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Chapter 13

Harnessing intellectual property in the digital environment for development in Africa: Is Africa ready for the party?

Marisella N. Ouma, PhD

Abstract

The rapid pace of digitalisation across the globe has ushered in an era of unprecedented innovation and creativity, resulting in certain intellectual property trends emerging. This presents both challenges and opportunities in harnessing intellectual property for the creation of intellectual capital, and has significant implications for business strategies. Based on desk research – mainly an in-depth literature review of online secondary data (grey and white) literature – this chapter provides an analysis of the intellectual property that is emerging and its role in the creation of intellectual capital in the context of digital transformation. It underscores the need for suitable governance structures that provide for effective but balanced protection of emerging digital assets. The chapter discusses legal and policy considerations as well as strategies, including collaborative digital initiatives to navigate the complexities of intellectual property in digital transformation. It also explores the dynamic intellectual property landscape in the digital economy, and its role in socio-economic development. The research is based on the assumption that digital transformation facilitates emerging intellectual property and intellectual property assets, and that existing legal and governance structures must be updated to accommodate these changes.

Key Words: Digital Transformation, Intellectual Capital, Digital Assets, Governance, Open Innovation

Introduction

Globally, innovation and creativity play a crucial role in the transition to the digital era through the creation of intellectual property (IP) assets, which in turn contribute to economic development. These intangible assets include copyright, patents, trademarks, industrial designs, utility models, geographical indications, integrated circuits and plant varieties. More recently, *sui generis* protection of traditional knowledge, traditional cultural expressions and genetic resources recognises intangible assets that do not fall under mainstream IP rights.

Digital transformation has led to new trends in IP protection, creating intellectual capital, meaning "intellectual material, knowledge and experience, intellectual property information that can be put to use to create wealth" (Trequattrini et al., 2022). Rapid digitalisation and resultant disruptive technologies such as artificial intelligence, the blockchain and the Internet of Things, to name a few, have contributed to the creation of digital assets including software algorithms, non-fungible tokens (NFTs) and digital data sets. It is important to consider how to navigate IP rights in the digital economy, in order to capitalise on the strategic value of these digital assets for sustainable development.

There is no universal definition of digital transformation, but it may be described as the use of digital technologies to enable improvement in performance. It is digital innovation, or the culmination of the combined efforts of several digital innovations, that creates new actors, structures, practices, values and beliefs that change, threaten, replace or complement existing rules within a given ecosystem (Hinings et al., 2018, p. 53). It is also defined as "a social economic change across individuals, organisations, ecosystems and societies that is shaped by the adoptions and utilisation of digital technologies" (Dabrowska et al., 2022).

An understanding of emerging IP is important, in the context of digital transformation, in order to appreciate the need for an effective and updated legal and policy framework. The main research question is: 'How can emerging intellectual property in digital assets be harnessed for economic development in the digital environment?'

Theoretical perspectives on digital transformation, innovation, and intellectual property

The interplay between digital transformation and emerging intellectual property rights is a complex area that is continuously evolving. As noted above, disruptive digital technologies create new forms of tangible assets. The evolving digital landscape comprises strategic economic outcomes, among other things. A brief consideration of some of the theoretical perspectives will examine emerging digital assets in the digital environment.

Existing international legal regimes for IP provide minimum standards of protection for the member states that are party to the international treaties. In the case of the Trade-Related Aspects of Intellectual Property Rights (TRIPs) Agreement, the World Trade Organisation (WTO) member states are obliged to provide minimum standards in their national laws. Given that most countries in Africa are members of the WTO, these minimum standards of

protection are compulsory. Protection of IP rights is territorial, and governed by national laws.

IP rights are deemed to be property, and can be used in digital strategy and value addition. These include patents, trademarks, copyright and related rights, industrial designs, geographical indications and utility models. There are various theories supporting the protection of IP rights, but in this chapter a focus on economic rights theory will suffice. Under this theory, protection of IP rights is deemed necessary to ensure that the creator/inventor is rewarded; such protection also encourages creativity and innovation. Proponents of this theory argue that intangible property rights are created to address the issue of market failure – if everyone was allowed to use the results of innovation and creativity freely, there would be no incentive to invest in innovation and creativity (Torremans, 2016). Protection of IP rights is therefore necessary to ensure that the rights-holders or owners of IP benefit, and that there are no 'free riders'. Secondly, IP protection provides exclusivity and ensures perfect competition. For creation, innovation and production, it creates competition; but at the consumption level, it restricts competition.

Protection ensures that IP is put into use; and in the case of copyright, the copyright owner's right to prevent others from exercising the owners' exclusive rights basically trades off the cost of limiting access to the work against the benefit of providing incentives to create work in the first place. This creates a balance between access by third parties and incentives to the author (Landes & Posner, 1989). IP protection is necessary to encourage innovation and creativity, and this can also be applied to the emerging digital assets. Under the economic rights theory, protection of IP is an incentive to innovation that has given rise to disruptive technologies that can provide a competitive advantage for its owners, and can also be used to forge collaboration in the context of digital transformation.

