Africa and SDG 9: Toward a Framework for Development Through Intellectual Property

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This paper initiates a conversation on how Africa can achieve Sustainable Development Goal (SDG) 9 through an effective intellectual property system. In the main, the paper explores some of Africa’s intellectual property frameworks in the light of the innovations taking place within the continent. We contend that an effective intellectual property system that recognizes intellectual property rights is key in driving progress in all societies. Consequently, Africa needs a robust intellectual property framework which guarantees the rights of intellectual creators.

Keywords: sustainable development goals, intellectual property, innovation

Introduction

Since the United Nations adopted the 17-point Sustainable Development Goals (SDGs) in 2015 as a universal call to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030, nearly all countries have committed to fast-track national development with the recognition that the SDGs provide an effective roadmap for human progress. However, to achieve an appreciable level of development, countries are required to explore all resources and potentials at their disposal. These resources and potentials may include a country’s creative industry which must be protected through an effective intellectual property framework. According to the World Intellectual Property Organization (WIPO, 2019), a global intellectual property system that protects inventiveness is key in driving progress at all levels. History has also demonstrated that an effective intellectual property system that recognizes intellectual property rights could be a powerful tool to achieving development (WIPO, 2019). In today’s global knowledge economy where knowledge and intellectual capabilities play a significant role in value creation, productivity, and economic growth (Florida & Kenney, 1993), there is every reason to explore the development potentials of Africa in all sectors.

The focus on Africa is proper for a number of reasons. Africa dominates world discussions as the continent that continues to punch below her weight. Afro-optimists hold the view that given the potentials of its human capital and the resources within its boundaries, Africa should be rubbing shoulders with world economic powers. Nonetheless, the story does not appear to be elating. The International Monetary Fund (IMF) and the World Bank
reduced their 2019 economic growth projections for Sub-Saharan Africa (SSA) to 3.5% and 2.8% respectively, with growth in 2018 at 2.3%. Poverty has increased with a total of 437 million of the world’s extreme poor found in Sub-Saharan Africa (Chakravorti & Chaturvedi, 2019). The statistics also show that 10 of the 19 most unequal countries are found in Sub-Saharan Africa. The World Bank projects that if poverty reduction measures and growth remain sluggish, Africa could be home to 90% of the world’s poor by 2030 (Chakravorti & Chaturvedi, 2019).

Besides, the global wave of technology and innovation requires that intellectual property rights are protected. This is particularly necessary, and it should be, that intellectual creators must enjoy all the benefits resulting from their creative endeavours. For example, it has been estimated that industries in the United States lose between $200 billion and $250 billion annually from intellectual property infringements, such as piracy, counterfeiting of goods and many others (Bouchoux, 2013). However, if properly managed, the benefits of intellectual property could be enormous. For example, it has been reported that about $126 billion of United States exports now depend on intellectual property protection (Bouchoux, 2013).

Given that there is a lot that intellectual property (IP) can offer and having regard to the innovations taking place in place, in this paper, we explore how Africa can take advantage of SDG 9: *Build resilient infrastructure, promote sustainable industrialization and foster innovation*. We argue that creativity, inventions, and innovations, in whatever form, are key in achieving this objective. We maintain that if Africa is to reap the benefits of innovation, rights of intellectual creators ought to be enforced.

**Background to the Sustainable Development Goals**

The Sustainable Development Goals (SDGs) owe their origin to the Millennium Development Goals (MDGs). In September 2000, world leaders adopted the United Nations Millennium Declaration, which committed nations to a new global partnership to reduce extreme poverty, and set out a series of eight time-bound goals which became known as the Millennium Development Goals (MDGs) (United Nations Development Programme, 2015). Matters concerning education, health, and inequality were considered critical to the overall development of all persons which required urgent attention. However, poverty was at the heart of all these. The first three goals of the MDGs addressed issues of poverty, education, and gender equality. The next three goals tackled health, addressing critical issues as child mortality, maternal health and “HIV/AIDS, malaria and other diseases” (Morton, Pencheon, & Squires, 2017, p. 82). The remaining two goals addressed environmental sustainability and global partnership for development. These eight MDGs were supported by a total of 21 individual targets (Morton et al., 2017).

It was agreed among the leaders that these goals were to be achieved by 2015. Nonetheless, by 2015, not much had been achieved. Critics of the MDGs questioned the justification for selecting these goals as priorities of the world. Besides, it was difficult to compare performance, particularly in addressing inequalities within countries. This was because data on progress made by individual countries was difficult to obtain (Morton et al., 2017). Nonetheless, the United Nations, through the Inter-Agency and Expert Group on MDG indicators,1 claimed that the MDGs had been the most successful anti-poverty movement in history. In particular, the MDG

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1 This report was based on a master set of data compiled by the Inter-Agency and Expert Group on MDG Indicators led by the Department of Economic and Social Affairs of the United Nations Secretariat, in response to the wishes of the General Assembly for periodic assessment of progress towards the MDGs.
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Report claimed a reduction in extreme poverty, reduction in both child and maternal mortality, increased access to antiretroviral treatment for people living with HIV (Morton et al., 2017).

In summary, the report indicated that since 1990, the number of people living in extreme poverty declined by more than half as more than one billion people was lifted out of extreme poverty. In addition to this significant progress, the proportion of undernourished people in the developing regions fell by almost half. The report further revealed that primary school enrolment rate in the developing regions reached 91 percent, and many more girls were now in school compared to 15 years ago. Lastly, the under-five mortality rate declined by more than half, and maternal mortality is down 45 percent worldwide (United Nations Development Programme, 2015).

