2 Hidden asymmetries: Enhancing trade through traceability, crypto-labelling and ethical property rights

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Abstract: This chapter examines the implications of information asymmetry on trade facilitation in Africa and how it can be resolved through a better understanding of adverse selection, moral hazard and principal-agent problems. We propose an explanation of how and why crypto labelling will help advance traceability and trade facilitation in Africa under an appropriate intellectual property rights (IPR) regime. Furthermore, the chapter presents a conceptual framework that provides a theoretical framework on how the prisoners' dilemma (tit-4-tat, indefinite game, repeated game), opacity in trade, creation of incentives, cross-border services, and a pandemic such as COVID-19 with face masks and vaccines, creates fragility in regional and global trade. Based on our inductive and deductive reasoning, we posit that a legal trade framework is not necessarily ethical, and policy makers should take cognisance of this challenge.

Key words: intellectual property rights; information asymmetry; crypto-labelling; traceability; trade facilitation; ethical (legal) instruments

1 Introduction

The non-tariff and vexatious cross-border obstacles at most African borders have placed Africa at a disadvantage, with intra-regional trade remaining very low. As Africa undergoes an intensive reorganisation and consolidation through trade blocs, there is a requirement for a consistent

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and harmonised cross-border framework necessary for sustainable intra-regional trade. This chapter addresses the issues associated with cross-border trade in Africa at a crucial moment when Africa is forging a united front in its strategies towards sustainable intra-regional trade as well as grappling with the devastating impacts of COVID-19 on its economies. With the launch of the African Continental Free Trade Area (AfCFTA), Africa seeks a united intra-continental trade as it wrestles with the cross-border inconsistencies of unstandardised regulations, diverse and volatile macroeconomic structures, incompatible infrastructure and constant conflicts. This creates economic uncertainties and growing concerns. Is it possible for African countries to overcome fragility and thrive? We propose in this chapter that antifragility can be attained if hidden asymmetries in the trading market are reduced and if it is understood that the market is always in a state of disequilibrium due to the activities of the players in the market, though equilibrating tendencies are visible.

The root cause of many of the cross-border obstacles is the result of information systems supported by ill-defined policies and poorly designed tracking systems, leaving important trade decisions dependent on ambiguous systems and asymmetric information. The outcome has been information opacity which is inversely related to trade facilitation.

This chapter looks at opacity in trade (OT) and its contribution to Africa's trade dilemma, explaining how opacity in trade can be reduced through the use of a single window, up-to-date websites, automatised systems, blockchain, traceability and a well-defined property right. Ethical and beyond-legal intellectual property rights (IPRs) are important in disseminating technology if due acknowledgment is made and appropriate royalties are paid. However, caution must be taken in the implementation of IPRs as they may impede development while promoting a global oligopolistic structure wherein a few players exercise a monopoly. Therefore, if developing countries and Africa, in particular, intend to grow their inter-regional trade, appropriate frameworks beyond merely legal instruments and capacity development should be emphasised. Specifically, we examine the following:

- the challenges of asymmetric information in trading using the tit-for-tat approach;
- the nexus between traceability and intellectual property rights;
- the implications of trade facilitation;
- the reasons why policies and standards should be ethically grounded and more than simply legally.

2 Hidden asymmetries

The interaction between people or stakeholders in any market, at times, is fraught with incomplete information because of the non-availability of desired information and the cost associated with searching for information. Even when the marginal benefit (MB) for an additional search is greater than the marginal cost ((MC), MB >MC), the desirability of information will still depend on the nature of the good, that is, whether they are search goods or experience goods of which the quality can be known through inspection or after the product has been consumed, respectively. It is more difficult with non-tangible goods such as intellectual property rights because of challenges in defining and protecting copyright, trademark, patent, and trade secrets, among other aspects. As a result of this, inventions and ideas should be protected by well-defined policies that enable their creators both to signal the originality of their ideas and to receive appropriate compensation. In other words, a lack of appropriate signalling mechanisms promotes asymmetric information, which leads to adverse selection because the bad, usually crowds out the good products. On another note, when the activities of the players in the market are difficult to monitor, it enhances moral hazard. For example, let us assume that there is an insurance company in Durban, South Africa, that insures cargo and freight companies in Africa. The availability of insurance may make some of the leaders of the companies not take extra care in their day-to-day activities. The solution is to arrange a contract that indicates only partial coverage in the case of loss or damages. If this arrangement is not in place, a full coverage contract may create an incentive for some unscrupulous elements in such logistics companies to contrive, for example, a vehicle fire or vehicle disappearance. Finally, to avoid the principal-agent problem, the germane staff both in public, for example, immigration, customs, law enforcement agencies, tax collectors, and standards organisations and private sector, for example, shipping companies, airlines, and financial institutions, should be well-trained and familiar with both new technologies, as well as various cross-border legal protocols. They should also be competitively compensated, for example, efficiency wage, profit sharing and bonuses and provided with a guaranteed retirement plan, as well as fringe benefits that will better align their long-term objectives with the objective of the organisation.

As indicated above, players in the trade market always have their motives when they operate in the market. Based on this premise, we suppose that the interaction between nations and individuals involved in trade across borders is a game. Hypothetically, let us imagine that there are three countries in the market for vaccines, for example, COVID-19

and antiretroviral drugs. Country A has a pharmaceutical company that produces the vaccines; B is a country in Africa with a compulsory licence to produce these vaccines; and B is supposed to export the generic drug to C, another country in Africa. Please note that the export of generic drugs at times is cumbersome due to the trade-related aspect of intellectual property rights (TRIPS). However, in this model we will assume that this will not be a problem, and it is given just as the activities of the rest of the world (ROW) are constant. In our model, we assume that players A and B are supposed to cooperate because it is a repeated prisoner's dilemma game. Suppose A defects by not supplying the necessary patented information or help with the necessary active ingredients or chemicals, then B might also defect by looking for another source and undercutting returns to A. Therefore, a tit-for-tat strategy may be useful to enforce cooperation in a game involving the exchange of goods or ideas across borders.

Tit-for-tat usually is a strategy employed in repeated games, otherwise, players are likely to defect if it is a one-shot game or if the end game is known. A player employing this strategy will start by cooperating and then subsequently imitate an opposing player's previous action. If the opposing player was cooperative previously, the initiating player is cooperative. If otherwise, the initiating player is not. For this strategy to work, the players must be stable, as well as preferably few in number; there must be a way to detect defection and retaliate, demand and cost functions must be relatively stable, and the number of moves must be infinite. The chief executive officer of Air Peace, Allen Ifechukwu Onyema (2021), alluded to using tit-for-tat to secure reciprocity from Côte d'Ivoire and Togo regulatory authorities as a result of hidden asymmetries in the movement of people and cargo in the region. He indicated that some countries whose flights can operate in Nigeria refused or were reluctant to allow Air Peace to operate in their countries, for example, Lomé's initial non-approval and Abidjan's exorbitant and discriminatory landing fee of around US $10 000. According to the entrepreneur, a court ruling or an injunction that stops airlines from such countries, mostly Francophone, from operating in Nigeria may be necessary to obtain reciprocity. In other words, the cons of tit-for-tat notwithstanding, it is a strategy that ensures commitment among players in international trade if the game is infinite.

Tit-for-tat cannot be applied for a one-shot game involving two or more players. This is even more challenging when the property right of creative work is not well defined and then exported as a trade-in service internationally via platforms such as Netflix. This example of hidden asymmetries in the market of intellectual property rights was seen in the case of *Mo Abudu v Tobore Ovuorie*, of an investigative journalist who had the impression that she had not been adequately compensated by

Mo Abudu and her company EbonyLife (EL) for using her story[1] for a popular movie, Oloture, which started streaming on Netflix late in 2020. Meanwhile, Mo Abudu indicated in a video published online, to which Tobore responded, that the journalist was employed by *Premium Times* where the article was published, that the media house was well compensated for the idea and that both the media house, *Premium Times* and Tobore had been adequately[2] acknowledged in the production. Who owns the copyright? Is a former employee bound by a contract signed by a former employer even when the idea was developed in collaboration with other organisations? Is the time of conception relevant in determining copyright protection? Legal is not necessarily ethical. This scenario, which leaves most of the questions above unresolved, is an example of the inappropriate attribution of credits for ideas when property rights are not well defined. Furthermore, cases of injunctions against the streaming of movies have been obtained because of the inappropriate impression that the idea was another person's copyright. If developing countries want to continue to trade in services across borders, appropriate frameworks and legal instruments should be well developed coupled with capacity building for pertinent professionals.

