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THE ROLE OF INNOVATION AND INTELLECTUAL PROPERTY RIGHTS IN ACHIEVING SUSTAINABLE DEVELOPMENT THROUGH THE INFORMAL SECTOR

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Abstract

As countries endeavor to migrate from resource-based to knowledge-based economies, innovation and intellectual property rights (IPRs) have become indispensable and are now regarded as the currency of the knowledge economy. In developing countries, they are key drivers and enablers for technological growth and sustainable economic development. Balancing the rights of the innovators and consumers so that innovators could recoup financial rewards from their investment has not been fully exploited. This paper investigates the role of innovation and IPRs in the informal sectors and their impact on the development of economies. Methodologically, the critical literature analysis was adopted in this paper. The study reveals that IPRs, innovation and creativity can drive sustainable development. Future research could focus on how the different innovation types, approaches, and models could be inculcated as practical sessions in the students' curriculum to develop student-led SMEs.

Keywords:

Models of Innovation, Frugal grassroots, Incremental, Social, Disruptive/Radical, Reverse, Inclusive

1. INTRODUCTION

The visionaries such as Ghanaian President Kwame Nkrumah, who delivered a keynote address at the Foundation Summit of the Organisation of African Unity, Addis Ababa on 24 of May 1963 [1], propelled innovators to develop technologies that would change the socio-economic landscape of developing countries, especially in Africa. The 21st century has experienced many disruptive technological changes [2] [3]. Everything that seemed abstract during the previous century has been reduced to trivial matters [3]. In this century, incredible speeds of producing output such as the complex geological surveys, machinery clearing roads absolutely with no effort, constructing roads, digging dams, delivering clean water, electricity generation, laboratories manufacturing sophisticated drugs, and massive plants being built have been witnessed. Recently, the world introduced modern dental and medical equipment, improved medicines, more efficient and sustainable energy resources, and new technological solutions to protect our environment or guarantee personal security. It is, thus, clear that technological change has transformed the quality of life [4] [5]. Further technological changes have led to the Internet of Things (IoT), i.e., a network of physical devices, vehicles, home appliances, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enables these objects to connect and exchange data [6] [7].

All these innovations result from incremental, frugal, and disruptive innovations in both formal and informal sectors. Within these sectors, innovators acquire intellectual property rights for their innovations. Therefore, it is critical to understand how intellectual property rights can be harnessed with innovation and creativity to effect sustainable development in developing economies, particularly in Africa.

Various studies have been conducted on how creativity and innovation lead to sustainable development. The effect of sustainability-oriented creativity, innovation and entrepreneurship education was studied by [8]. While, [9] examined the innovative thinking role in sustainable growth. Another study was done by [10] on creativity in sustainable business. While, [11] [12] surveyed studied on innovation, economic development, and intellectual property rights and sustainable development in the changing world. However, there is limited research on harnessing intellectual property rights together with innovation and creativity to effect sustainable development. This is the gap that the current study seeks to close by examining the use of intellectual property rights in innovation and creativity among small and medium enterprises (SMEs) to promote sustainable development, especially in the developing countries of Africa.

This paper is structured as follows: firstly, it defines the informal sector; secondly, it explains the importance of innovation, then the approaches to innovation; and thirdly, it presents the models of innovation and how these can be applied to SMEs, and how intellectual property rights interact with innovation in the informal sector. Lastly, the ways in which intellectual property (IP) holder amongst SMEs can exploit their IPRs to achieve sustainable development is presented.

2. THE INFORMAL SECTOR DEFINED

The informal sector may broadly be characterized as units engaged in producing goods or services with the primary objective of generating employment and incomes for the persons concerned. These units typically operate at a low level of organisation, with little or no division between labour and capital as factors of production and on a small scale [13].