However, in spite of these considerable successes, the report acknowledged certain deficits which impede progress. In his foreword to the report, the then United Nations Secretary General, Mr. Ban Ki-moon admitted saying, “yet for all the remarkable gains, I am keenly aware that inequalities persist and that progress has been uneven” (United Nations Development Programme, 2015). Without a doubt, a great number of people still live in poverty. In 2011, nearly 60 percent of the world’s one billion extremely poor people lived in just five countries (United Nations Development Programme, 2015). There are still cases of child and maternal mortality in most parts of the particularly least developed countries.

Thus, some critics contend that when the MDGs proved difficult to achieve, they went through a christening system and they are now the Sustainable Development Goals (SDGs). Iris Borowy (n.d.), for example, maintained that the SDGs must be viewed within the context of old wine in new bottles. Some scholars (Morton et al., 2017) have suggested that perhaps,

the MDGs focussed primarily on the needs of developing countries … and implying that the global challenge is a problem of development which international aid can help address, rather than a set of shared problems which only collective action globally can resolve. (Morton et al., 2017, p. 83)

Whichever way one looks at the success or otherwise of the MDGs, it is obvious that SDGs provide well defined objectives and a more practical means of achieving the goals. In essence, the SDGs are “broader in scope, more collective in action, and more detailed in content” (Morton et al., 2017, p. 83).

The goals remain a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. These Global Goals entered into force in January 2016. So far, 193 countries have adopted these goals (UN Communications Group [UNCG], 2017).

A critical examination of the SDGs document reveals five overarching themes, which have come to be known as the five Ps namely: people, planet, prosperity, peace, and partnerships, which span across the 17 SDGs.

In essence, the SDGs deal with the root causes of poverty covering areas, such as hunger, health, education, gender equality, water & sanitation, energy, economic growth, industry, innovation & infrastructure, inequalities, cities & communities, consumption & production, climate change, natural resources, and peace & justice (UNCG, 2017; Morton et al., 2017; Mensah, 2019). The goals provide “a framework that is sufficiently scientifically robust, politically accept-able, and publicly intuitive” (Morton et al., 2017, p. 82)

Sustainable Development Goal 9 in Context

Unlike the MDGs, the SDGs introduced a framework on industrialization and innovation. SDG 9 encourages states to build resilient infrastructure, promote sustainable industrialization and foster innovation. It
would appear that at the Rio Conference in 2012, world leaders agreed that innovation drives progress (WIPO, 2019). It is not to be suggested that industrialization and innovation have never been a matter for consideration by world leaders. Of truth, after 1992, the concept of sustainable development formed an integral part of industrialization discourse of development with a focus on poverty (Borowy, n.d.). In the opinion of the World Intellectual Property Organization (WIPO, 2019), innovation is essential to achieving the SDGs.

Given the global nature of the world, innovation and creativity constitute an important wheel which drives change and helps to overcome poverty, hunger, child, and maternal mortality, preserve the environment and to optimize the use of artificial intelligence (WIPO, 2019). This can only be achieved by creating an effective intellectual property system that gives innovation and creativity value. Thus, recognising intellectual property rights is key to encouraging innovation that drives progress (WIPO, 2019).

The Director General of the World Intellectual Property Organization, Francis Gurry, maintains that intellectual property as a policy “exists to create an enabling environment for—and to stimulate investment in—innovation”, and to create a framework for sharing and trading new technologies around the world. In his view, the economic imperative at the heart of innovation is fundamental to the process of societal transformation that the SDGs aim to achieve (WIPO, 2019). Thus, SDG 9 identifies the link between economic and social progress and innovation (WIPO, 2019). There is, therefore, the need to recognise by law, IP rights and their creators, guarantee those rights and enforce them.

**The Framework**

Studies have shown an unwavering link between technological innovation, economic growth, and human development (De Beer, Sowa, & Holman, 2014). However, development as a concept has evolved over the years. Classical economics theory beginning with Adam Smith in 1776 measured development on the basis of a group’s or firm’s savings and capital accumulation (De Beer et al., 2014). This view continued to hold sway until the late 19th century, when neo-classical economics was formulated. In the main, this theory postulated that individual preferences were largely rational and that economic decisions were founded on information (De Beer et al., 2014). During the period between 1959 and 1962, modernisation theories relative to sociology and psychology also emerged. While sociological theory of development maintained that industrialisation was key in driving change (Lipset, 1959; De Beer et al., 2014), the psychological theory took the view that economic development was possible in communities that recognised the value of innovation and entrepreneurship (McClelland, 1961; De Beer et al., 2014).

Contemporary development scholarship considers human freedom as equally fundamental to the concept of development (De Beer et al., 2014). De Beer et al. maintain that while economics is still heavily influential in theories of development, it no longer dominates policy discourse. Rather the dialogue has become infused with international affairs, political science, and law including intellectual property law. Given that innovation influences development, it becomes imperative for one to explore how an intellectual property legal framework could assist in the attainment of the Sustainable Development Goal 9 as a means to reduce poverty.

**Key Concepts Defined**

SDG 9 encourages member states to *build resilient infrastructure, promote sustainable industrialization and foster innovation*. These concepts that form the basis of this goal may be understood differently across disciplines.
Therefore, in order to eliminate possible cases of ambiguity and to situate the study within its proper context, it is imperative to clarify these concepts. However, our focus is on infrastructure, innovation and, to some extent, industrialization.

**Infrastructure**

The term “infrastructure” is ordinarily understood as the physical structures of a society or organization, such as buildings, roads, and others physical facilities that support the operation of a society (Hinings, Logue, & Zietsma, 2017). It also refers to the systems and services of a society, such as transportation system, communication networks, sewage, water, and electricity. Nonetheless, infrastructure has been conceptualized into three categories, namely, institutional infrastructure, personal infrastructure, and material infrastructure (Buhr, 2003). These concepts are explained briefly.