3 Traceability and intellectual property rights

The asymmetries in the exchange of corporeal and non-corporeal goods can be resolved by traceability and a well-defined property right. This part presents scholarly papers and examples related to traceability, the challenges and solutions to traceability, intellectual property and trade, the economics of intellectual property rights and why the conversion of a non-excludable good to an excludable good through the introduction of intellectual property rights, such as patents, copyrights, trademarks, geographical indications and industrial designs, creates imperfection in the market. This scenario notwithstanding, there is always a residual that will remain in the commons.

3.1 Traceability

Trade in Africa has continued to be challenged by the lack of appropriate legal instruments.[3] Based on this premise, important trade decisions are

1 The article 'Inside Nigerians ruthless human trafficking Mafia' was published on 23 January 2014 by Tobore Ovuorie in *Premium Times* as an employee of the media house.

2 Credits were also given to Tobore and *Premium Times* in the movie.

3 MG Sikoyo and others 'Intellectual property protection in Africa. Status of laws, research and policy analysis in Ghana, Kenya, Nigeria, South Africa and Uganda' (2006) African Centre for Technology Studies (ACTS) Ecopolicy Series 16, series editor Judi W Wakhungu, Nairobi, ecopolicy16_1.pdf (africaportal.org)

made based on ambiguous systems, asymmetric information, and both poorly interpreted and understood policies, rules and regulations. This has left room for misinterpretation, dishonesty and mistrust. For instance, a system that promotes organic or halal foods, or both, will expect a farmer to account for the place of origin, raw materials, soil, farming methods, harvesting, processing, transportation and distribution of produce. This is a laborious and strenuous activity requiring rigorous record keeping. If the benefits are not well understood by the stakeholders in the supply chain, then the record keeping may be compromised. The lack of understanding and awareness of the benefits end up being a deterrent to accurate record keeping and consequently compromise traceability. Traders would rather exploit less cumbersome processes as they do not understand and appreciate the benefit of traceability. This has resulted in regional and cross-border trade being flawed with dubious activities,[4] which are difficult to trace back to the original source. Foul play with regard to the quality and quantity of products for selfish goals is a common practice that has undermined profits and acted as a disincentive to trade facilitation.

Trade facilitation can be enhanced through traceability, which promotes quality, creativity and ownership. The possibility to trace and associate a product to its origin creates an incentive to maintain quality which in turn allows for openness and protection of self-image and hence fosters excellence as there is an increased appreciation for quality.[5] As trade becomes globalised, more people are appreciating the value associated with quality and aggressively protecting the image of their products on the market. In the African context, since there is little ability to trace due to a lack of branding, proper packaging and record keeping, stakeholders are not motivated to maintain quality and standards. Many stakeholders are able to get away with poor-quality products in the pool of anonymous producers, thereby enabling the continued manufacture of low-quality goods and services.

There is a need to harmonise information for a common trade language through efficient, transparent and secure electronic data management, sharing procedures, packaging and labelling regulations, all of which remain underdeveloped in Africa, to facilitate cross-border trade

4 C Lesser & E Moise-Leeman 'Informal cross-border trade and trade facilitation reform in sub-Saharan Africa' OECD Trade Policy Paper 86 (2009), https://www.oecd-ilibrary.org/trade/informal-cross-border-trade-and-trade-facilitation-reform-in-sub-saharan-africa_225770164564 (accessed 15 January 2021).

5 C Yuan and others 'The impact of food traceability system on consumer perceived value and purchase intention in China' (2020) 120 *Industrial Management and Data Systems* 810, https://doi.org/10.1108/IMDS-09-2019-0469 (accessed 31 January 2021).

in Africa. Informal trade flow across borders comprises the bulk, which goes largely unrecorded. Moreover, the trade language across borders has not been standardised.[6] The promotion of cross-border trade requires set regulations, compliance with those regulations, documentation for imports, and an understanding of the legalities involved in documentation and data management to promote traceability.[7] As well there should be protocols and publications that create awareness and ensure reliable information, as well as record keeping that is traceable and accessible by all stakeholders. With such a system in place, easily accessible information can reduce information asymmetry and alleviate market failure. This system may be further advanced through the use of crypto-labelling to allow the traceability of a product from the start of a value chain to the end.[8] This labelling technology would, for example, solve the asymmetries in the halal industry as it enhances product traceability. Crypto-labelling helps to contain product adulteration, and tampering with expiry dates and ingredients, thus promoting authenticity, transparency and trustworthiness. Crypto-labelling also helps one understand the journey of a product from start to end and solve a global value and supply chain fraught with traceability challenges. Table 1 below presents different scholarly papers on the challenges of traceability and the suggested solutions.

6 DM Dooley and others 'FoodOn: A harmonized food ontology to increase global food traceability, quality control and data integration' (2018) 2 *Science of Food* 1; S Charlebois and others 'Comparison of global food traceability regulations and requirements' (2014) 13 *Comprehensive reviews in food science and food safety* 1104.

7 M Tripoli & J Schmidhuber 'Optimising traceability in trade for live animals and animal products with digital technologies' (2020) 39 *Revue Scientifique et Technique* 235, Optimising-traceability-in-trade-for-live-animals-and-animal-products-with-digital-technologies-EN--FR-Optimiser-la-tracabilite-des-animaux-vivants-et-des-produits-dorigine-animale-faisant-lobjet-d.pdf (researchgate.net) (accessed 15 January 2021).

8 B Adekunle 'Halal food: Conception, misconceptions, and certification [Blog]' *ECVOntario* (2019), http://evcontario2011.blogspot.com/2019/01/halal-food-conception-misconceptions.html (accessed 31 January 2021).

Table 1: Summary of studies about traceability

Author/Year	**Study**	**Solution**
Olsen, P & Borit, M 'How to define traceability' (2013) 29 *Trends in Food Science & Technology* 142-150.	Traceability has been defined by Olsen and Borit as the ability to access any or all information relating to that which is under consideration, throughout its entire life cycle, by means of recorded identifications.	In their definition, they emphasise the value of record-keeping as a key component of traceability.
Pizzuti, T, Mirabelli, G, Sanz-Bobi, MA & Gomez-Gonzalez, F 'Food track & trace ontology for helping the food traceability control' (2014) 120 *Journal of food Engineering* 17-30.	Pizzuti et al 2014 helped create a traceable food chain from farm to folk by describing the food language used in cultures around the world, making an effort to create a common food language. In so doing, the opacity in food terminologies and gaps were addressed.	A common understanding of food terminologies and classifications across the food value chain is important in order to improve traceability and facilitate trade across borders.

Opara, LU & Mazaud, F 'Food traceability from field to plate' (2001) 30 *Outlook on Agriculture* 239-247.	There is growing demand for food traceability globally, given concerns about food safety and ethical issues such as the use of GM materials, hormones and growth regulators, animal welfare issues and food production methods. However, traceability requires investment in IT and human resources which cannot be afforded by many developing countries.	There is a need for food policies and regulations that promote traceability and investment in IT and human resources in order to boost the technical and financial capacity of small-scale consumers in implementing food traceability.
Van Rijswijk, W & Frewer, LJ 'Consumer perceptions of food quality and safety and their relation to traceability' (2018) *British Food Journal*.	Food quality and food safety are considered interlinked and important for the traceability and purchase of a product.	Food quality and food safety play a major role in food traceability.

Golan, EH and others (2004) 'Traceability in the US food supply: Economic theory and industry studies' (No 1473-2016-120760).	Traceability in the US is motivated by economic profits, where consideration is on profits rather than government regulations. The traceability system is motivated by the effect of minimising distribution and recall expenses. However, to make traceability effective, there is a need to ensure that the traceability system works in conjunction with an effective safety	While it's necessary for the African governments to enforce traceability regulations, African stakeholders in the supply value chain, too, need to understand and appreciate the economic value of an efficient and effective traceability system and its association with an effective safety control system.
Pearson et al 'Are distributed ledger technologies the panacea for food traceability' (2019) 20 *Global Food Security* 145-149.	Distributed Ledger Technology (DLT), and blockchain in particular, is essential in improving and maintaining traceability; however, there is a need for data standardisation along the food supply chain, ease of use of the DLT to facilitate entry into the food chain, governance and scalability.	In theory, DLT can provide an immutable record of food traceability. This enables extremely robust and rapid traceability of food origin through the chain.