Intellectual property, as a catalyst in the knowledge economy, drives different digital disruptions. Digital transformation is linked to digital strategy, intangible assets, value creation and entrepreneurship, among other concepts (Chen et al., 2016). The resource-based view posits that intangible resources are important for providing competitive advantage in markets. Such resources include human, organisational and information resources (such as IP). Disruptive digital innovations can address the consequences of digital disruptions

(Karimi & Walter, 2015). Knowledge management and pooling knowledge resources (using emerging and disruptive technologies) are therefore crucial.

Broadly, innovation is a new idea, process, or device; the introduction of something new or a different way of executing a task with the desired results (Bogers et al., 2018). Open innovation establishes an ecosystem where people, organisations and various sectors can use new knowledge to enhance open innovation collaboration in creativity and innovation. It builds on access to both external and internal knowledge and is linked to knowledge management across various boundaries, whether institutional, geographical or organisational. An example is Ushahidi, a Nairobi, Kenya-based crowdsourcing platform that is built on open-source principles but also has some elements of proprietary software and creative elements. Ushahidi has evolved into a global platform that collects data that may be used for various activities, such as disaster response and election monitoring. This provides access to knowledge that is utilised, as well as managed, for the purposes of innovation, creativity, and ultimately the creation of intellectual capital. Any proprietary aspect may be managed using the open-source licences allowing for open access.

Digital technologies, such as the use of software, hardware and social networking, improve the exchange of knowledge. This provides for the strategic management of emerging intellectual property assets in an open and collaborative framework (Chesbrough, 2003).

Innovation ecosystems exist at national, regional and international level; and it is important to examine the interactions and dynamics within the different ecosystems, especially in light of the continental framework under the African Continental Free Trade Area (AfCFTA). Innovation systems theory recognises the role of the diffusion and flow of information in the innovation process between various actors in the digital environment. The innovation ecosystem consists of enabling policies, laws and regulations, governance structures, intellectual property, access to finance, supportive research, markets, infrastructure, and collaborative frameworks.

Over the last 10 years the world has witnessed rapid changes in technology that have spurred digital transformation in almost all sectors. There are a series of disruptive technologies which have reset the way individuals, institutions and society work and live, including those in manufacturing, agriculture, provision of health services, management and dissemination of

information, education and entertainment, to name only a few. These technologies include artificial intelligence (AI), the blockchain, augmented reality and virtual reality, the internet of things (IoT), cyber-security innovations, 5G technology, biotechnology, quantum technology, and more recently, green technology. These innovative technologies have created digital assets that may be subject to intellectual protection.

The above theoretical perspectives provide the basis for a discussion of IP and emerging digital assets.

Intellectual property in Africa

Intellectual property (IP), taken literally, may be understood as the product of the mind which is owned by the creator or inventor of such product. The term refers to the legal rights that result from intellectual activity in the industrial, scientific, literary and artistic fields. (WIPO, 2004).

IP is playing an increasingly important role in the knowledge economy, driven by innovation, creativity and technology. The benefits that accrue from these innovations may be fully realised with the protection of IP rights. As alluded to above, the essence of IP is to provide recognition for inventors and creators by granting them exclusive rights to control their works and realise the commercial benefit from them. This is anchored on the premise that the creation, protection and enforcement of IP is necessary for economic development. An example is the affordable smoke-detection system developed by Lumkami, a company in South Africa. Lumkami secured patent protection for the system; the patent grants the company 20 years of exclusive rights to the system, during which they can commercialise it.

The intellectual property system in Africa is a multi-layered tapestry of national polices and laws, case law and practices which have been influenced by the colonial legacy as well as by the international legal framework (Ncube, 2023). The history and development of IP systems differ for each country. In African countries, IP law was introduced through the extension of the application of the laws of the colonising countries, such as in the case of Kenya, Ghana and Nigeria. These laws, though extended to the colonies, were only applicable to the settlers and not to the local populations. There were also instances in which the colonising state declared certain international instruments applicable to their colonies (Ncube, 2023).

Many African countries continued to use these laws after independence; though they enacted national laws, in most cases these mirrored the laws of the former colonising countries. For instance, Kenya and Ghana enacted their first post-independence copyright acts in 1966. In most countries, IP law was only enacted – or existing patent laws were updated – after the adoption of the WTO TRIPs Agreement in 1994. The protection of intellectual property was mainstreamed into the national laws through membership of the WTO. Once a country is a member of the WTO they are bound by the provisions of the WTO TRIPs Agreement, which provides minimum standards of protection for WTO member states. In effect, this established strong IP regimes for the member states (Peukert, 2017); the TRIPS Agreement obliges member states to provide the minimum standards of protection in their national laws. Currently, 44 African countries are members of the WTO.