**Institutional Infrastructure**

Institutional infrastructure refers to “all customary and established rules of the community as well as the facilities and procedures for guaranteeing and implementing these rules by the State” (Buhr, 2003, p. 4). Thus, by a nation’s legal order, state institutions are empowered to safeguard the rights of its people. Accordingly, Pietrzyk (2000, p. 26) defined institutional infrastructure as “the playing field for the society or the anthropogenic conditions that shape the interactions between humans” (as cited in Malinowski, 2019, p. 54). He maintains that this playing field entails a gamut of institutions and their operational frameworks (Malinowski, 2019). These institutions are heterogeneous and may comprise public institutions, public-private institutions, non-government civic institutions, private institutions, private associations, and many others (Malinowski, 2019).

In many African countries today, there exists a plethora of institutions aimed at protecting the rights of intellectual creators. For example, one can talk of the Beninese Copyright Office (BUBEDRA) in Benin, the Companies and Intellectual Property Authority (CIPA) in Botswana, the Burkinabe Copyright Office (BBDA) in Burkina Faso, the Institute for Quality Management and Intellectual Property (IGQPI) in Cape (Cabo) Verde, the Central African Copyright Office (BUCADA) in Central African Republic, the Intellectual Property Office in Egypt, the Ethiopian Intellectual Property Office (EIPO), the Copyright Office in Ghana, the Kenya Copyright Board in Kenya, the Mauritius Society of Authors (MASA) under the Ministry of Arts and Cultural Heritage, the Nigerian Copyright Commission (NCC) under the Federal Ministry of Information and Culture, the National Intellectual Property and Quality Service in Sao Tome and Principe, the National Registry for Industrial Property and Copyright in Sierra Leone, and many others. Apart from these country specific institutions in Africa, there are also continental and global intellectual property organizations. Within the continent of Africa, reference is made to the African Regional Intellectual Property Organization (ARIPO), an inter-governmental organization (IGO), which deals with intellectual property matters among member states. On the world scene, one could point to the World Intellectual Property Organization (WIPO), a self-funding agency of the United Nations with 193

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2 There is also the Egyptian Patent Office and the Trademarks and Industrial Designs Office.
3 Ghana also has the Industrial Property Office under the Registrar General’s Department of the Ministry of Justice.
4 There is also the Trademarks, Patents and Designs Registry Ministry of Industry, Trade and Investment.
member states. According to WIPO, their core mandate is to “lead the development of a balanced and effective international IP system that enables innovation and creativity for the benefit of all”.5

Whether viewed from the local or global perspective, these institutions, in the proper sense and within the meaning provided by Walter Buhr (2003), could be deemed as institutional infrastructure. Therefore, to encourage creativity and innovation, these institutions must be adequately resourced and the rules effectively applied. Indeed there is the need to establish such IP institutions in African countries where they do not exist. In addition, such IP institutions may perhaps serve their purposes better if they are encompassing of all the relevant branches of IP and not just an aspect of it. Anything short of this will create an environment that allows abuse of intellectual property rights to fester.

As has been noted institutional infrastructures are to be regarded as “social technologies” in the operation of productive economic activities, involving patterned human interaction rather than physical engineering. When the rules change persistently or are not respected, and rule enforcement is fragile, or when property rights are not well defined, there is likely to be a problem with the quality of the institutions. (Law & Bany-Ariffin, 2008; Nelson & Sampat, 2001; North, 1990)

In essence, given that these institutions are pivotal in the protection of intellectual property rights, we contend that if SDG 9 is to be achieved, states have an obligation to ensure that the institutions dedicated to the protection of the rights of intellectual creators remain strong and effective at all times.

**Personal Infrastructure**

Personal infrastructure deals with the qualities and characteristics of the working population (Buhr, 2003). By qualities, reference is made to the competencies of the working population that allow people to function effectively (Buhr, 2003). The justification for the inclusion of the population in the concept of infrastructure is based on the fact that population and its growth influence economic growth (Buhr, 2009). Thus “population is the hook on which all economic activities hang” (Buhr, 2009, p. 28). Physical properties, such as buildings, roads, cars, and all other forms of intellectual creations are the result of human activities. In Africa, there is no shortage of intellectual creators who form part of the general population.

Walter Buhr (2009) had noted that in discussing personal infrastructure, a distinction should be made between the individual within whom the ability to perform labour services is embodied and the labour input as a sequence of services performed that could be traded in an open market. This is because human capital in the view of Buhr (2009) includes cognitive abilities under which one can conveniently place intellectual creations. Thus, any new product, process, or service is created not by one innovation but by a sequence of innovations (Buhr, 2009). Nonetheless, the utilization of innovation benefits depends also on specific institutional regulations particularly patent law. In this regard, it has been suggested that the duration of the patents and related rights must all be considered. In effect, states must consider copyrights, trademark law, patent law, and the laws against unfair competition (i.e., trade secrets) (Buhr, 2009).

It is important to note also that personal infrastructure has marked references to institutional and material infrastructure (Buhr, 2003). For example, institutions are manned by humans who work to implement policies. Besides, one needs a labour force to produce material infrastructure for the operation of society.

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5 WIPO official website.
Material Infrastructure

Perhaps the most basic view of material infrastructure or physical infrastructure includes roads, water, buildings among others. This view persists because of how accessible these facilities are for quantitative analysis (Buhr, 2003).

Material infrastructure is defined as “those immobile capital goods that essentially contribute to the production of infrastructure goods and services needed to satisfy basic physical and social requirements of economic agents” (Buhr, 2009, p. 18). Walter Buhr classifies material infrastructure into two distinct qualities. According to him, the first characteristic refers to the desire for basic necessities of human life which are satisfied by infrastructure outputs, such as goods and services (Buhr, 2009). For instance, the need for information could be met by telephone services, newspapers/telecommunication facilities, and newspaper production works. The quest for knowledge could be satisfied through education and intellectual creations (Buhr, 2009). The desire for entertainment could also be met by music, drama, and other works of art.