The informal sector activities keep changing every time, the definition constantly varies, and many versions appear in the literature. One of the present definitions adopts the following form: Informal sector is defined as all unregistered or unincorporated enterprises are owned by individuals or households that are not constituted as separate legal entities independently of their owners, and for which no complete accounts are available that would permit a financial separation of the production activities of the enterprise from the other activities of its owner(s) [14]. Although there is not a universally accurate or accepted description or definition, there is

a broad understanding that the term "informal economy" accommodates considerable diversity in terms of workers, enterprises, and entrepreneurs with identifiable characteristics. Nevertheless, they experience specific disadvantages and problems that vary in intensity across national, rural, and urban contexts.

The term "informal economy" is preferable to "informal sector" because the workers and enterprises in question do not fall within any one sector of economic activity but cut across many sectors. However, the term "informal economy" tends to downplay the linkages, grey areas, and interdependencies between formal and informal activities [14]. The term "informal economy" refers to all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements. Their activities are not included in the law, which means that they are operating outside the formal reach of the law; or they are not covered in practice, which means that – although they are operating within the formal reach of the law, the law is not applied or not enforced; or the law discourages compliance because it is inappropriate, burdensome, or imposes excessive costs. Although most are at risk and therefore most in need, most workers in the informal economy have little or no social protection. They receive little or no social security, either from their employer or the government. Beyond traditional social security coverage, workers in the informal economy are without social protection in education, skill-building, training, healthcare, and childcare, which are particularly important for women workers. The lack of social protection is a critical aspect of the social exclusion of workers in the informal economy.

In this paper, the informal sector is regarded as a group of production units influenced by innovation, forming part of the household sector as household enterprises or, equivalently, unincorporated enterprises owned by households.

3. INNOVATION

3.1 IMPORTANCE OF INNOVATION

Innovation provides solutions for gap reduction in the living standards between the rich and the poor groups in a society. This is achieved by producing simplified versions of existing often-sophisticated products for purchase by low-income populations.

Innovation support grassroots entrepreneurship and has the potential to integrate previously marginalized groups into circuits of economic activities, especially the innovation by low- and idle-income groups. Innovation usually exploits traditional knowledge or an adapted use of modern technology that most populations can afford, such as mobile phones. However, there is often some value in local innovations that are born out of necessity and can help improve living standards more than some technical innovations.

Innovation is linked to the market, i.e., the informal sector responds immediately to market demand, supply, and social demand. Therefore, innovation can drive growth and create jobs. The informal sector's contribution to the GDP and job creation has been studied extensively. It has been found that innovation from this sector has driven significant economic growth and job creation.

3.2 INNOVATION APPROACHES

The first approach to innovation is to describe the innovation to determine its depth and detail completely. However, one of the bottlenecks of this approach is the amount of work that one must do in putting down the descriptions

The second approach is to count the number of innovations. In this approach, one must count all the essential innovations initiated by a company in the different sectors of the economy. Several sector experts must monitor the trade press, including other sources, for stories about innovations. After compiling the stories, one will build up a fascinating picture of the innovation intensity in different sectors of the economy [14].

Another approach for assessing innovation is preparing a questionnaire survey for innovative companies. For example, one of the best-known surveys for innovative companies is the Community Innovation Survey in which 18 000 companies responded by providing innovation regarding innovation strategies that they use. The results showed a picture of innovation intensity amongst the different sectors of the economy for a particular country.

One can also measure how innovative individuals or companies are by counting the number of issued patents by each sector, although patents provide a measure of inventions rather than innovations. The invention is simply a result of the process of putting money in and getting knowledge out. At the same time, innovation is the result of process of using new knowledge/adapting existing knowledge to new applications and getting money out or extracting value (i) new value, more effectiveness, new products, processes, or services, and (ii) doing something better differently. However, the entrepreneur is the driving force in innovation, putting into practice the introduction of new inventions and receiving profits as a reward. Therefore, a sole dependency on patent data to measure innovation is inadequate [15]. This means that the presence or absence of patents does not immediately indicate the level of innovation, although they provide a good picture. Moreover, in some cases, patents could act as bottlenecks that impede creativity and innovation and impede collaborations [16]. The information about issued patents can be obtained from Patent Offices. Although the process may be viewed as straightforward, it is rather time-consuming, especially if one is to create a picture of patent intensity for each sector.