Intellectual property protection is territorial. For instance, where a patent is granted in one country, if the application was under the national regime, then the protection does not extend beyond the borders. If an applicant files under the Patent Cooperation Treaty (PCT), they may obtain a worldwide patent, or designate the countries in which they wish the protection to be granted. In the European Union (EU), EU directives and regulations provide a harmonised system for registration, administration and management of intellectual property rights among the EU member states. Copyright is also territorial, but the protection may be extended to other countries that are members of the same treaty or agreement. In Africa there are two regional intellectual property offices where one can file for a regional patent and designate the countries for which protection is required.

The African Regional Intellectual Property Organisation (ARIPO) was established by the Lusaka Agreement, its purpose (among others) being to "promote the harmonisation and development of intellectual property laws, and matters related thereto, appropriate to the needs of its members and the region as a whole". As at 14 July 2022, ARIPO had 22 member states, mainly Anglophone and Lusophone countries. The ARIPO protocols do not apply directly to member states, which have their own national IP laws (Ncube, 2023). This means that for an applicant to have protection in all the ARIPO member states, they would have to designate all the relevant countries when applying through ARIPO.

For the Francophone countries, the African Intellectual Property Organisation (OAPI) was created in 1977, under the Bangui Agreement. The annexures to the Bangui Agreement

regulate (at OAPI level) copyright, trademarks, designs and patents, to name a few. Unlike for ARIPO, the IP protection granted is for all 17 OAPI member states. There are 16 countries that are not members of either ARIPO or OAPI.

There have been attempts to harmonise IP regimes in Africa. The Statute for the Pan African Intellectual Property Office (PAIPO), which was adopted on 30 January 2016, created the PAIPO, but has not yet come into force. The PAIPO was set up as a specialised body of the African Union, without clear objectives. However, its proposed functions (set out in Article 4 of the Statute) include harmonisation of IP standards that will reflect the needs of the AU, its member states and Regional Economic Communities (RECs), the ARIPO and OAPI; assist member states in formulating their IP policy, on request; and strengthen regional and similar organisations as may be necessary. The recently adopted AfCFTA Protocol on Intellectual Property attempts to create a harmonised IP system at the continental level, by providing a framework for protection that will be complemented by annexures to the various IP rights.

The emerging technologies in the digital environment discussed above provide innovative and creative tools for creating digital assets. As discussed in the theoretical framework, there are arguments that link strong IP regimes to growth and development and to increased levels of innovation and creativity. IP regimes are seen as providing an incentive to innovation, by granting time-based monopolies to the IP holders as a trade-off for overall societal gains. However, this has not been the case in most African countries, given the level of utilisation of IP by its creators and innovators.

But at the same time, there are arguments against the strong protection, which is deemed to stifle innovation, creativity and technology transfer for countries that still developing their capabilities (Hall & Harhoff, 2012). Lack of a harmonised IP regime at the continental level and developing IP laws at the national level have led to failure by countries in Africa to harness the potential of IP for the creation of intellectual capital. The limited utilisation of IP rights and institutional capacities exacerbates the situation (United Nations, 2022).

It is notable that there are tangible developments led by innovative outputs in the continent. Use of IP in the digital environment has been challenged by disruptive technologies, and there is a need to rethink IP governance strategies. It is important to look at the emerging IP trends in the context of digital transformation.

Emerging intellectual property trends in the context of digital transformation

There is a push towards greater protection of intellectual property rights, especially in developing and emerging markets. This may be attributed to the increased innovation and creativity observed, as well as increased global trade, where rights-holders want to ensure that their IP is protected beyond their borders. Africa is deemed to be the new frontier in trade and development (Mangeni & Juma, 2019).

As discussed previously, digital transformation involves the adoption of new processes, business models and technologies. Understanding the relationship between digital transformation and the protection of IP rights is crucial in the digital environment. The dynamic innovation and technology landscape has led to emerging IP trends and assets. Innovations arising in the digital transformation ecosystem may result in the creation of IP such as patents for novel technologies or processes, or copyright for new creative works such as software.

5G technology for mobile communication is used in new wireless transport prototypes, and is thus an essential technological component of digital transformation in socio-economic development, especially in advanced economies (Guarda et al., 2021). 5G has the capability to differentiate services on the existing networks, increasing the efficiency of service delivery and changing the business models of network operators. 5G will support the IoT, virtual and augmented reality, Big Data, robotics and AI. It will also allow the transmission of large data sets that would previously have been restricted by the technology of the time, allowing the deployment of the IoT and the growth and development of Big Data services, as well as massive deployment of sensors. This becomes possible thanks to new high internet speeds (bandwidth of above 1Gbps, up from the current 200Mbps) as well as dynamic information access and variable devices with AI capabilities (Guarda et al., 2021).