The second distinguishing quality of material infrastructure refers to infrastructure goods and services which cannot be met by individual household or firm as a result of cost of production (Buhr, 2009). Walter Buhr (2009) maintained that modern technology allows for mass production of infrastructure outputs. The cost involved in such production is usually high which individual households lack the financial wherewithal to meet. Thus, this second quality of material infrastructure implies that societies have the obligation to ensure the supply of infrastructure goods and services to the individual economic agents of a country (Buhr, 2009).

Our use of the term infrastructure in this paper encapsulates a combination of the laws, the human capital, and the gate-keeping institutions entrusted with the mandate to safeguard the rights of intellectual creators. Thus, infrastructure, as used in this paper and within the context provided in SDG 9, must not be restricted to a single meaning. A broad approach that captures a blend of all the existing structures relative to human progress must be considered, be they tangible or intangible. Consequently, African states have an obligation to ensure that these infrastructures whether institutional, personal, or material, are fit for purpose. There is also need for African experts in matters of intellectual property law. If the institutions are adequately resourced with an appreciable level of expertise, public confidence will grow and innovators will be incentivised to do more.

Innovation as a Concept

The concept of innovation dominates disciplines, such as economics, business, engineering, science, and sociology (O’Sullivan & Dooley, 2009). It is a fluid concept. As a result, there is no single definition that is universally applicable. In essence, what exist in literature as definitions may, at best, be working definitions and not definite in character. The ordinary dictionary meaning of the term connotes “making changes to something established by introducing something new”. Indeed innovation is a process that transforms ideas into output. That transformation that takes place during the process adds value to the product or service (O’Sullivan & Dooley, 2009). Consequently, innovation can occur to processes, products, or services. Product innovation refers to beneficial changes to physical products, such as introducing a new screen size for television. Process
innovation involves changes to the processes that produce products or services faster and cheaper. It is basically about a new or improved method for the production or delivery of output. Largely, service innovation involves changes to services known to customers (O’Sullivan & Dooley, 2009).

The emerging view is to define innovation in a much broader scope as a narrow definition may have the potential to limit creativity (O’Sullivan & Dooley, 2009). It is also to be noted that innovation is often associated with terms, such as invention, change, design, and creativity (O’Sullivan & Dooley, 2009). However, some scholars attempt a distinction between these concepts. To begin with, innovation is primarily distinct from invention in that invention adds to the stock and may not immediately end up in the market for commercial purpose. On the contrary, an innovation, whether product or service, has an immediate economic value to the consumer. In effect, innovation leads to new products and services being sent to the commercial market (Greenhalgh & Rogers, 2010; Oguamanam, De Beer, & Schonwetter, 2014). Invention, on the other hand, is usually about creating something that is yet to be desired (Greenhalgh & Rogers, 2010; Oguamanam et al., 2014). Innovation also includes exploitation for benefit adding value to the customer (Greenhalgh & Rogers, 2010; Oguamanam et al., 2014). Therefore, when exploitation of an invention adds value to the customer, then it becomes an innovation. It must however be noted that innovation does not necessarily require invention in terms of originality (Greenhalgh & Rogers, 2010; Oguamanam et al., 2014).

Innovation is further distinguished from creativity even though creativity is regarded as a key building block for innovation (O’Sullivan & Dooley, 2009). Creativity is a mental process that results in the production of novel ideas and concepts that are appropriate, useful, and actionable (O’Sullivan & Dooley, 2009). We agree with O’Sullivan and Dooley that one could treat innovation and creativity as twin concepts not to suggest that one is synonymous to the other but because creativity involves some form of originality and novelty that is essential for innovation. Innovation encourages further processing of the output of the creative process (the idea) so as to allow the exploitation of its potential value through development (O’Sullivan & Dooley, 2009).

Innovation is also distinguished from design. Design, in the context of innovation, is defined as “the conscious decision-making process by which an idea is transferred into tangible (product) or intangible (service). Of truth, design draws heavily on creativity” (O’Sullivan & Dooley, 2009, p. 7).

Innovation is relevant to every society (Gollin, 2008). In addition to introducing new products and services that serve the needs of society, innovation contributes to economic growth. Process innovation also increases the amount of economic growth by providing cost competitiveness within a nation (United Nations Development Programme, 2015). National economies develop through the innovation and manufacturing abilities of institutions and from selling the resulting innovative products on the global market. These activities not only bring increased revenue streams into the economy, increasing the gross domestic product, but also provide employment opportunities (United Nations Development Programme, 2015). To this end, many countries have established state agencies to promote and foster innovative culture in order to increase the wealth of the nation (Borowy, n.d.). However, the development of a new product involves cost which must be adequately compensated. The only way to reward innovation and/or invention is through a robust intellectual property

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7 Supra note 1.
system. Thus, in the absence of intellectual property rights over new products, the innovator obtains no gain and there will be no incentive to innovate (Greenhalgh & Rogers, 2010). Greenhalgh and Rogers (2010) maintained that intellectual property rights help innovators to appropriate the returns of their innovation while it guarantees ownership over their innovations. But is there any possible affinity between innovation and intellectual property that deserves attention? If there is any, how should this be perceived? In the subsequent paragraphs, we shall examine this connection briefly.