Charlebois, S and others 'Comparison of global food traceability regulations and requirements' (2014) 13 *Comprehensive Reviews in Food Science and Food Safety* 1104-1123.	According to Charlebois (2014), Many of the OECD countries lacked specific legislation on food traceability. However, global tracing and tracking of imported products done through record keeping, lot identification and	An integrated and standardised global traceability system with uniform electronic identification and database is important to support cooperation across border trade.
Adekunle, B & Filson, GC 'Understanding halal food market: Resolving asymmetric information' 2020 5 *Food Ethics* 13	This is a seminal paper about asymmetric information in the halal food market. The authors alluded to the fact that the level of asymmetric information leads to opaqueness in the food system and is inversely related to food authenticity, based on Adekunle and Filson (2019). There is generally a problem of adverse selection, which is pronounced in the food sector based on their attributes as an experience good.	Appeal to Adekunle (2016). The authors suggested the use of crypto-labelling, a blockchain technology, to reduce asymmetric information in the food sector through traceability, authenticity and transparency.

3.2 Intellectual property rights and cross-border trade

IPRs are the ownership of originators' inventions, created as an incentive to foster creativity for the benefit of the economy while enabling the inventors to enjoy the fruits of their achievements. IPRs act as a motivation for disclosure as patent holders reveal the step-by-step details of their creativity, which otherwise would never have been known. Through the use of trade licensing, joint ventures and franchising, patent owners can

reveal the details of the patent,[9] making technology transfer possible. This increases transparency as it encourages disclosure of processes and end products. IPR protection helps inventors recover the costs of the invention by awarding exclusive rights to commercialise their assets over a period. This enables them to sell proprietary rights above marginal cost,[10] hence encouraging continued investment in creativity. So, patents, trademarks and copyrights are important in trade as they enable investors to recoup their initial investment, facilitate continued production and hence avoid market failure due to underproduction. However, if not well-managed IPRs may lead to market failure as competition squeezes out those who cannot afford to pay the high prices associated with IPRs.

IPR management differs from one country to another, with developed economies observing stricter IPR protection policies compared to developing economies. The difference in the strength of the IPRs policies as well as in the law enforcement capability of the two countries, is likely to affect trade flow.[11] Countries with stricter IPR policies and implementation tend to trade with countries with equally good IPR policies, making IPR protection a prerequisite for a positive cross-border and international trade flow.[12] Because of the perceived positive impact of IPR on trade facilitation, countries with a strong IPR policy have continued to push for stronger global IPR adherence believing this is important for international trade. While IPR policies may be necessary for trade facilitation, developing countries are known to have weak IPR policies or a weak implementation capability which makes these countries less competitive.

For example, referring to our countries, when country A, with weak IPR policies, trades with two countries, B and C, where country B observes strict IPR rules and country C has a weaker adherence, country A has a choice to import authentic goods from country B or cheaper affordable imitation from country C. Since imitation goods may suffice as substitute goods for those from country B, the imitation goods are likely to flood the market, deterring the importation of goods from country B despite its strong IPRs protection. Apparently, country A has turned its country into

9 L Yang & EK Maskus 'Intellectual property rights, technology transfer and exports in developing countries' (2009) 90 *Journal of Development Economics* 231.

10 C Fink & AC Primo Braga 'How stronger protection of intellectual property rights affects international trade flows' (1999) Policy Research Working Papers, World Bank Group eLibrary.

11 KE Maskus & M Penubarti 'How trade-related are intellectual property rights?' (1995) 39 *Journal of International Economics* 227.

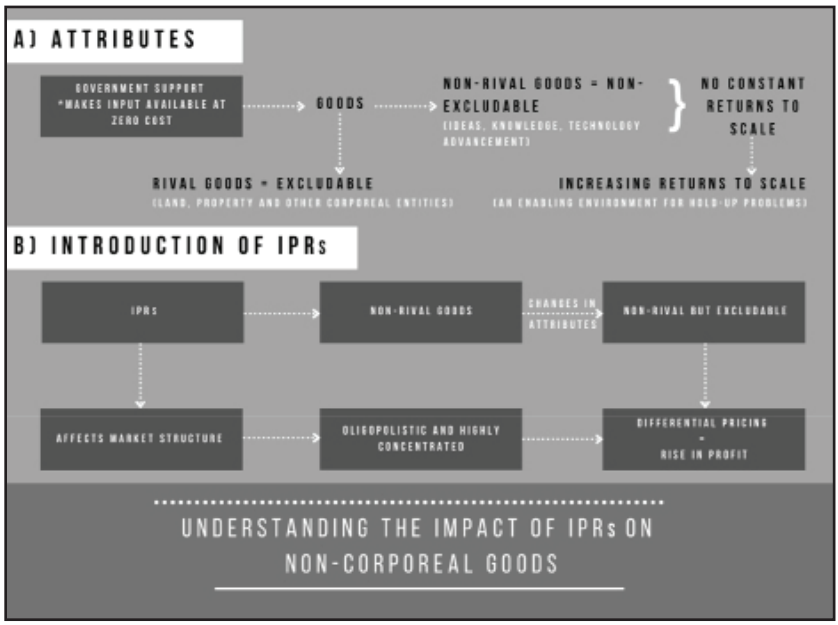
12 CA Primo Braga & C Fink 'The economic justification for the grant of intellectual property rights: Patterns of convergence and conflict (1997) in Abbott, FM & Gerber, DJ (eds) *Public policy and global technological integration* (1997) 439-461.

a market for lemons. This may adversely impact country A trade which may see an increase in profits on the substitute products from country C while incurring a decrease in profits on legitimate products from country B. This may discourage innovation and slow technology advancement as country B may not be able to cover the high costs invested in research and development (R&D). Diminishing country B's profitability results in a negative market contraction for country B. On the other hand, strengthening IPR protection by country A reduces the consumption of imitation products from country C and increases the importation of legitimate goods from country B. This stimulates trade between countries A and B as the net demand for imports from country B increases, thus displacing the imitations and leading country B to enjoy a greater market share. However, how does country A benefit from this arrangement, especially if a large majority in country A cannot afford the legitimate products? Country A may have to forgo the cheaper goods for the more expensive, unaffordable, patented goods. Although IPR protection may be an incentive for innovation, the benefits from strict adherence to IPR policies are more significant in technologically advanced economies. There has been little consideration given to the impact of strong IPRs on market prices and their impact on developing economies with weaker purchasing power. Because of this, cross-border trade in many developing countries has been tainted with IPR violations. To have a clearer picture of how the introduction of IPRs changes the nature of a good, we present the economics of intellectual property rights below (see Figure 1).

3.3 Economics of intellectual property rights

The analysis of the economics of intellectual property is presented below to provide the logic behind the arguments on whether or not TRIPS should be waived. In this subsection, we present the attributes and nature of goods – corporeal and non-corporeal – and how the inclusion of a nonrival and noncorporeal good in the production function introduces increasing returns to scale; thus, hold-up problems arising. Furthermore, we present how the inclusion of IPRs changes the market structure and the nature of non-corporeal goods from nonexcludable to excludable, even though there will still be a residual in the commons (see Figure 1 below).

Figure 1: Economics of intellectual property rights (IPRs)



Note: Please see Romer (1990), Takeyama (1994), and Fulton (1997) for further clarification.

As seen in Figure 1, goods can be rival or nonrival goods. Rival goods are excludable, while non-rival goods are non-excludable. The availability of government support makes inputs available at zero costs. When non-rival goods are included as variables in the production function, there will be increasing returns to scale instead of constant returns to scale.[13] This is possible because of the reusability of the factor of production. The implication of increasing returns to scale is that the organisation cannot be a price taker[14] – an attribute of an imperfect market. As a result of increasing returns to scale, firms must charge a price that is greater than the marginal cost. The nature of nonrival goods and its support for increasing returns to scale can lead to hold-up problems where parties refuse to cooperate because it may lead to a better bargaining position for the other player at the expense of the returns and profits of the firm. In other words, there is a reluctance to invest in the development of a noncorporeal good because of the fear that the benefits may accrue to

13 PM Romer 'Endogenous technological change' (1990) 98 *Journal of Political Economics* 71.

14 M Fulton 'The economics of intellectual property rights: Discussion' (1997) 79 *American Journal of Agricultural Economics* 1592.

other parties who did not contribute to the advancement of the idea.[15] This imperfection can be resolved with the support of the government through the funding of research and development.