One can also use the company's accounting research on research and development. This data relates to the amount expended on research and development, especially in high technology sectors. However, this approach has several limitations; for example, small companies often do not have entry accounts for their Research and Development (R&D). Lack of records doesn't immediately depict the lack of innovation. Success in innovation does not directly call for expenditure on R&D but calls for another parallel spending on design, training, and investment, and high R&D does not immediately imply high innovation. Moreover, companies in some sectors may be concerned that a high R&D figure in their accounts may affect the company's stock market valuation mainly because R&D is perceived as a risky investment.

3.3 MODELS OF INNOVATION

The innovation models are divided into two main categories, open and closed innovation. Closed innovation is related to user innovation, know-how trading, and mass innovation. The closed innovation paradigm views successful innovation as requiring control and ownership of the intellectual Property (IP). At the core of closed innovation, the model is the strict control of ideas, which

are never allowed to originate outside or leave the firm [17]. The cornerstone of the close innovation paradigm could be viewed as resting on the following six principles, as suggested by [18]: (i) the brightest minds in our sector work for us, (ii) successful R&D demands that we discover, develop, produce, and deliver ideas to market in-house, (iii) discovering an idea is the surest way to get it to market first, (iv) if we get to market first, we can control the market, (v) if we have the most and best ideas, we will control the market, and (vi) strict control of our IP is essential to prevent competitors from profiting from our ideas. The latter principles were associated with giant, inward-looking companies monopolising their sector, investing heavily in internal research, presenting a significant barrier to entry for would-be start-ups, and then reaping the rewards in terms of market share.

On the other hand, Open Innovation is defined as a paradigm that assumes organisations can and should use both internal and external ideas and internal and external paths to the market [19]. It is viewed as using purposive inflows and outflows of knowledge to accelerate internal innovation, and expand the markets for external use of innovation, respectively. This paradigm assumes that the firms can and should use external ideas and internal ideas and internal and external paths to market as they look to advance their technology [20]. The generic principles of open innovation are stated as follows:

- Not all the smart people in the field work for us. We need to work with smart people inside and outside the company,
- External R&D can create significant value: internal R&D is needed to claim some portion of that value,
- We don't have to originate the research to profit from it,
- Building a better business model is better than getting to the market first,
- If we make the best use of internal and external ideas, we will win, and
- We should profit from others' use of our IP, and we should buy others' IP whenever it advances our business model.

In the light of the above, we consider that the most suitable model for an SME will be open innovation because of the following reasons, open innovation:

- Views both internal and external ideas as equally important sources of valuable ideas and emphasizes the importance of aligning open innovation with the business model of a firm;
- Allows the collaboration between the individuals, groups, and public agencies in the informal sector to create innovative products and services and, in the process, share its risks and rewards;
- Allows outsourcing, licensing, partnerships, knowledge sale, and divestment of company units; and
- Beliefs that organisations cannot rely only on internal research in a world of distributed knowledge and can benefit immensely from innovating with partners.

The models of innovation could be made vividly by implementing the intellectual property rights (IPRs). The IPRs are often used to indicate the organisations, regions, or countries' innovative capacity and performance [21] [22]. As such, IPRs are a significant generator of patent numbers and patenting behaviour. IPR-statistics provide measures of innovation output, measuring many aspects of inventive performance, including R&D [23]. Furthermore, IPRs may also be viewed as measures of innovation input, as they are bought or licensed and used as a source of information by subsequent inventors.