**Intellectual Property and the Innovation Cycle**

Innovation is deemed a cycle that revolves through history in that it converts old knowledge into new, and links individuals with their society. This innovation cycle involves creating new works from existing knowledge, sharing those works leading to the adoption by the society (Greenhalgh & Rogers, 2010). According to Michael Gollin, the innovation cycle establishes “a new threshold for innovation, with IP rights applying selectively to some of those innovations” (Greenhalgh & Rogers, 2010, p. 16). At the first stage, creative work occurs when a creative new idea, or work product emerges from an individual or a group (Gollin, 2008). The second stage of the innovation cycle occurs when individuals make available to their immediate society, the creative products (Gollin, 2008). The third stage of the innovation cycle occurs when shared new knowledge becomes accessible to creative individuals and their community (Gollin, 2008).

Michael Gollin (2008) argued that the dynamics of the innovation cycle, and intellectual property’s role within it, can be properly understood by analogy to the life cycle of a tree growing in a forest. This tree he calls an “innovation tree”. According to him:

> The creative act is like a seed using its internal energy to sprout in a forest, and then absorbing external resources—air and light through its leaves and water and minerals through its roots—to grow into a sapling, then a tree. While living, the tree enriches its surroundings, producing oxygen, sugar, limbs, leaves, flowers, and fruit. The woody core is built from past years’ growth. This year’s growing Greenwood will become next year’s core wood. Likewise, this year’s leaves and fruits fall to the ground and become part of the nutrient cycle for the tree and forest, and perhaps seeds for new trees. Eventually the tree dies, topples, and the wood decays, returning to the soil and air to provide resources for new life to complete the tree’s lifecycle. In this model, the innovation cycle is like the life cycle of a tree. The knowledge and resources that flow into creative human endeavours, giving rise to innovation, are like the air, earth, light, and water that flow into a tree and make it grow. Innovative ideas, susceptible to IP protection, are like the new growth—the greenwood enveloping the tree beneath the bark, the growing leaves and ripening fruit. The ideas can flow from the innovator to other people, from A to B to C to D, and eventually join the accessible domain. Ideas are like the fruit, leaves, and sap that come from a tree and enrich the forest and its inhabitants, and eventually the old growth of the tree itself when it dies and supports new life. The fallen leaves and fruit, and the tree trunk when it dies, symbolize how IP rights dissipate and ultimately become accessible to others. (Gollin, 2008, p. 64)

This analogy is necessary because intellectual property (IP) is deemed as the invisible infrastructure of innovation in that it remains an important tool which stimulates and channels innovation. Significantly, innovation creates new businesses, cultural movements, and social institutions, and destroys old ones (Gollin, 2008).

Africa cannot be left out in this obvious link between innovation and intellectual property because of its rich history. Historically, Africa provided technical and cultural leadership beginning from Egypt. It is on record that Imhotep invented the Egyptian pyramid, and the Egyptians developed beer and learned anatomy. The knowledge
and the skill associated with this was later to be transported to Europe particularly Greece and Rome and then to Islamic societies and China during the middle ages (Gollin, 2008).

**Some Key Innovations in Africa**

There are a number of innovations taking place in Africa. From Agro products to pharmaceutical kits, Africa can now boast of innovations designed to protect the environment, increase productivity and improve health and sanitation. More importantly, these innovations originate from Africans. For example, in Madagascar, mention can be made of the biodegradable seed tray for rice farming developed by Juslain Nomenjanhary Raharinaivo. This innovation sows seed in innovative pots made of paper, known as biodegradable germinators. Farmers only need to transplant seedlings into easy-to-transplant clumps with a high tilling capacity. This increases rice yield at a relatively low cost (Jere, 2018).

Similarly, Wassim Chahbani from Tunisia is also credited with the Buried Diffuser, a patented innovative irrigation system which waters crops through underground irrigation network which delivers both water and nutrients to plants at root level (Jere, 2018). Professor Abdeladim Moumen and Dr. Hassan Ait Benhassou from Morocco are also known for their TB and Hepatitis C test kits. These innovations are said to be three to five times less expensive than those that currently exist on the market (Jere, 2018).

There is also an eNose sensor for tea processing developed by Abraham Natukunda from Uganda. Abraham’s innovation applies an “eNose” and analytics platform to supplement current tea processing procedures using low power sensor devices to determine optimum levels of tea fermentation (Jere, 2018). In Ghana, the Incas Vaginal Discharge Kit is credited to Dr. Laud Anthony Basing is equally worth mentioning. Also, known as Incas Vagkit, this innovation is a 3-in-1 urine-based test kit that drastically reduces testing time for vaginal infections, leading to the efficient and quick detection and management of vaginitis (Jere, 2018). Ghana is also in the limelight for a mobile app which detects counterfeit drugs. Developed in 2009 by a Ghanaian student named Ashifi Gogo, the mobile app helps to fight the influx of fake drugs into Africa. Users simply need to text a code to a receiving number which confirms the authenticity of the drug (Fishman, 2018).

From Egypt comes the “iThrone” portable toilet developed by Dr. Diana Yousef. This “iThrone” eliminates 95% of daily onsite sewage volumes, with no discharge to the environment (Jere, 2018). Henri Nyakarundi from Rwanda has also developed the Mobile Shiriki Network. The Mobile Shiriki Hub is a Smart Solar Kiosk, powered by strong solar panels and equipped with large capacity batteries, Internet of Things (IoT) sensors, and a custom designed router, offering device charging, virtual top-ups, and low-cost connectivity options for access to digital content and services.

In South Africa, Prof Keolebogile Shirley Motaung’s natural solutions for skeletal regeneration and repair deserve mention. They are two innovative products namely the La-Africa Soother (LAS), effective for treating pain, infection, swelling and inflammation and the Plant-Based Morphogenetic Factor Implant (PBMF) which induces bone and cartilage formation. Both products are plant based.