The sunk cost involved in the investment and development of innovation is the reason why it may be desirable to strengthen IPRs. The introduction of IPRs limits technology transfer and changes the market structure by transforming the attributes of non-rival goods from non-excludable to excludable. Furthermore, the market becomes highly concentrated, which is a situation where originators have monopoly power, and there are mostly few players in the market; in other words, oligopoly. This is observed in the market for COVID-19 vaccines where there are few players, such as AstraZeneca and Oxford alliance, Pfizer and BioNTech collaboration, Moderna, Johnson and Johnson, Novavax, Sanofi GlaxoSmithKline, among others. The presence of oligopoly in the market leads to differential pricing, scarcity of the good, real or artificial, and increase in profit – at times arbitrary and abnormal. This situation makes accessibility difficult for some people who need the goods, especially for the poor and a significant percentage of people in developing countries when it comes to goods like seeds, vaccines and other pharmaceutical products.

The economics of IPRs indicates that IPRs transform the nature of non-rival goods, thus creating barriers to usage. But the transfer of technology spreads innovation because copying may be desirable since it can lead to a positive externality and an increase in demand for the goods that were copied.[16] In other words, technology transfer and appropriate copying of ideas – attribution and credit given to the source, and royalties paid to the originator for commercial use of ideas – lead to economic development and a Pareto efficient solution. We will conclude the analysis in this part by stating that there is no way a non-rival good can be totally exclusive. There will always be a residual left in the commons. So, if the use of the goods is for a commercial purpose, the originator should be compensated – royalty, fees, profit sharing or any other agreed-upon arrangements – but if it is for non-commercial use, the originator should be appropriately acknowledged as the source.

15 The argument used by people who assert that the trade related aspect of intellectual property rights should not be waived. Their impression is that the waiver will create a disincentive for the development of non-corporeal goods such as biologics and other technological innovations required for vaccine development.

16 LN Takeyama 'The welfare implications of unauthorized reproduction of intellectual property in the presence of network externalities' (1994) 42 *Journal of Industrial Economics* 155.

3.4 Trade-related aspects of intellectual property rights (TRIPS)

The increased violation of patents, copyrights and trademarks has led to the urgency for more workable property protection laws by the advanced economies, which want both to curtail an enabling environment that stifles new ideas and to maintain their profit, at times, in a non-competitive space. Although initially intended as an incentive for creativity, IPRs have been linked to increased profits by powerful multinational companies capitalising on the use of monopoly power to promote their agenda. Both the duration and scope of IPRs have been tampered with, going from an initial short duration and limited geographical scope to a 20-year globalised system. This IPRs governance system was then smuggled into the World Trade Organisation (WTO) under the Trade-Related Aspects of Intellectual Property Rights (TRIPS), culminating in price hikes due to IPR-related royalty payments on innovations.[17] These unconscionable restrictions have rendered IPRs a subject of contentious discussion, with a thin line between the interests of proprietary holders and the interest of users of the technology. Therefore, TRIPS was instituted to ensure participating WTO countries abide by the rules to curtail losses incurred through plagiarism, pirating and illegal copying. However, TRIPS is not beyond legal, nor necessarily ethical, as TRIPS was initiated with selfish intentions and its establishment was based on lobbying and a lack of democratic bargaining. The pervasive patenting of innovations through TRIPS has therefore led to slow diffusion and utilisation of new inventions in less developed economies.

Consequently, IPRs have become a stumbling block to the accessibility of badly-needed resources by the less privileged, as IPRs have been used to promote business endeavours rather than to incentivise development. This has reinforced a global oligopolistic structure, which is highly concentrated, and in which a few players exercise monopoly power in different contexts. This scenario promotes the creation of a few players with huge profits and an industry with entry barriers while the services remain too expensive for the consumers, especially the poor. For example, HIV drugs remained expensive and unaffordable for the vast majority from 1985 to 2005, resulting in millions of deaths that would have otherwise been preventable. In Uganda, the development of a generic HIV drug by Cipla Quality Chemical Industries (CQCI) reduced the cost of medication from US $16 000 to US $100 per annum and saved the

17 P Drahos 'The Real News Network (2016) TRIPS: Linking intellectual property to trade' Peter Drahos 1/7 [Video] YouTube, https://www.youtube.com/watch?v=BCJ2cDgoZ_Q (accessed 20 December 2020).

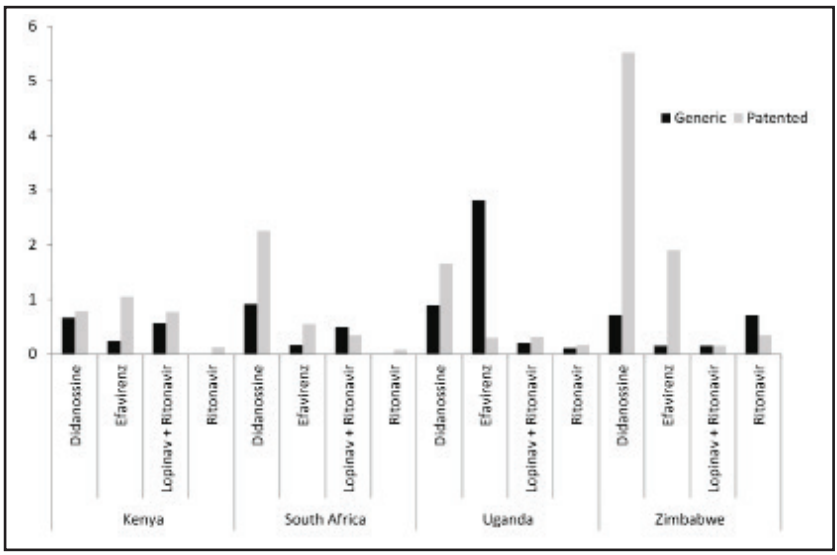
lives of millions[18] who would have otherwise never been able to afford the cost of the patented HIV drug. While generics helped the Ugandan population, South Africa, one of the hardest-hit countries with a total of seven and a half million people with HIV by 2020, could not access affordable generics. Efforts to boost its medication supply through an approved parallel importation of low-cost medication and use of generics were opposed, and a lawsuit was filed for infringement of IPRs at the WTO by pharmaceutical giants including Bristol-Myers Squibb (US), GlaxoSmithKline (UK) and Boehringer Ingelheim (Germany) who held the patents for the antiretrovirals.[19]

It is apparent that the development of generic HIV drugs reduced the cost of AIDS treatment, making it affordable for many in Africa. Figure 2 below illustrates the relationship between four patent drugs and their generic counterparts, as recorded by the WHO. A comparative study of the unit prices of four generics with their patent drug equivalents, Ritonavir, Didanossine, Lopinav and Efavirenz, revealed the necessity of generics in improving drug accessibility and affordability. Generic drugs remained markedly cheaper than the corresponding patented drugs. In this case study drug unit prices as quoted in US dollars by WHO were considered from four African countries. For consistency, the cheapest of each type, generic or patent, was selected for our study. Generally, results obtained indicated that generic drugs were relatively cheaper than the patent version across the four countries, with the exception of Efavirenz in Uganda and Ritonavir in Zimbabwe, of which the generic version was more highly priced than the patented equivalent.

18 S Charon & L Soustras 'An entire continent in need of cheap medicines. Africa's struggle for pharmaceuticals *Le Monde diplomatique* (2020), https://mondediplo.com/2020/12/09africa-pharma (accessed 15 December 2020).

19 As above.

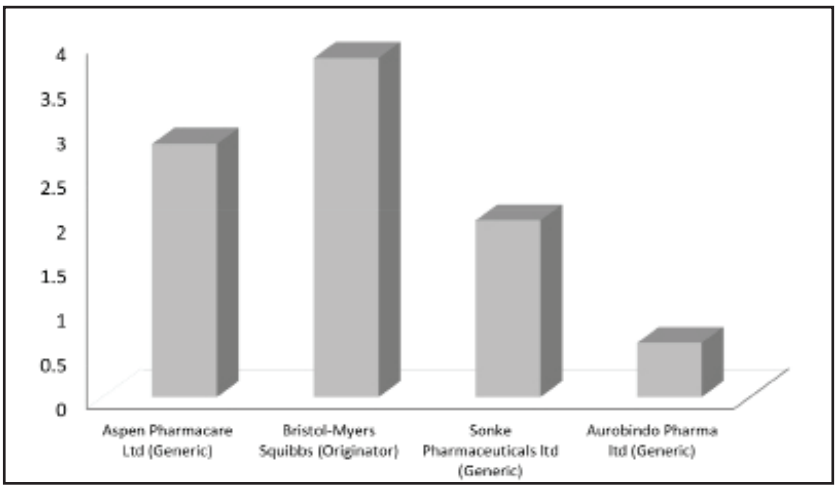
Figure 2: Prices of generic and originator drugs in four select countries in Africa



Note: Represents the cheapest of the generics and patented drugs as represented by WHO statistical data.