Amongst others, one of the most critical roles that IPRs system play is to protect the innovators' IP assets and prevent other innovators from exploiting them. Thus, IP affords innovators to recoup the innovation expended and offers an incentive for expenditure on innovation [24]. Furthermore, efficient IP systems assist in accelerating access to knowledge markets, thus enabling firms to buy and sell intellectual assets (for instance, via the assignment, licensing, etc.), which encourages the culture of R&D investment. Moreover, efficient IP systems play a pivotal role in technology collaborations because they protect firms from unconscious knowledge leakage and minimize concerns related to the unscrupulous behaviour of the collaborators [25].

The IPRs and, in particular, patents are important to the functioning of the technology environment. This is because patents can accelerate the realization of transactions, especially when knowledge is systemized and hence easily imitable. In that case both the disclosure and protection of technology are possible. Furthermore, IPRs allow innovators to access finance for innovative sectors. This depicts the level at which IP assets can act as important signals for potential funders. Therefore, the role of the IP system is strongly interrelated with venture capital and business angel funding in particular.

Moreover, the development of markets where IP assets can be used as collateral strengthens its contributions to innovation. Patents have also become a favoured mode to acquire property rights on intangible assets to gain access to external finance. They are also more commonly being employed in opportunistic patent litigation or to block the entrance of competitors.

4. EXAMPLE OF INNOVATION AS APPLIED TO THE SME

Innovation is important at all stages of development, and this implies that different types of innovations play a critical role at various stages. Innovations may be grouped into several classes. Innovation can either be high or low technology and based on the efforts of private firms, governments, non-government organisations or individuals, universities, NGOs, and some are even grassroots innovators with little and, at times, no formal education at all.

Below, we provide these classes and SME examples under each class:

4.1 INCREMENTAL INNOVATION

Incremental innovation refers to a type of innovation at the early stages of research and development, i.e., it involves modest changes to existing products. It is often associated with adopting foreign technology and or local, traditional knowledge generated out of necessity. It mainly consists of social innovation to help introduce technical innovations in communities and to improve the effectiveness of business and public services. The adoption requires adaptation, i.e., innovation needs to respond to specific local conditions for outcomes.

The innovation mainly addresses challenges faced by low/ middle-income households to improve their welfare and the

possibility of access to business opportunities. The main agents of incremental innovation are small firms, public and private associations, universities and research institutes, and leading private businesses, especially those exposed to foreign or international markets. This type of innovation is mainly driven by intense research and development but adapts, applies and improves existing knowledge. Usually, this type of innovation primarily addresses the needs of the poorest communities by offering solutions to their day-to-day challenges as they arise. Learning on the job, i.e., apprenticeships, solve some of these challenges. Moreover, they appear to be invisible because the of lack of use of the appropriate metrics, for instance, patent registrations as in the formal sector. Examples of innovations under this type embrace:

4.1.1 Gillette Razors:

Gillette has used incremental innovation to stay ahead of the competition by adding new features to an existing product. For example, gillette razors started life with a single blade, but their product has evolved, adding different features and more blades as the company has sought to meet customer needs better [26].

4.1.2 Dropbox:

Dropbox is one of the best examples of lean innovation. The file transfer service has over 500 million users worldwide, but it started life as a minimal viable product in the form of a 3-minute screencast showing consumers what Dropbox could do. Response to the video enabled Dropbox to test if there was a demand for the product and, at the same time, capture an initial audience through a waiting list. But most importantly, comments on the video provided a way for Dropbox to gain high-quality feedback from target customers, which the team subsequently used to shape product development in line with consumer needs.

4.2 FRUGAL INNOVATION AND GRASSROOTS INNOVATION

Frugal innovation and grassroots innovation reduce the complexity and cost of a good and its production by removing the non-essential features, i.e., redesigning products and processes to cut out unnecessary costs [27] [28]. Basu et al. [29] define frugal innovation as a design innovation process in which citizens' needs and circumstances in the developing world are put first to develop appropriate, adaptable, affordable, and accessible services and products for emerging markets [29]. Frugal innovation is sometimes assumed to match Jugaad innovation which relies on six principles [30]: (i). Find opportunities in a context of adversity and transform constraints into opportunities, (ii). Do more with less, (iii). Think and act with agility, (iv). Aim for simplicity, (v). Involve the marginal population, and (vi). Follow your heart. Frugal innovation is related to new market segments linked to new needs [30].