The reliability and zero interference of 5G technology is likely to spur creativity and innovation sectors such as smart manufacturing and telemedicine, and is also a game-changer for creative industries such as fashion, film, music and gaming. 5G allows for collaboration across borders in the virtual space, as well as marketing and sales. A fashion designer no longer needs to showcase their creative works on a runway and can have wider market reach.

5G technology is also a catalyst for the film and gaming industries, as larger files can be transmitted in real time, in a borderless space.

Augmented reality and virtual reality are not exactly new technologies, but have increased in popularity and are now used in different fields, courtesy of digital transformation. For instance, mobile applications (including Google Maps) have had a role to play in the resurgence of augmented reality. Virtual reality has also increased in popularity, as it can be used on smartphones and is now cheaper and more widely available. These technologies facilitate the creation of new works that may be subject to IP protection and are used in education, healthcare, tourism, and a range of other fields. NFTs represent virtual reality experiences or assets such as virtual art, game items and virtual real estate. Augmented reality and virtual reality may be used to create digital assets that may be subject to copyright protection, creating intellectual capital in the digital environment.

All these aspects present various challenges as well as opportunities, in terms of IP protection: in governance, legal and institutional structures. The following section examines these issues in light of the current challenges to the governance framework in Africa.

Protection of digital assets

Digital assets are generated and used by various entities, including software algorithms. Software is protected either under copyright or via patents. Traditionally, patents did not protect software, as it was deemed to be a method of doing business and thus fell within the scope of unpatentable subject matter. However, the US Courts made a landmark ruling in the case of *Diamond v Diehr* 450 US 175 (1981), in which the Court held that a computer-implemented process is patentable even though a mathematical formula is used by the computer in the process. This opened up the route for patent protection of software in the United States. In the European Union, although software *per se* is excluded from patentability, an invention implemented by means of a computer program or software may be patentable as long as it produces what is known as a 'technical effect', and the technical aspect of the software represents an inventive step that was previously unknown.

In Africa, several countries expressly prohibit patent protection for software in their laws, while others are silent about the issue. Nigeria, for instance, under Section 6(1) (b) of the Patents and Designs Act (Cap P2 2004) of the Laws of Nigeria, provides that "a patent can be

granted in respect of a process and a patentee has the right to preclude any other person from applying the procedure in respect of a product obtained directly using the method". This means that a functional element of software can be granted patent protection. On the other hand, Kenya allows patent protection of software as long as the software is a technical solution to a problem: Section 21 of the Industrial Property Act provides that a technological invention that meets the criteria for patentability is patentable. However, no software patents have been granted to date. It is notable that in South Africa, the law specifically *prohibits* patentability of software, under Section 25(2) (e) of the Patents and Designs Act. However, Section 25 (3) offers an exclusion to the above provision, but only to the extent to which the invention relates to the subject matter.

Most countries provide that software (either source or object code) can be protected as a literary work. Zindi is a data science competition platform that fosters open innovation across Africa. It brings together data scientists, researchers, and various institutions to solve complex challenges using data. It makes use of algorithms, datasets and platform design, which may be subject to copyright protection. However, such copyright protection may restrict use to authorised users through commercial licensing, which may in turn restrict innovation. The open licensing model, which is based on recognition of copyright protection, may encourage innovation and creativity, for instance in the algorithms for more effective service delivery on the competition platforms.

As of 2021, according to the Africa Developer Report from Google, here were approximately 716 000 software developers in Africa, 38% of whom work for at least one company based outside the continent. The tech ecosystem in Africa is dynamic, and is spurred on by accessibility to cheaper, faster internet, especially through the mobile phone. 4G technology is already redefining the way users engage with digital services, particularly in commerce.

Data and Big Data

In the context of ever-changing and disruptive digital technologies, data is touted as the 'new oil'. Data is generated and utilised in various ways, including large language models and AI. The current IP regime recognises the protection of both original and non-original databases. However, protection of non-original databases is only found in the European Union; most other countries only protect original databases. The protection of databases began to be considered with the emergence of electronic databases in the last decade of the 20th century.

In line with the provisions of Article 25 of the Berne Convention, the TRIPS Agreement provided for the protection of compilations of data without prejudice to the protection granted to the underlying copyright (Gervais, 2019).

The emergence and use of Big Data opened a new dimension regarding IP. Data discovery and the ability to integrate and use data are core to AI systems (Forredellas & Gallastegui, 2021). Big Data is defined by three main attributes: volume, velocity and variety (Gervais, 2019). Sources of Big Data include the IoT; for example robots, smart appliances and sensors may be subject to IP protection.

Social media is yet another source of Big Data. Online posts, videos and even comments may be used to create new IP works. Social media is a platform that allows third parties to create, upload and disseminate content, as well as sharing ideas that may be used for collaborative innovation. Social media may itself be viewed as a source of Big Data, and the attendant issues of data protection and IP protection of data accrue. On the other hand, social media facilitates the creation of IP assets, in user-generated content and other digital assets such as NFTs. For instance, a tweet from an individual's account could be minted into an NFT by the account owner, or by a third party. The latter would have to obtain permission to mint the NFT from the owner of the tweet. Use of IP-protected work requires express permission from the rights owner.