Further analysis of the data demonstrated the impact of increased numbers of generic versions on the market price. An increase in the number of generics on the market allowed for competition, bringing down the unit price. For example, patented Didanosine (100mg) manufactured by Bristol-Myers Squibbs in South Africa went for an average unit price of US $3,84, yet the generic equivalents of the same drug at the same strength manufactured by Aspen Pharmacare Ltd, Sonke Pharmaceuticals Ltd and Aurobindo Pharma Ltd was averaged at US $2,85, US $1,99 and US $0,61, respectively (see Figure 3). The results from a comparison of the unit prices of HIV drugs reveal that multinational companies have used IPRs for corporate gain by charging high prices. The initial purpose of IPRs has changed over time to benefit innovators at the expense of consumers.

Figure 3: Average unit price in US dollars of Didanosine 100mg in South Africa



3.5 Ethical IPR policies

For consumers to benefit from IPR protection, it is essential to institute ethical IPR policies by revisiting both the restrictions on the patent length and the control over the creations. There should be trade-offs that make the protection conditional and therefore limit absolute control. The short-term patents enable ample time for the creators to harness their profits while ensuring the creation remains accessible to consumers. With short-term restrictions, the investors realise a modest profit while the well-being of consumers is promoted through the provision of affordable generics and, in some cases, through improved technology. The more affordable generics benefit weaker economies that are import-dependent, especially with respect to technology and innovation. This promotes trade with countries involved in the production of generics.

While generics have improved accessibility and affordability, dubious companies have increased the production of counterfeits disguised as generics. Consequently, there has been an increase in fake drugs made with less efficacious ingredients rendering them less effective, and hence an accelerated record of drug resistance to antibiotics and antimalarials has occurred.[20] This is evident in Africa, where cheap products from

20 S Yeung and others 'Quality of antimalarials at the epicenter of antimalarial drug resistance: Results from an overt and mystery client survey in Cambodia' (2015) 92 *American Journal of Tropical Medicine and Hygiene* 39-50 DOI:https://doi.org/10.4269/ajtmh.14-0391(accessed 20 October 2020).

China flood the market. In West African countries, counterfeit products of Nivaquine, an antimalarial, have been sold under the names of Niruquine and Samquine. Trafficking of counterfeit products is on the rise, especially with the claims that they are effective against the COVID-19 virus.[21] In Nigeria alone, the pharmaceutical industry has been reported as a hotspot for the manufacture and trade of fake drugs resulting in a loss of an estimated N200 billion annually.[22] This has not stopped at counterfeit drugs but also extends to cheap goods and products, especially in the entertainment industry, where sophisticated recording methods have led to an increase in movie and music pirating. With weak IPRs, there has been escalated software piracy.[23] Table 2 below shows some of the ways the IPR system has hurt the African economy.

Table 2: IPR infringement in five select African countries[24]

Country	**Industry**	**IP infringement**	**Weakness in IP enforcement**	**Strategies in place**
Nigeria (Score – 10.97) GIPC, 2017; Awomolo-Enujiugha, OF (2020)	Nollywood (Movie industry)	High rates of physical and online piracy 67 percent Software Piracy (2003)	The legal and regulatory framework is weak Enforcement challenges persist Limited participation in international IP treaties	Basic IP framework NCC (enforcing copyright laws, enlightening the populace on copyright issues as well as monitoring and curbing piracy) Signatory to (Patent Law Treaty and WIPO Internet Treaties)

21 Charon & Soustras (n 18).

22 PriceWaterhouseCoopers 'The impact of intellectual property infringement on businesses and the Nigerian economy' (2019), Impact of Intellectual Property Infringement on Businesses and the Nigerian Economy (pwc.com) (accessed 20 October 2020).

23 Weak IPR laws can result in economic losses as demonstrated in this table. Likewise, too strong IPR laws can result in price exploitation and the inaccessibility of essential drugs for consumers; therefore, there is a need to find the right balance.

24 The scores were calculated based on 35 indicators under six categories including patents, trade secrets and market access, copyrights, trademarks, membership and ratification of international treaties and enforcements (GIPC, 2017).

South Africa (Score – 12.70) GIPC, 2017; WIPO, 2005	Textile and fabric Industry	High level of counterfeit goods Theft of designs and textile prints	IP protection is not well addressed in the new IP Consultative Framework Weak protection for patents Health-related IP rights are missing.	Draft copyright amendments provide greater clarity on copyright exceptions Software piracy is low compared to other African countries (33 percent in 2015)
Egypt (Score – 9.38) GIPC, 2017; Awomolo-Enujiugha, OF (2020)		High levels of Software piracy 52 percent Software Piracy (2003)	Weak framework for health-related IPR Challenging enforcement environment and lack of border measures Not a signatory to (WIPO Internet Treaties and Patent Law Treaty)	WTO member, Basic national IP framework in place The Egyptian government protects its valuable cotton seed to maintain its quality. They have registered an international trademark application (Madrid system number 756059), guaranteeing the quality and superiority of Egyptian cotton.

Kenya (Score – 13.95 GIPC, 2017		67 percent Software Piracy (2003)	Weak Judicial system Weak copyright protection Legislative and resource barriers to border enforcement	Basic IP framework Dedicated IP bodies and enforcement agencies Stronger efforts to address IP infringement Signatory to WIPO Internet Treaties, Singapore Treaty on the Law of Trademarks, Patent Law and Post-TRIPS FTA Reduced IP-related market barriers for a better market environment

Algeria (Score – 9.34) GIPC, 2017		High rates of piracy (83 percent software piracy) The bulk of imports - cosmetics, mobile devices, and consumer goods are counterfeit.	Health-related IP rights are missing. Weak legal framework for enforcing copyrights and Unfavourable Patent enforcement environment. Lack of transparency in customs activities- no systematic recording of IP rights infringing goods. Not a WTO member or TRIPS signatory	The basic framework for IP protection Signatory to international IP treaties (WIPO, Internet Treaties and Patent Law Treaty)

Although IPR policies are required to protect an invention, the repercussion of strict IPRs has resulted in a scarcity of products and usually has an adverse impact on developing economies; developed economies take advantage of these same policies to hoard technologies. This creates a scarcity of products, especially socially valuable goods like drugs and agricultural products.[25] This has left developing economies scrambling for the much-needed drugs as their weak technological and manufacturing capabilities expose them to the liability of the reliance syndrome as indicated in the scramble to obtain the COVID-19 vaccine. India's push for a waiver on the COVID-19 patent met strong resistance from the US, UK and Japan, leaving it, along with other low-income countries, scrambling for the limited doses with an inoculation record of only 0,2 per cent as of 4 May 2021.[26] According to Dr Moeti of WHO, as of 28 April, Africa was playing the catch-up game in the COVID-19 vaccination race as less than 2 per cent of the 690 million COVID-19 vaccine doses administered

25 M Mazzucato, J Ghosh & E Torreele 'Waiving COVID patents. Intellectual property and COVID-19' *The Economist* 20 April 2021, Mariana Mazzucato, Jayati Ghosh and Els Torreele on waiving covid patents _ The Economist.pdf (accessed 15 May 2021); Gravitas 'European Union blames China, Russia for vaccine disinformation' (2021) Palki Sharma – YouTube video, https://youtu.be/uzDXCMeW-LA (accessed 30 November 2021).

26 Gravitas Plus 'Vaccine hyper nationalism is helping no one' (2021) Palki Sharma - YouTube video, https://youtu.be/flugu1PyzwU (accessed 30 November 2021).

globally had been in Africa (WHO, 2021) while countries such as the US and UK stood at 69 per cent.