Further to these innovations taking place in Africa, the GKSORB developed by Dr. Fohla Mouftaou from Benin cannot also be ignored. The GKSORB is a 100% organic and biodegradable fibre made from water hyacinth. This innovation has the potential to absorb up to 17 times its weight, and it can be used as a separator for hydrocarbons, or as a cleaning agent for surfaces contaminated by pollutants, such as hydrocarbons, acids, and
paints (Jere, 2018). Christian Mwijage from Tanzania has also developed the Waxy II Technology which recycles and transforms post-consumer waste plastic into durable and environmentally friendly plastic lumber using a chemical-free and energy conserving technology called “Waxy ,, technology”. This plastic timber is said to be considerably cheaper and should be preferred over wood timber for building purposes (Jere, 2018). Similarly, in 2013, Kodjo Afate Gnike from Togo created a cheap 3D printer using electronic waste.

It is evident from the foregoing that Africa is equally experiencing the global wave of innovations. It is equally clear that these innovations have provided solutions to challenges peculiar to the African situation. By this, the quality of lives would improve and innovators would be happy that their innovations, no matter how insignificant, could affect life positively. However, it is more fulfilling to have an assurance of protection by law for one’s innovations. This assertion begs the question: How effective are African intellectual property laws? In the paragraphs that follow, we shall examine some of the intellectual property legal frameworks in some African countries and determine whether or not Africa is better placed to achieve SDG 9.

Innovation and the State of Intellectual Property in Africa

There is sufficient evidence of the connection between intellectual property protection and innovation and creativity (De Beer et al., 2014). Nonetheless, there appears to be two conflicting views on how IP protection interacts with innovation and creativity. One view holds that IP protection is inescapably an incentive for innovation and creativity. While the other view holds that IP protection does not facilitate innovation and creativity. Indeed, IP protection is rather deemed to be an obstacle to “the free and open exchanges of technology, culture and knowledge that form the core of innovative and creative modalities” (De Beer et al., 2014, p. 2). De Beer et al. maintain that this view continues to hold sway because little is known about how IP protection creates an environment that allows innovation and creativity to flourish as a means to development. Despite these opposing views on the influence of IP on innovation and creativity for development, some new narratives seem to be emerging. For most of the 20th century, the orthodox assumption has been that IP protection is good for development (Drahos & Frankel, 2012). IP protection, globally and in Africa, is considered as a “power tool” to facilitate economic growth (Idris, 2003, p. 4).

An examination of the intellectual property environment in Africa, either at the regional, national, or local level, reveals an impressive intellectual property hub which remains untapped. Africa, thus, needs to plug in its intellectual property potentials associated with the numerous innovations occurring within its boundaries. This way the SDG 9 would become an achievable goal adding to the stock of developments taking place in Africa. The net effect of this is that Africa would be better placed to erase the long held tag describing it as a “dark” continent, a disease and affliction hotspot dominated by poverty (De Beer et al., 2014). Such a feet will equally not project African knowledge as “traditional” which is opposed to innovation and creativity (De Beer et al., 2014).

Nevertheless, the intellectual property environment in Africa is greeted with systemic inefficiencies (De Beer et al., 2014). As we shall see later, there is no shortage of intellectual property laws in Africa but these laws are either ineffective or poorly enforced. In most cases, mechanisms to implement the laws are simply non-existent. It would appear that intellectual property laws in Africa are out of touch with the modern trends of technology, innovation, and creativity. But this view may not be entirely correct.
This is because the formal, informal, or mixed formal-informal modes of innovation and creativity in Africa cannot be fully understood through the Western-oriented prism of patents, copyrights, trademarks, and other formal IP outputs (De Beer et al., 2014). We agree that the measurements used in developed countries, and exported to developing countries, betray apparent misunderstandings of the nuances of IP law, policy and practice (De Beer et al., 2014). For instance, simply citing numbers of patents issued in Africa over a period is an incomplete attempt to measure innovation. A new regime of intellectual property protection should be introduced to cover traditional technologies, intermediate innovations, inventions, and other products of innovative activity (De Beer et al., 2014). Such a regime should take into account the national development needs, regional co-operation, and international competitiveness (De Beer et al., 2014; Juma & Ojwang, 1989). In the subsequent paragraphs, we shall present herewith some of the innovative products and/or services that originate from Africa in the light of the existing IP laws. We do this with the view to determine whether or not Africa is better placed to safeguard the rights of its innovators through a robust intellectual property framework.

In 2014, Fernando dos Santos and Simão Pelembe explored the potential relevance of intellectual property (IP) dynamics particularly patent dynamics to small-scale, locally driven biofuel production in Mozambique. Mozambique is known for the production of biofuels (ethanol and biodiesel) from agricultural products, such as coconuts, jatropha, and sugar cane (Dos Santos & Pelembe, 2014). The government of Mozambique, through its National Policy and Strategy on Biofuels (NPSB) of 2009, seeks to create the optimal policy framework for biofuels production in the country. Indeed the potential benefits of the implementation of a biofuel policy and strategy to Mozambique have been explored. Of particular interest is the view that biofuel policy can contribute to the expansion in the production of raw materials, reduction in cost of fuel importation, increased tax revenues, creation of 150,000 new jobs, and increased exports (De Beer et al., 2014; Econergy, 2008).

Conspicuously missing from the narratives is a possible intellectual property (IP) dimension (specifically a patent dimension) to the drive towards large-scale biofuels production for the country. The NPSB document of 2009 does not contain a single reference to the role of IP in the development of the biofuels industry in Mozambique (Dos Santos & Pelembe, 2014).

Fernando dos Santos and Simão Pelembe report that their study revealed only 18 patents registered with Mozambique’s Industrial Property Institute related to biofuels in Mozambique. Regrettably, all the patents had been filed by companies from foreign countries, i.e., Australia, Brazil, Germany, India, Italy, Japan, Mexico, South Africa, South Korea, Spain, and the US. There was no patented, locally developed Mozambican biofuel technology, and only one patent originated from Africa (South Africa) (De Beer et al., 2014; Econergy, 2008).