Machine-generated data is used in various industries such as transport, self-drive/reliant vehicles, and industrial equipment. Video streaming is yet another source of Big Data, and is used in the creation of videos, augmented reality projects and streaming platforms. Licensing, collaboration and legal compliance must be addressed. Big data may be protected under existing IP regulations regarding such issues as copyright, for the processes and algorithms used, patents, and trade secrets. The resulting digital assets can also be protected by IP rights such as those for trade secrets, for as long as they have commercial value and reasonable steps have been taken to ensure that they remain secret.

AI-generated works

In 2016, Sophia the Robot (created by Hanson Robotics) took the world by storm with its ability to hold conversations with human beings. The technology combines cutting-edge work from AI, neural networks, expert systems, conversational and natural language and adaptive

motor control, among others. Here, digital technology was used to integrate AI with other digital technologies to enable Sophia to perform some complex human tasks which could be autonomous or scripted.

There is no universal definition for artificial intelligence (AI). The term AI "applies to systems manifesting intelligent behaviour capable of analysing their environment and taking action, with a certain degree of autonomy, in order to achieve specific objectives" (Butterworths, 2018). The World Intellectual Property Organisation (WIPO) defines AI as *"*a discipline of computer science that is aimed at developing machines and systems that carry out tasks considered to require human intelligence and include machine learning and deep learning". It is the ability of a machine or software to learn from experience, adjust to new inputs and implement human-like tasks (Kitsios & Kamariotou, 2021). Machine learning entails AI tools having the capacity to derive regularities from data and learn from them, creating their own knowledge.

Machine learning allows AI to identify trends from data autonomously and use them. This enables AI to generate content such as text, code, images, music and audiovisual works (Bonadio & McDonagh, 2020). Generative AI also includes large language models, which are a form of deep learning algorithm with the capability to perform various language-processing tasks. AIs such as Alexa and Siri are trained to perform general functions. The training process relies on large textual data sets from the internet which undergo fine tuning, as well as prompt tuning, to get the desired results. AI relies on data sets, which include Big Data, to perform tasks. Big Data and AI therefore have a synergistic relationship. AI relies on massive data to learn and enhance its decision-making and output, while Big Data analytics rely on AI for data analysis and synthesis.

Combining Big Data, AI and machine learning is desirable for analysing massive data sets which seek to identify patterns that enhance decision-making, as they are faster, better, more effective and will spur innovation.

The protection of AI-generated works through IP rights has been a subject of discussion for some time. Recently, the case of an AI device known as 'Device for Autonomous Bootstrapping of Unified Sentience' (DABUS), used to generate inventions, has highlighted the conundrum of the protection of AI-generated works. In 2019 Dr Stephen Thaler filed

patents for two devices, applying for protection with the Australian Patent Office, the UK Patent Office, the German Patent Office, the European Patent Office, the South African Companies and Patent Commission, the New Zealand Intellectual Property Office, the Korean Intellectual Property Office, and the United States Patent Office. In the patent applications, he named DABUS as the creator and himself as the owner (Oriakhogba, (2021).

Save for South Africa, all other patent offices declined to proceed with the application on the grounds that DABUS has no *locus standi* in law as a legal person. The Australia case provides an analysis of the thinking behind authorship and ownership in relation to AI. The Commissioner of Patents declined the application on the ground that DABUS – which was named as the inventor in the application – did not qualify under the regulations, which require an applicant to be a human person. After a reading of Section 15 of the relevant Act, the judge in the High Court where the appeal was logged was of the considered opinion that "an inventor can be an artificial intelligence system or device. But such non-human inventor can neither be an applicant for a patent nor a grantee of a patent. So, to hold is consistent with the reality of the current technology. It is consistent with the Act. And it is consistent with promoting innovation."

The judge recognised DABUS as the inventor, but the patent could not be granted to DABUS as it was not the applicant and could not be named as the patentee. The Federal Court in Commissioner of Patents v Thaler (2022) FCAFC 62, in upholding the decision of the Commissioner of Patents, agreed that "the origin and entitlement of the grant of a patent lies in human endeavour", and concluded that by naming DABUS as the inventor, the application did not comply with regulations, as DABUS could not be named the inventor.

The courts in Germany held that AI-generated works are patentable, but a natural person must be named as the inventor. Here, the court did not address the issue of whether the AI can be named the inventor. The US decision upholding the decision of the USPT clearly stated that the US Patent Act restricts the definition of an inventor to a human being. In South Africa, the application was granted; and so far, no one has challenged the decision of the Intellectual Property Office.