Apart from charging high prices for licensing, multinational companies holding IPRs have also manipulated the market through transfer pricing, where profits are shifted to low-tax regions by transferring assets between subsidiaries, preferring to pay licence fees in jurisdictions with low taxes.[27] The taxation games played around intellectual property rights have led to fiscal degradation affecting both rich and poor economies as a substantial reduction in tax revenue is recorded. The increased focus on financial gain has also meant little motivation to invest in the research and development of tropical medication as it is considered less profitable, with tropical medication accounting for less than 1 per cent of the drugs produced.[28]

The high research and development (R&D) costs have been used to justify the high price tags for patented social goods; however, this rationalisation of pricing has been considered inadequate, especially when the argument focuses on costs incurred on failed R&D. First, the funding of R&D, by the government, usually is predetermined regardless of the end result and, in some cases, arrangements are made for advanced government purchases to mitigate any risks in the event of a financial loss. Second, a lot of drug-related R&D benefits from prior public research or public funds, and these same innovations then get patented, and the public pays tax (private tax) on them yet again. This acts as a double taxation as companies levy high licensing fees while imposing high prices on the products.[29]

So, to curtail IPR-related concerns and ensure enhanced trade facilitation, enforcement of legal instrumentation that is ethical and beyond legal is important as it reduces opacity in trade and improves availability and accessibility while ensuring reasonable returns for the patented goods. Citizens need to be educated on the importance and value of these trade agreements and strengthened implementation structures to enable a more transparent system. All other strategies stand on the foundation of a system that is ethical and beyond legal. There should also be strategies employed to regulate the enforcement of IPRs to prevent a market failure. The TRIPS implementation has therefore undergone repeated provisions, with developing countries allowed a period of up to January 2005 and least-developed countries up to January 2006 in which

27 Drahos (n 19).

28 P Trouiller and others 'Drug development for neglected diseases: A deficient market and a public-health policy failure' (2002) 359 *The Lancet* 2188.

29 Drahos (n 19).

to implement, which was eventually extended to July 2013, and July 2033, respectively, allowing these countries' gradual adjustment and adoption of the TRIPS regulations. Who knows what will happen next? The flexibility in these dates indicates the inadequacy of the implementation of the TRIPS agreement, as low-income countries fall short of expectations. Governments have also intervened using compulsory licensing of patented products to prevent market failure.

3.6 IPR and compulsory licensing

Product accessibility and affordability have also been guaranteed through either voluntary or compulsory licensing. Compulsory licensing, established as a legislative provision under the TRIPS agreement, allows governments to sanction the reproduction of a generic product for their use without the consent of the inventor as long as the patent holder is adequately compensated. It is used by governments under specified conditions, and it is limited in scope and duration.[30] On the other hand, voluntary licensing has been employed where the patent holder willingly accords licences allowing the production of the patented product to promote accessibility to the product.[31] Table 3 below further illustrates how both compulsory and voluntary agreements have been used under the IPR system.

Table 3: Compulsory and voluntary licensing in the IPR system

Compulsory licensing [32]	**Voluntary licensing**
Compulsory licensing involves a third-party patented product without the patentee's permission.	Other exceptions to accessing patented products have been through the use of voluntary agreements between patent holders and generic manufacturers.

30 WTO 'TRIPS and pharmaceutical patents: Obligations and exception' (2006), http://www.wto.org/english/tratop_e/trips_e/factsheet_pharm02_e.htm#art31 (accessed 20 November 2021).

31 International Federation of Pharmaceutical Manufacturers Associations (IFPMA) 'Voluntary licences and non-assert declarations' (2010) Actions by R&D pharmaceutical companies that facilitate access to medicines 28 July 2010.

32 Compulsory licensing may not always be a solution to price reduction as the cost of some patented medicines (for example Efavirenz) produced under compulsory licensing has been reported to be more expensive (WHO, 2021).

Compulsory licensing offers exceptions to existing patent products, therefore, improves accessibility to a patent product by a member country without having a price negotiation with the patent holder.	Contractual pacts have also been used between patent holders and generic manufacturers, such as the Medicine Patent Pool2.
Originally, compulsory licensing was predominantly for the domestic market of the country receiving the licence, and no exporting was acceptable. So, the benefits were limited to only those countries with manufacturing capabilities.	Price negotiation is another strategy that can be effective in lowering prices and improving accessibility to the badly needed patented product (Raju, 2017).
With the 30 August decision, amendments to the 'Paragraph 6 system' allowed the export of generics to countries that lack technological capacity.	Other voluntary provisions may include the non-assert declaration where patents may not be imposed on a low-income community, therefore, allowing the use of the generic version that meets the agreed upon international standards (IFPMA, 2010).
Compulsory licensing may face distribution constraints in some non-LDC countries that are listed as import or export prohibited, even if both countries issue a compulsory licence.	Voluntary licences on patented products commonly have geographical and economic limitations (Gold and Morin, 2012), for instance, countries like China and Russia (Luca, 2015) which may restrict the export of products to these countries.

4 Trade facilitation

The bottleneck of hidden asymmetries in trade across SSA countries could be further addressed through trade facilitation to minimise its negative impact on cross-border trade. Trade facilitation refers to initiatives, measures, and policies targeted at minimising trading costs through the enhancement of performance at every stage along the international trade chain. The WTO defines trade facilitation as the 'simplification of trade procedures', which are understood as the 'activities, practices and formalities involved in collecting, presenting, communicating and processing data required for the movement of goods in international trade'.

Undoubtedly, trade facilitation is witnessing growing attention because of the no-tariff policy in operation in some areas lately. Interestingly, aside from the WTO, trade facilitation has become a force to be reckoned with by a circle of international bodies, namely, United Nations (UN) – different arms, the World Customs Organisation (WCO), and those that are related to economic development, supply chain security, as well as sector-specific concerns that include but are not limited to international transport and logistics. Trade facilitation efforts, initiatives, and recommendations, which include reducing paperwork requirements, improving procedures, modernising and harmonising customs requirements, can be instrumental in reducing the cost and time required for the movement of people, goods and services globally.

It is generally believed that intra-sub-Saharan African trade is minimal, and so it requires an expansion for continuous growth in the economy and social development. Thus, several initiatives, such as trade facilitation, are part of the action plans devised by the African Union (AU) to promote seamless trade in SSA. The trade facilitation initiated in both developed and developing countries has greatly helped in the elimination of red tape and bureaucracy that hindered the free flow of goods across borders. The positive impacts are more noticeable in developed countries because they are more fully complied with legislation and carry out policy executions. It has been estimated that trade among SSA countries stands at 10 per cent, while Europe and North America account for approximately 60 and 40 per cent, respectively. This fact could be further buttressed as the volume of trade between developed and developing countries is far higher than the trade among developing countries, including African countries, due to non-tariff barriers (NTB) that are expected to be significantly reduced by trade facilitation. The reduction of NTB through trade facilitation will reduce transaction costs in the business environment and promote trade. For example, the improvement of border management jointly executed by both the East African Community (EAC) and the Economic Community of East and Southern Africa (COMESA) has been yielding a positive impact on the intra-trade between these regions. African countries need to improve 'cross-border initiatives' to ease the flow along their borders. Such initiatives are thriving in Nigeria en route Republic of Benin up to Côte d'Ivoire and beyond. The most common cross-border companies are ABC transport, Chisco transport, Efex Executive transport, Cross Country transport and Guo Transport, to mention but a few.

The associated cross-border bottlenecks are reasonably managed because transport companies are considered corporate entities, and their dealings with relevant agencies and stakeholders are well arranged. For example, the use of ABC transport with respect to the movement of goods

across the West African borders from Nigeria to Ghana is convenient and reduces the nervousness associated both with travelling across such borders and with the stamping of passports in and out of countries, the introduction of one-stop border posts (OSBP) will eliminate this NTB. Furthermore, the introduction of OSBP will reduce the duration of border crossing and diminish the opaqueness of border requirements currently in place. It currently takes two weeks to truck consumer goods, such as Nestle products, from Nigeria to Accra – a distance of less than 480 kilometres. A roughly equivalent distance of 540 kilometres from Montreal to Toronto in Canada takes between six and seven hours, depending on the driver and the time of the day as a result of the traffic in the Greater Toronto Area (GTA). Even where the OSBP are functional in Africa with the help of TradeMark East Africa (TMEA), they are more functional in terms of structure but not processes and procedures. While a building is commissioned for trade-related officers of both countries, goods and passengers will still pass through agents of both countries. This is not a 100 per cent OSBP. Desirable examples of OSBP are located at both the Fort Erie (Canada)-Buffalo (United States) and the Windsor (Canada)-Detroit (United States) borders, where cargo and people only need to deal with the entry officers.