The main goal behind frugal innovation is to develop a product that can improve the standard of living for the poor on a sustainable basis, serves as a real need, is effective, and with extensive outreach. Thus, this type of innovation establishes an engine of economic growth by producing less expensive products to increase the extent to which the needs of the poor are fulfilled and sets a positive factor of supporting demand. As a result, macroeconomic growth becomes more inclusive.

Examples of frugal innovation comprise M-KOPA, a home solar solution: M-KOPA is a home solar solution in a box started in Kenya. It has a solar rooftop panel three LED light bulbs, a solar radio, and a cell phone charger. The whole kit costs $200, which is expensive for most Kenyans. This is where mobile phones make them more affordable (half of Kenya's population uses M-PESA, a mobile payment solution). After making an initial deposit of $30, you make a daily micropayment of 50 cents with your mobile phone. Once one has made 365 micro-payments, you own the product, can set it up, and start receiving clean, free electricity. This is extremely useful in Kenya, where 70% of people live off the grid. M-KOPA now provides energy to more than 450,000 homes in Kenya, Tanzania, and Uganda. With frugal innovation, you can take something that is abundant mobile connectivity to deal with what is scarce energy (TED).

4.3 SOCIAL INNOVATION

Social Innovation refers to developing and deploying effective strategies, and solutions to challenging and often systemic social and environmental issues in support of social development. It simply involves new ideas that meet social needs, create social relationships and form new collaborations. Among others, these innovations consist of products, and services that address problems that have not been effectively met. Social needs include activities like online volunteering, microcredit, or distance learning.

4.4 DISRUPTIVE/RADICAL INNOVATION

Disruptive/radical innovation refers to a significant change in technology; possibly, it is the first application of innovation in the world [24]. It is a response to technology to unserved needs. The technology on product aspects is enhanced to make a new product not valued by mainstream customers. The consequences of disruptive innovation are noticeable when mainstream customers shift to the new product gaining market share in an established market [24]. Both Zoom, Skype and podcasting can be considered "disruptive technologies" in that they allow for new and different ways of doing familiar tasks and in the process, may threaten traditional industries. These two technologies offer intriguing opportunities for language professionals and learners, as they provide additional channels for oral communication [26]. Another example of disruptive technology is autonomous vehicles**.** This technology consists of automated cars and drones that could operate and self-drive in many situations by incorporating advanced light detection and ranging technology. The potential uses for these vehicles are farmers, architects, and real estate agents.

4.5 INCLUSIVE INNOVATION

This type of innovation tackles the necessities of people with low incomes to improve their welfare, i.e., access to food, shelter, health, safe water, and electricity. It aims to lead to affordable access to quality goods and services and thus create livelihood prospects for the excluded vulnerable population, especially at the base of the pyramid, and on a long-term sustainable basis with a significant outreach. In the long-term, the costs of production and distribution of inclusive innovation must be extremely low such that even excluded people or those at the bottom of the pyramid can afford it.

The excluded population or population at the base of the pyramid are usually the poor, the disabled, orphans, and the elderly [30]. Sometimes, the exclusion is due to financial reasons or

location. The essential components of inclusive innovation are affordable access, sustainable basis, quality goods and services, access to the excluded population, and significant outreach. The benefits emanating from inclusive innovation must reach a large section of the targeted population. The rationale of this type of innovation is that people with low income (usually from least developing countries) do not have access to many innovations that improve their quality of life by providing them with access to goods and services like health, education, etc. Inclusive innovations are gaining momentum in emerging markets such as China and India [29]. In these countries, policies on inclusive innovations have been made a priority. Research grants have been provided to researchers from disadvantaged groups to promote inclusive innovation in other countries. Furthermore, the deployment of programs to popularize science and technology, the provision of micro-credit to entrepreneurs, and grants to firms locating their R&D activities in peripheral regions have been prioritized.