The DABUS case raises pertinent questions which must be addressed at policy and legislative level. (Mhangwane & Cochrane 2023).The first is, for the purposes of patent protection, in

the case of AI-generated works, who is the inventor, and can a non-human be considered an inventor? And secondly, can a patent be granted to a non-human (in this case, an AI) for AI-generated works? AI applications, platforms, hardware and services may be the subjects of IP protection. However, these present a challenge with regard to issues of ownership, authorship, originality and inventorship.

Dr Thaler filed for a patent under the Patent Cooperation Treaty, which means that various national offices must consider the application in the national phase. In Kenya, the Kenya Industrial Property Office is likely to decline the application on the grounds that the AI is not a recognised legal entity or human being. In the case of New Zealand and others, the inventor may only be a human being; and where a legal entity applies for a patent, the human inventor must be identified as such. In countries where the patent offices do not carry out substantive examination of patent applications, there is a possibility that a patent could be granted for AI-generated works, as was the case with the DABUS application.

Section 1(1) of the Patents and Designs Act of Nigeria provides that patents may be granted to inventions that satisfy the three criteria for patentability: novelty, having an inventive step, and being industrially applicable (Oriakhogba, 2021). However, there are issues: who is the inventor, and can an AI transfer inventorship to a human being? In such cases, novelty is also questionable, and may lead to the dismissal of the patent application.

AI can also generate content which may be subject to copyright protection. The algorithms and applications can be considered for copyright protection. Authorship and originality determine whether an AI-generated work, algorithm or application may be protected under copyright. The definition of authorship is descriptive, and provides for who an author is deemed to be in relation to the subject of protection. For instance, in Rwanda, Article 6 item 2 of the IP Law defines an author as the natural person who created the work. Article 2(1) of the EU Computer Program Directive defines an author, in the case of a computer program, as the natural person or group of persons who has created the computer program. Under copyright law, protection can only be granted to natural persons. This means that AI cannot qualify for protection, as it is not a natural person.

On the other hand, in countries such as Ghana an author is defined as a person who creates a work; and in the case of a cinematographic work or sound recording, the person by whom the

arrangement for making the work or recording is undertaken (Section 76 Ghana Copyright Act, 2005). Section 1 of the same Act provides for authors of computer programs or software to be eligible for copyright protection. It would thus be important to determine whether or not an AI may be considered to be a person, for the purposes of protection. Although there is no express provision excluding AI from authorship, the definition of 'person' could exclude an AI from claiming authorship. Thus, if a work is created by an AI without any human authorship, no copyright protection may be conferred on the work. However, if one can demonstrate a level of human intervention, then authorship will be granted to the human author.

The author of the work is deemed to be the first owner of the work and is granted exclusive rights to sell, license, or control the work (Bonadio & McDonagh, 2020). A machine taking over the creative function is deemed to be unethical, going against the concept of ownership under copyright.

Though this is controversial, if works are AI-generated with no human intervention, they cannot be protected under copyright; other persons are free to use them. The other criterion for eligibility for copyright protection is originality. With the increased use of data it has become difficult to know what is original; this then casts doubt on the authenticity and originality of the AI-generated works. This situation should be seen as an opportunity to consider a governance framework that will provide for the protection of AI-generated works.

From the above, it is notable that AI has the potential to spur innovation in various sectors and industries, and have an impact on economic growth and development. AI is driving innovation as it is executing various functions, especially in human-machine interaction, and generating opportunities for various entities and for society as a whole (Kitsios & Kamariotou, 2021). The digital environment also provides opportunities for AI-generated works, such as content for the entertainment industry. Consideration must be given to including these emerging issues in existing IP legal and governance frameworks in Africa.

Non-Fungible Tokens

Digital technology continues to present opportunities for innovation. In October 2021, Maia Lepine became the first Rwandan artist to create the first Rwandan *imigongo* art Non-Fungible Token (NFT). Her piece, titled *Strong Woman*, was showcased on the log-in page of

Humbl's NFT Marketplace, and sold out within 30 minutes. Several artists in Africa have since used NFTs for their creative works. NFTs, which are based on blockchain technology, are seen to be a disruptive technology. They are used in various industries, especially art and entertainment. Other blockchain products such as cryptocurrencies have been created on an open-source platform by software developers. NFTs are digital representations of intangible assets such as digital artwork, and are also used in game items (such as avatars), as non-digital collectibles and as event tickets.

NFTs are cryptographic tokens built on the Ethereum blockchain and are non-fungible, meaning they cannot be replaced by identical items. Blockchain technology may be described as a decentralised method of recording data including financial transactions, dispositions regarding value or assets, registration of titles, etc., in a continuously encrypted and irreversible ledger. (Mougayer, 2016). This technology is revolutionary because it does not require a third party to transfer value, yet it assures the transacting party of security and inspires confidence. NFTs have been made possible through peer-to-peer technology.

