from the chip design and layouts.
   v. Grant the Registrar the powers of a civil court to ensure the smooth operation and swift disposition of matters that bother on the layout design of integrated circuits so as not to further congest the court.
   vi. Payment of royalty to the proprietor of registered layout design by an innocent infringer.
   vii. National Exhaustion of Right at the first authorized sale.

[73] *Ibid*
[74]Wikipedia, "Rwanda" available at: https://en.wikipedia.org/wiki/Rwanda (last visited on August 23 2024)
[75]National Research Council, *Global Dimensions of Intellectual Property Rights in Science and Technology* 251 (National Academies Press, Washington DC, 1993).
[76]A. Gupta, "Integrated Circuits and Intellectual Property Rights in India" 10 JIPR 478 (2005).

viii. Allow reverse engineering. Reverse engineering gives room for technology transfer, which is important for a least-developed country (LDC) like Nigeria. Reverse engineering is also a common practice in the integrated circuits industry used to ensure continued innovation.

Conclusion

Intellectual property is a fundamental business asset and a primary contributor responsible for causing human development and global economic growth to escalate to the next level and inadequate intellectual property protection makes it difficult for Innovators to benefit from their inventions, with adverse consequences to society.

The importance of intellectual property protection of integrated circuits cannot be over-emphasized. However, technologies like integrated circuits that require incremental innovations do not fit easily within the existing Nigerian intellectual property paradigms, because under the Copyright Act, integrated circuits are too functional to be a subject matter of protection and not "non-obvious" enough under the Patent and Design Act. While it may seem natural for the Copyright Act and Patent and Design Act to expand beyond their traditional concepts to protect integrated circuits; however, it may distort the essence of the law. In contrast, a *sui generis* law provides a special kind of intellectual property protection different from the known traditional framework. It is a regime especially tailored to meet a certain need and offers a special form of protection that is particularly adapted to a specific subject or specific circumstances, such as integrated circuits.

Like Rwanda, this paper proposes that Nigeria develops a robust layout design of integrated circuits *sui generis* regime that is specially designed to protect integrated circuits by incorporating lessons from the Rwandan Layout Design of Integrated Circuit Law.

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