The desirable reduction of NTBs through trade facilitation is why we agree with the ideas presented by Adekunle on the need for simplification of processes and procedures as well as the creation of a structure that promotes intra-regional trade in Africa. A single window will help importers, exporters, freight forwarders, and shipping lines to do away with cumbersome paperwork and will increase customs efficiency. Moreover, the publication of up-to-date information on the website of countries' Ministry of Trade and Customs websites will make it clear what is contraband by addressing the problem of asymmetric information where traders, and at times, some customs officers, are not aware of updated standards with respect to goods allowed into a country. The absence of trade facilitation provokes traders to bribe and customs officers to exercise overweening authority. Another important part of trade facilitation is automation. It fast-tracks processes and reduces the time traders have to deal with customs officers – a platform for corruption. Automation in this century should be 5G compliant and blockchain-based. The use of blockchain makes trade data immutable, decentralised and trustworthy. Traceability is also enhanced through a blockchain-based technology referred to as crypto-labelling.

The introduction of blockchain is an innovation that has successfully assisted with international money transfers (for example, Western Union), compensation for creators through property rights protection, value

chain authenticity, an appropriate sharing economy, and management of data. Thus, it can help to achieve reasonable improvements in trade and digital business transactions because fixed and provable deals entered in a blockchain remove the need for the conventional use of paper prevalent among SSA countries along the trade corridor. Moreover, faster payment is also enhanced while it mitigates corruption through desirable technology, for example, smart and green technologies. A good example of such technology in operation will be if an embedded sensor in a truck or container signals a rise in temperature above the accepted level. Such a smartly designed system can prompt customs to screen, impose a fine or verify an insurance indemnity.

In sum, trade facilitation can be enhanced by innovative cross-border initiatives such as Gatatransport, a technology-based trucking start-up operating across borders, as well as passenger transport businesses such as ABC Transport and any other trucking businesses in the region. Cargo flights, airline connectivity and the development of indigenous airlines should be promoted on the continent. Furthermore, crowd-funded platforms for agricultural production, ThriveAgric, Crowdyvest, Groupfarma, and Greenhill's farms should become regional and serve as hubs for food security and agribusiness. All these initiatives should carry out with enhanced digitalisation through the use of mobile apps such as Mpesa, Kuda and other cross-border trade apps. Sustainable and inclusive growth will require the use of mobile technology that is integrated with social media platforms, and QRCode enabled. Growth and development will be boosted if solutions such as single window, harmonisation of processes and procedures, one-stop border post, automation, and publication, are in place. The strengthening and sustainability of this growth will be enhanced by blockchain. Blockchain technology helps with international money transfer, compensation for creators, property rights protection, value chain authenticity, an appropriate sharing economy, and management of data.

5 Crypto-labelling

Trade facilitation can be enhanced through the use of crypto-labelling. As defined by Adekunle, 'crypto-labelling uses secure communication technology to create a record which traces the history of a particular food from the farm to the grocery store. It would require consistent records, no duplication, a certification registry, and easy traceability.' Adekunle further described how digital technology could be used to ensure traceability, authenticity and transparency across borders. In this chapter we employ the framework from Adekunle and Filson

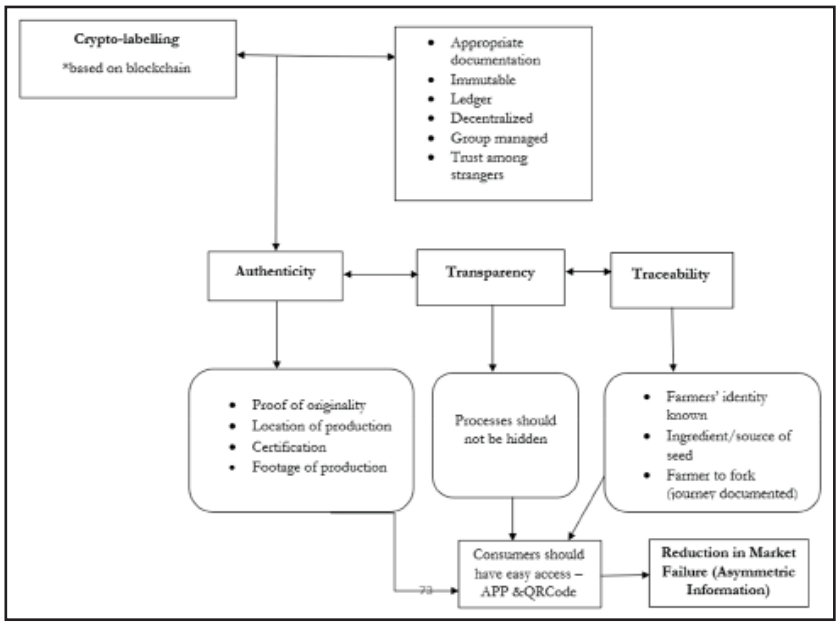
to explain how crypto-labelling can reduce market failure due to asymmetric information.

As seen in Figure 4 below, crypto-labelling is a blockchain-based technology that allows people who do not know or necessarily trust each other to cooperate in a decentralised, immutable, and group-managed ledger. Successful implementation of this structure leads to the promotion of authenticity, transparency, and traceability in any commodity or product sector. The interaction of these variables will reduce opaqueness in global value supply chains, including those in Africa. Consumers or final product users can use a mobile phone application, which has an easily read QRCode, managed by a user group or a consortium, to ascertain the originality of a product. This approach will reduce asymmetric information and market failure associated with the exchange of both corporeal and non-corporeal goods.

6 Understanding legal instruments: Ethical versus legal

Traceability, crypto-labelling, and ethically-defined property rights are important for sustainable and desirable regional and global trade. There should be well-developed legal instruments that are ethical and beyond legal to make these concepts workable. Given legal activity may not necessarily be ethical, ethics should be the building block of trade policy and negotiations as Africa prepares for the future. In this chapter we present our analysis with the assumption that the players in cross-border trade are involved in a game. In this game, the players are countries that are in continuous interaction with other players because, in our globalised world, no country can live in isolation. So, the game of trade is an indefinite game where all the players do not know the end game. If the trade market has an end game, it leads to a situation where players can easily become dubious and not follow the standards that are necessary to ensure traceability, promote crypto-labelling and guarantee the development of well-defined physical, tangible and intellectual property rights. Analysis of legal instruments is more interesting in terms of IPR, especially in the context of ethics.

Figure 4: Market failure reduction in the food market by crypto-labelling



Source: Adekunle and Filson (2019)

Ethics is one of the challenges of the intellectual property rights (IPRs) for countries and is even more pronounced in the trade-related aspects of intellectual property rights (TRIPS) because these legal structures are defined by private sector leaders who lobby policy advocates and law makers to develop laws that will protect their innovation, at times at the expense of the consumers. According to Drahos, IPRs are usually imposed from the developed onto the developing countries, mostly decided by the quad, the United States, the European Union (EU), Japan and Canada, and not consistent with the theory of democratic bargaining. The theory of democratic bargaining is implemented when there is representation, full information and non-domination in the development and implementation of trade practice. This is not necessarily the case with TRIPS. This is part of the reason why we are suggesting that the legal framework for sustainable and desirable global trade should be beyond legal.

To have a trade structure that promotes ethical behaviour, one of the prerequisites would be trade facilitation through the harmonisation of processes and procedures. Currently, in Africa there presently is no consistency across regions in terms of macroeconomic stability. According to Isemede,

the prerequisites for common currency – a common external tariff (CET), single-digit inflation, a fiscal deficit of less than 4 per cent, tax revenue greater than 20 percent of the GDP, stable real exchange rate and positive real interest – are not present in most of the ECOWAS member states. Furthermore, value-added tax (VAT) is consistent in Francophone countries but not in Anglophone countries. Most of the Francophone countries have currency centres instead of their own central bank, with the central bank for the region in Dakar, Senegal. Trade facilitation in Africa can only be enhanced if harmonisation is well implemented with an appropriate legal structure that keeps undergoing reform based on the changes occurring globally and the implications of digitalisation. Ethically developed legal instruments should reduce opacity in trade facilitation. Opacity arises when there is asymmetric information in the system, and it can also be referred to as the level of asymmetric information. Furthermore, in the analysis of the food market by Adekunle and Filson, opacity and food authenticity are shown to be inversely related. We adapted this idea to trade by proposing that opacity in trade and trade facilitation are also inversely related.