Peers using blockchain technology are able to create and maintain trust and have the ability to accept or reject a transaction. NFTs have emerged as a groundbreaking blockchain technology, revolutionising various industries worldwide. These unique digital assets, built on blockchain technology, have gained significant attention for their ability to authenticate and tokenise digital or physical assets. Each token is unique and is used as proof of ownership. Once minted, NFTs can be displayed on a public ledger where they can be viewed, copied and traded, but the ownership remains with the person who bought the NFT. Protection of the NFTs may be through copyright or designs to create a digital asset that may be used to create intellectual capital.

Image Rights

For years, photographs and artworks depicting someone's image have been protected under copyright law, including computer-generated work, digital photographs, digital scans of artistic works, and computer-generated images (Stokes, 2014). Digitalisation and disruptive technologies have given rise to image rights issues and neither copyright nor trademarks offer adequate protection (Evans, 2015) There are no specific legal provisions that protect image rights in most jurisdictions in Africa. Image rights can help in codifying personality or image rights. Guernsey, in the UK's Channel Islands, was the first 'country' (officially it is not part

of the UK) to provide *suis generis* protection for image rights, in 2012. This approach is useful in the digital environment, as it creates a new digital asset that may be commercialised by the image rights holder to generate income. For instance, the owner of the registered image rights may use the rights to structure endorsement or sponsorship agreements (Evans, 2015). Like other IP rights, image rights are territorial.

Harnessing the intellectual property of emerging digital assets for development

New technologies have a profound impact on innovation, creativity and the creation of digital assets and intellectual capital. Protection of digital assets such as AI-generated works, NFTs, image rights and Big Data through the IP system is likely to encourage innovation and creativity. IP protection provides incentives that encourage investment in time and resources that results in the monetisation of digital assets by the rights holders. For instance, in the case of works eligible for copyright protection, the developers may have an incentive to create new algorithms and systems that contribute to the creation of intellectual capital. In the context of this chapter, IP may be used to generate digital assets, especially with the deployment of technologies such as AI, using Big Data. AI may be used to synthesise data from various sources used in the process of innovation to come up with a product that may be subject to IP protection. In case of DABUS, the granting of the patent provided an opportunity for the inventor or rights owner to have exclusive rights to work the patent for a period of 20 years. During this time, the owner of DABUS can benefit by licensing other parties to use DABUS to generate inventions that may be used for a consideration. This creates capital that may be cascaded to various levels of the economy, providing opportunities for economic development.

Copyright-protected works generate intellectual capital, as they are accorded economic value (Bonadio & McDonagh, 2020). Social media has expanded the platform on which copyright-protected works can be created and commercialised. Social media increases the production and marketing of digital assets (Romdonny & Maulany, 2020). This helps to unlock and realise the potential in the copyright, as well as in copyright-based industries in the region.

Secondly, IP protection facilitates commercialisation of digital assets, as they may be licensed or assigned for a consideration. Licensing and cross-licensing may also lead to collaborative innovation, due to optimal utilisation of resources by the licensor and licensee. A good example is the licensing of image rights: there is no specific regime for protection of

image rights in Africa, but the courts in Kenya and South Africa have pronounced on these, holding that a subject has the right to authorise or prohibit the use of their image. This is distinct from the copyright protection granted to a photographer.

Thirdly, protection provides legal certainty, and prevents others from using the works without authorisation. This encourages investment in the digital assets, with an economic output, encouraging development.

The use of flexibilities that exist in the IP laws allows for exploitation by third parties. These include exceptions and limitations which allow third parties to use the works for specific purposes without express permission from the rights holder. In Uganda, Section 15 (1) of the Copyright Act of 2006 provides, *inter alia,* that "the fair use of a protected work in its original language or in a translation shall not be an infringement of the right of the author and shall not require the consent of the owner of the copyright where the production, translation, adaptation, arrangement or other transformation of the work is for private personal use only". This provision is especially useful in the case of AI (machine learning and large language models) (Bonadio & McDonagh, 2020). The 'fair use' doctrine allows for AI to use existing copyright-protected works to generate new works that are eligible for copyright protection. The authorship/ownership conundrum for AI-generated works may be resolved by relegating them to the category of 'works for hire'. In this way, the person or persons who created the AI will be accorded the relevant intellectual property rights. The law should also be updated to take emerging technologies into account. This may also be dependent on whether the AI learning is supervised, unsupervised or reinforced, and the laws and governance structures should be cognisant of this.

NFTs are yet to gain traction in most countries in Africa. As discussed previously in this chapter, these rely on blockchain technology. They may be protected under the current intellectual property regime to ensure that their owners are compensated for the commercial use of their work. Note that emerging digital assets may already be accorded an economic value, especially through IP protection. However, machines do not need an incentive to create; but the persons who invested in the digital technology may need an incentive to produce.

Institutions can leverage digital platforms to create, distribute and utilise intellectual capital. This contributes to economic development; and to technological development, as they provide a competitive edge. It encourages investment in research and development, and in collaborative frameworks. For start-ups, IP protection can attract investment and encourage risk taking.