Furthermore, of the 18, 15 of the biofuel patent applications had been filed via the Patent Cooperation Treaty (PCT) International Bureau in Geneva, one had been filed via ARlPO in Harare, and two had been filed directly with the Industrial Property Institute in Maputo (De Beer et al., 2014; Econergy, 2008). A key finding that emerges from this study is the absence of locally developed patented biofuel technology in Mozambique. It is also evident that there is some degree of foreign control over biofuel technology in Mozambique (De Beer et al., 2014; Econergy, 2008).

However, the Mozambican situation may only be a tip of the iceberg. Indeed studies have shown that most of the African patent offices lack the capacity, particularly logistics and personnel expertise, to perform their core mandate of “examining patent applications and collating patent information so that it can be made publicly
available for public and inventor follow-on use” (Mgbeoji, 2014, p. 1). Of 44 African countries sampled for a study, Ikechi Mgbeoji (2014) found that most patent applications filed in African Patent Offices were drafted by foreign patent lawyers, examined in Geneva, and mailed to African capital cities for filing purposes. According to him, nearly all the states surveyed continue to rely on foreign examination for domestic registration of patents—in spite of statutory provisions for local inspection of patent applications.

Additionally, patent offices in the states surveyed did not prove to have an electronic data base of stored patent filings for public use particularly innovators. Ikechi Mgbeoji (2014) equally discovered that South Africa and Nigeria did not require local patent examination. Nonetheless, he found an appreciable level of professionalism in some national patent offices (Mgbeoji, 2014, p. 1). Perhaps, what is remarkable about Ikechi Mgbeoji’s research is that it was evident through the study that most of the African states surveyed have, through membership of World Trade Organisation (WTO) and World Intellectual Property Organisation (WIPO), had begun to revise their patent laws (Mgbeoji, 2014). In addition, regional bodies, such as AR IPO and OAPI have improved the patent examination situation to some extent. For instance, AR IPO, under the Harare Protocol, is empowered to receive and process patent and industrial design applications on behalf of Member States (Mgbeoji, 2014).

In spite of this positive finding, it is important to note that a bulk of the patent applications filed with AR IPO in Harare emanate from US and European pharmaceutical companies with nearly all patent applications drafted by foreign patent agents, suggesting a near-total absence of Africans skilled in the drafting of patent claims and applications (Mgbeoji, 2014; Drahos, 2008; Sayre, 2012).

In order to overcome the structural defects and to have the requisite expertise to manage African patent offices, Africa needs to provide training of persons preferably lawyers and judges in IP matters (Mgbeoji, 2014; Drahos, 2008; Sayre, 2012). This way, we can be assured of an effective patent system that leaves nothing to chance.

Another area that is equally up for discussion is the music industry in Africa. This area is ripe with cases of copyright infringements as well as inadequate royalties. An African country which dominates the discourse almost immediately is Egypt. Egypt, like many other African States, is famous for its entertainment industry. It has been described by many as the “Hollywood of the East” because of its impressive history in works of art. Egypt has created for itself a cultural hub making it prominent in film and music industries within the region (Rizk, 2014).

Nonetheless, studies point to a seemingly lack of awareness of matters of copyright. As a result, the music industry in particular is greeted with copyright infringements. According to Nagla Rizk (2014), this lack of awareness of copyright is rife among both musicians and consumers. Rizk (2014) maintained that all the musicians surveyed admitted to knowing very little about copyright, deeming it irrelevant to their practices. He maintains that from the musicians’ perspective, intellectual property law is totally removed from people’s lives and hence knowledge of it would not serve any end. In addition, some musicians find the courts’ approach to enforcing intellectual property rights inadequate, thus rendering the intellectual property regime even more irrelevant to them. Besides, most consumers believe that online music, unlike CDs or cassettes, is free from copyright given its immateriality. In effect, respect for copyright is directly correlated with the physicality of the music product (Rizk, 2014).
This lack of awareness of copyright among musicians and consumers can only be an evidence of the poor state of intellectual property rights in Egypt. It reveals the near absence of education on intellectual property rights as well as an effective enforcement mechanism in the country. Intellectual property laws in and of themselves are not sufficient. Intellectual creators must be exposed to the law and the rights therein. Similarly, there is need for a robust control mechanism that can enforce the law to the latter. If Egypt is to take advantage of the SDG 9, there is an urgent need to provide education on intellectual property particularly copyright to safeguard IP rights.

In a similar study that investigated the place of intellectual property in the interaction between formal and informal sector artisans in Kampala, Uganda, it was found that among the informal-sector artisans the role of intellectual property rights and intellectual property protection was the least of their concerns. The view to own ideas, innovations, or inventions was clearly absent among these informal sector artisans (Kawooya, 2014). On the contrary, the formal sector showed keen interest in intellectual property protection in their collaborations with the informal sector artisans. This can only be a manifestation of the absence of education or sensitization of intellectual property rights among informal sector artisans who may have a wealth of innovations that remain unprotected exploitation. In this light, there is need for policies that support formal and informal knowledge exchanges so that innovations extend beyond project-specific initiatives (Kawooya, 2014).

Further to these studies, one can equally turn attention to countries, like Ghana and Ethiopia, whose IP potentials, if properly harnessed could have a huge impact on their development. In a study by Oguamanam and Dagne (2014), these researchers sought to determine the degree to which Geographical Indications (GIs) could be a form of intellectual property amenable to protection and preservation of certain rights to locally specific Traditional Knowledge-based agricultural production. Using the Ethiopian coffee and Ghanaian cocoa as the basis of their study, the researchers concluded that the two countries possess the potential to obtain GIs in respect of coffee and cocoa.