4.6 USER INNOVATION

User innovation refers to a new product or service developed by intermediate or individual users (for instance, user firms or industries) or consumer users (individual end-users or communities) without the assistance or involvement of suppliers, producers, or manufacturers [31]. In user innovation, end-users, rather than manufacturers, are responsible for considerable innovation. Compared to other innovation processes, or types, this kind of innovation is very essential on several fronts because it allows the innovator to develop an exact product needed by users instead of relying on manufacturers to act as their agents. Manufacturers often develop products that cater the needs of a wide range of consumers and trying to meet a wide range of the needs of different people. If the product does not cover a particular user experience, they make the adjustments themselves to meet their own needs.

Depending on the user, in most cases, these ideas are then communicated to the manufacturing companies on how the product can be improved, and this process is called free revealing. This type of innovation can be seen in home cleaning equipment, sports equipment, medical devices and scientific instruments. For example, in science, scientists develop new scientific instruments on their own to make an exact measurement of their desired variables. After that, they send the details to manufacturers, who then copy the innovations (alterations) to create more specific instruments and later sell them to users.

In the case of sports, the fanatics develop new equipment required for various activities, for example, snowboarding (where users join two skis together to produce a snowboard, and this was when they started to build snowboards when they began to lose several customers to snowboard manufacturers), mountain biking and kite surfing and then send them to manufacturers.

The manufacturers then copy the user-developed products and sell them to the market. Some examples include the music industry, which was late to embrace digital music as man users converted their collections to MP3 in 1990 before music was commonly sold in digital format. On the other side, divers found ways to waterproof cameras before waterproof cameras were made available (https://simplicable.com/new/user-innovation).

4.7 REVERSE INNOVATION

Reverse innovation is often related to innovation originating from the South that is transferred to the North after some incremental or more significant changes have been incorporated into the original product. Reverse innovation matches a new product developed in emerging markets modified for sale in developed economies [32]. Reverse innovations are cost, good-enough, or frugal innovations that find a market among customers outside of the emerging markets at which they were initially targeted. They add that the products often the products must be "re-engineered" to ensure that they are adapted to the norms and characteristics of their new markets. Based on this phenomenon, one can observe that reverse innovation requires solid technological and managerial competencies. Several definitions have emerged; for example, according to [33], reverse innovation is developing and selling new products in emerging markets as a first step and then modifying these products for sale in developed countries. The idea of RI is associated with the market issue and not with the causal technological system. The innovations transferred to the North are new technological devices for which the global markets are relevant.

Frugal innovation and reverse innovation are connected to the same concept of innovation, i.e., low R&D costs, weak technological sophistication, and appropriate response to peoples' basic needs [32]. Furthermore, frugal innovation is related solely to the domestic market. Still, by contrast, reverse innovation aims to develop market-oriented products in and for emerging economies through globalized innovation teams, which are meant to be sold worldwide from the beginning. This shows that both frugal and reverse innovation share the same approaches, i.e., aiming to develop simple, and ecological products, processes, services and business models with low resources, costs, and environmental interventions. Similarly, considers FI and RI to be variables that push the sustainable performance of firms.

5. CONCLUSION

This paper explores how to use intellectual property rights with innovation and creativity to achieve sustainable development. This is conducted through the critical analysis of literature from published academic journals. Furthermore, the critical literature analysis indicated that the type of innovation common among informal businesses in developing countries is catch-up innovation. Moreover, the study examined various innovation types, approaches, and models relevant to the SME sector in developing countries. Finally, we discussed how such innovations could interact with intellectual property rights to drive sustainable economic development. Future research should focus on how the different innovations be included in students' curriculum to develop student-led SMEs.

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