Governance of emerging digital assets

The legal frameworks are yet to address some of the issues that have been raised, such as originality, authorship and inventor identity; and there, uniformity in the law is lacking. It is important to have a harmonised legal framework, as the European Union does. As discussed, the AfCFTA IP Protocol seeks to harmonise the IP regime in Africa to boost intra-African trade and promote economic development on the continent. Harmonisation is premised on conformity of economic and legal conditions that are expected to facilitate trade (Ncube, 2023) The IP Protocol contains general provisions on the protection of intellectual property; as stated before, these will be complemented by protocols yet to be negotiated.

On emerging technologies, Article 17 (1) of the IP Protocol gives state parties the flexibility to adopt measures to protect technologies using existing intellectual property rights; and secondly, to promote access to and environmental utilisation of emerging technologies to facilitate industrialisation and development of value chains. Unfortunately, unlike for other IP categories there is no provision for an annexure regarding emerging technologies. The protocol acknowledges the role of IP protection in emerging technologies, but does not provide for a continental framework for them. Given the disparities in the national IP laws, for the protection of digital assets arising from merging technologies, each state party will have to formulate their own laws. This may present a challenge to intra-regional trade, and should be addressed at continental level.

It is important to have a defined legal framework at continental level to address the challenges that arise in relation to emerging digital assets. This may be through the existing intellectual property system, or a *sui generis* system that will address the challenges arising from existing IP regimes.

Article 21(2) of the IP Protocol requires state parties to ensure that they have the requisite policies in relation to (among other issues) innovation and trade. State parties are therefore

obliged to formulate and implement policies that will facilitate intra-African trade and innovation. This opens the door for collaboration and inclusive innovation.

Policy considerations

Striking the balance between the interests of the innovators and the wider public system aims to foster an environment in which creativity and innovation flourish (WIPO, 2004). Previously promoted extensively was the concept of open innovation, which – according to some scholars – involves the use of internal and external resources by an organisation to maximise the resources of each organisation involved. In the context of IP it is important to foster collaborative innovation in managing digital assets, and in how the current governance structures, namely legal and policy, can be used to create intellectual capital for economic development.

Digital transformation thrives in collaborations and partnerships. Licensing agreements provide the opportunity to capitalise on external knowledge and on innovative products and processes. IP rights, including in emerging digital assets, should be included in the negotiation strategies of organisations. This is likely to foster a culture of collaboration among organisations.

Open-source initiatives, which are based on existing works eligible for IP protection, may be considered to foster innovation and creativity in the digital environment. Open-source initiatives are often eligible for IP protection, and may be used to allow others to build on Big Data, NFTs, social media and AI. AI and Big Data have demonstrated the need for the free flow of knowledge to allow for collaboration.

Laws and policies that encourage open innovation at national and regional level must be formulated. However, the annexures to the AfCFTA Protocol on Intellectual Property are yet to be negotiated and concluded. Some negotiations should consider the protection of the emerging IP assets, but these should not be restrictive to the exclusion of third parties, especially MSMEs (micro-, small- and medium-sized enterprises).

Use of emerging technologies for the purposes of managing IP, for instance the use of the blockchain for the registration of IP. The current system is expensive, and requires filing in multiple jurisdictions.. There must be consideration of a digital transformation strategy at the

continental level to address the policy issues arising from digital transformation. The generation and management of intellectual capital requires strategic governance to navigate the complexities of the digital landscape.

Creating respect for IP in the digital environment is another important policy consideration. Although the legal framework may be in place, there could be challenges, especially in terms of technology. Disruptive technologies such as the blockchain may be used for safeguarding the rights or the rights holders, as well as for ensuring they receive their royalties.

Conclusion

Governance structures in the digital environment must be cognisant of emerging technologies and the attendant digital assets. These include existing legal regimes, at national, regional and international level. It is important to leverage emerging IP in digital assets for economic development in the digital environment.

Emerging digital assets – including AI-generated works, image rights, NFTs and Big Data – can be protected under existing IP systems, albeit with some challenges, especially in relation to the concept of authorship or ownership of emerging assets, which may be an impediment to the realisation of intellectual capital. The current IP regime provides for the protection of digital assets to a certain extent, which in turn generates intellectual capital for economic growth and development. Open innovation may be used to foster collaboration at both national and regional level.

Once the governance and policy considerations are addressed, Africa may just be in time for the party.

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Legal Instruments

AfCFTA Protocol on Intellectual Property Rights 2023

EU Computer Software Directive 2009/24 EN-EUR-LEX

Trade Related Aspects of Intellectual Property Rights (TRIPs) Agreement

ARIPO Lusaka Protocol

Copyright Act of Kenya

Copyright Act of Ghana

Copyright Act Uganda

Patent and Designs Act, South Africa

Patent and Designs Act Nigeria

Industrial Property Act, Kenya