Arabica Coffee originates from Ethiopia. Beyond its social value as a traditional beverage, it is a major contributor to the country’s economy. Coffee is Ethiopia’s number one source of foreign exchange earnings (Organisation for Economic Co-operation and Development [OECD], 2011; Oguamanam & Dagne, 2014). Statistics from the Ethiopian Ministry of Agriculture (MOA, 2009; Oguamanam, & Dagne, 2014) indicate that coffee accounts for more than 25% of the country’s GNP, 40% of total export earnings and 25% of all employment opportunities across both rural and urban inhabitants.

Ghana is ranked second in world cocoa production. Cocoa production accounts for nearly 8% of Ghana’s gross domestic product (GDP), 25% of its agricultural GDP, 28% of its foreign exchange earnings and 5% of government revenue (Overseas Development Institute [ODI], 2007; Oguamanam & Dagne, 2014).

A key finding that emerged from the study is that both Ethiopia and Ghana lack the institutional, legislative, and organisational frameworks for GIs currently. At best, Ethiopia can only boast of a draft legislation on GIs namely the Proclamation for the Registration and Protection of Designation of Origin, and the Draft GIs Proclamation. Ghana, on the other hand, is in the process of revising its Geographical Indications Act of 2003 to

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8 GIs are forms of IP that seek to harness the value of the geographical origin of a product where the origin contributes to a “given quality, reputation or other characteristic of the good” (TRIPS, Art. 22.1). Protection of GIs take one of two forms: protection through sui generis systems, or protection through conventional IP rights, typically a form of trademark.
make it applicable to cocoa, pineapple, kente, adinkra, and other export-based Ghanaian products. However, as indicated already in this paper, laws in of themselves are not sufficient. Ethiopia and Ghana would need to establish strong institutional mechanisms, adequate infrastructure and the requisite expertise for matters related to GIs (Oguamanam & Dagne, 2014).

Nigeria is equally better placed to explore intellectual property potentials through its textile and leather industries. The textile industry is a major contributor to Nigeria’s gross domestic product (GDP) (Njoku, 2004; Adewopo, Chuma-Okoro, & Oyewunmi, 2014). Indeed Nigeria has been identified as a potential leading contender in the export of leather in spite of its low quality (UN Conference on Trade and Development [UNCTAD], 2009; Adewopo et al., 2014).

Of truth, the global market is experiencing a shift in conventional methods of sale to a more protected approach where small-scale entrepreneurs are using intellectual property tools to establish communal trademarks: certification marks, collective marks, and geographical indications (GIs). In India, one can cite the example of the Darjeeling tea made in West Bengal. In Africa, an example of communal use of trademarks is the Ethiopian initiative that saw the registration of three brands of Ethiopia’s fine coffee produced by local farmers (Adewopo et al., 2014).

In a study aimed at investigating the feasibility of using communal trademarks to promote quality, competitiveness and market access of leather and textile products produced by small entities in Nigeria, it was found that of three models of communal trademarks investigated: certification marks, collective marks, and geographical indications (GIs), only certification marks are specifically covered in the Nigeria Trademarks Act of 1965, specifically Sections 43 and 67. Collective marks and GIs cannot be registered in Nigeria in terms of the Act. Meanwhile, in other countries, there is evidence of increasing recognition of communal trademarks as instruments for facilitation of trade and economic development from grassroots level upward. Since the 1990s, India, South Africa and the UK have all recognised the benefits of communal trademarks and have amended their laws accordingly (Oguamanam & Dagne, 2014).

There is therefore a need for law reform in Nigeria to expand protection to all three main communal trademark models—certification marks, collective marks, and GIs—and to this end it is in Nigeria’s interest to ratify the Madrid Treaty (so as to protect any Nigerian mark in regional and international markets) (Oguamanam & Dagne, 2014).

Conclusion

Elsewhere in this paper and relying on studies, such as O’Sullivan and Dooley (2009), Greenhalgh and Rogers (2010), Gollin (2008), we have sufficiently demonstrated the strong affinity between innovation and intellectual property protection. Innovations, whether process, product or service must have a corresponding intellectual property framework that guarantees IP rights. In essence, innovation and creativity only receive meaning when they are clothed with a competent legal framework whose protective gears transcend the innovative products to include the rights of the innovators. It is also evidently clear from this study that Africa is not out of the global wave of innovation and invention during this fourth industrial revolution. From test kits to agricultural products, Africa is replete with life-changing innovations (Jere, 2018; Fishman, 2018). Nonetheless the IP environment in Africa leaves much to be desired. There are institutional as well as human resource
inefficiencies associated with Africa’s IP system. The specific examples from Mozambique, Egypt, Nigeria, South Africa, Ghana, and others require individual countries to take a second look at their IP laws. The SDG 9 therefore presents an opportunity for reviewing IP laws which have outlived their importance and are no longer relevant to the emerging trends of IP protection.

Africa is better placed to add to its economic growth through innovations adequately protected by IP laws. As indicated above, nations such as the United States and India continue to reap the benefits of innovations through IP laws. We are therefore of the considered opinion that if Africa is to achieve SDG 9, it ought to first have a robust IP legal framework. Such a framework must take cognisance of the peculiar situation of the African continent. It would, however, be out of place to measure Africa’s IP framework against European standards. This is because, the environment differs and the contexts are distinct. A robust IP framework must have home grown solutions.

We also advocate for a highly skilled human capital to operate Africa’s IP institutions. Studies point to the lack of adequate expertise in most IP offices in Africa. There is the need to beef up the competencies of the working force in these IP institutions. Africa must consider training more persons in IP matters. Such interventions will ensure that Africa derives the maximum benefit from its implementation of SDG 9.

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