Opacity in Trade (OT) = f {Asymmetric information} (1)

Opacity in Trade (OT) appears in multiple forms, such as dubious product quality, customs not following processes and procedures, customs and immigration interested in making money at the expense of the trade process, and unclear publications about standards, among other issues. All these issues are summarised in equation (2) below as different forms of asymmetric information that can lead to adverse selection, moral hazard and the principal-agent problem.

$OT \alpha {}^{1}/_{TF}$, where TF is trade facilitation (2)

As indicated in (2), the inverse relationship indicates that the more opaque trade processes are, the more difficult it is to do business across borders. Appropriate legal instruments that are up to date, coupled with an ability to solve current challenges, will enhance trade facilitation. Policies and laws should be standardised where required, and both producers and consumers should be adequately protected as they use technology.

Legal Instrument – OT + Ethical Consideration = Enhanced Trade Facilitation (3)

In a nutshell, trade policy instruments should be beyond legal if Africa wants to be competitive in the global landscape.

The competition will be sustainable if there are various incentives that encourage the players to commit to cooperation on a long-term basis. Imperfection in the international trade market should be taken into consideration as Africa prepares for the future. For example, cross-border services – banking, airline, and telecommunication – are controlled by a few players. Policies should also be resilient in the face of challenges and randomness, such as the COVID-19 pandemic that has changed the factor market and commodity market for face masks and vaccines. The implications of such randomness and uncertainties underscore the importance of public goods and the desirability of positive externalities across borders.

7 The future

The future of prosperous cross-border trade depends on a vastly improved market free from asymmetric information. Figure 5 below summarises the future of trade in Africa. As Africa leverages to grow its regional trade, it is necessary to reassess its trade policies and guidelines to emphasise ethical and beyond-legal policies that are aimed at creating cross-border consistency and strengthening value chains that guarantee the quality, consumer protection and ethical pricing. For the guidelines to be ethical and beyond legal, there should be transparency in the formulation and interpretation of the policies and guidelines. A shortage of African government expertise in this area has meant that expensive experts are hired to draft and interpret these laws. These challenges culminate from the fact that Africa lacks awareness about the importance of IP protection and has not invested enough in the science and technology of IP. This lack of awareness is clearly exemplified by Nigeria's popular Nollywood industry which, absurdly, registers low patronage of the IPR system despite a robust creative capacity in the Nollywood industry.

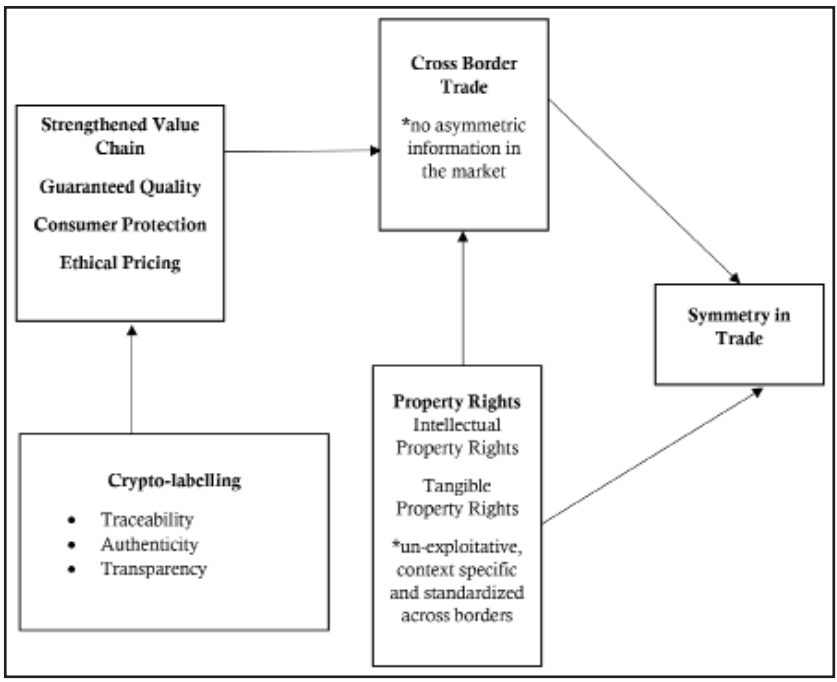
Second, the policies and guidelines enacted should be authentic as well as developed to reflect and represent the values and requirements of the consumers. However, until recently, countries in Africa have continued using IPR regulations designed in the colonial era designed to favour the colonial masters. Africa should invest more in educating the general public about the laws that govern their trade. Neither direct importation of foreign policies nor the use of colonial policies are conducive to African trade or meet the needs and values of African consumers.

As well, Africa should emphasise traceability, where everyone along the value chain is cognisant of the importance of a systematic, accountable and traceable system that clearly considers the well-being of consumers and the environment. A traceable record obliges one to maintain quality as

well as encourages people to keep each other accountable along the value chain. The accountability is rooted in blockchain technology through systems such as crypto-labelling, which enables accurate maintenance and tracking of information. Crypto-labelling allows for the protection of consumer interests, such as IPRs and tangible properties, using un-exploitative, standardised, cross-border systems that are not open to manipulation. This clears the anomalies created because of asymmetric information, thereby fostering confidence and enhancing symmetry in the trade of both corporeal and non-corporeal goods. This may not be achieved instantaneously as it requires commitment and obligations from all participating parties and, as we see, even the strongest trade blocks are still struggling with many different challenges.

In sum, we posit that the path to information symmetry in trade is not linear because products have different attributes. For example, the nature of IPRs and their impact on corporeal and non-corporeal goods are not similar and should be handled differently. Furthermore, macro-economic variables are difficult to standardise across borders because of weak or non-existent infrastructure, non-tariff barriers, and limited use of technology. Value chains should be strengthened, quality should be guaranteed, and consumers should be protected with respect to food safety and accessibility, including ethical pricing to promote a symmetric trading system in Africa. Moreover, the current opaque system will be less opaque by crypto-labelling and its concomitants – traceability, authenticity, and transparency. All these innovative prescriptions will only work if cross-border trade is devoid of adverse selection, moral hazard, opacity, mislabelling and questionable signalling devices. A conducive trade environment is established when asymmetric information is removed, and property rights are well defined. The scenario described above ensures symmetry in trade, a prerequisite for sustainable and competitive intra-regional trade in Africa.

Figure 5: The path to symmetric trade



References

Adegoke, S 'Intellectual Property Rights in sub-Saharan Africa' (2016), https://scholarship.claremont.edu/cmc_theses/289/ (accessed 24 October 2021)

Adekunle, B 'How can African countries boost trade among themselves?' *World Economic Forum* (2015), https://wwwweforumorg/agenda/2015/07/how-can-african-countries-boost-trade-among-themselves/#:~:text=It%20can%20boost%20exports%20too,environment%20for%20foreign%20direct%20investment&text=This%20is%20very%20important%20in%20the%20case%20of%20African%20countries

Adekunle, B 'How technology nations can navigate the difficult path to food sovereignty' *Huffington Post* (2016), https://www.huffpost.com/entry/how-technology-can-help-n_b_12454210

Adekunle, B 'Halal food: Conception, misconceptions, and certification [Blog]' *ECVOntario* (2019), http://evcontario2011.blogspot.com/2019/ 01/halal-food-conception-misconceptions.html (accessed 28 October 2019)

Adekunle, B & Filson, G 'Blockchain technology and asymmetric information in the food market' A selected paper presented at the IAABD 2019, 8-11 May 2019, Dar es Salaam, Tanzania.

Adekunle, B & Filson, GC 'Understanding halal food market: Resolving Asymmetric information' (2020) 5 *Food Ethics* 13 doi:10.1007/s41055-020-00072-7

Adekunle, & Kajumba. 'The Nexus between Instagram and Digital Entrepreneurship. Journal of African Development', 21(1), 2021, 14-40. https://doi.org/10.5325/jafrideve.21.1.0014

Adekunle, B.; Kajumba, C. Social Media and Economic Development: The Role of Instagram in Developing Countries. In *Business in Africa in the Era of Digital Technology*; Springer: Cham, Switzerland, 2021; pp. 85-99.

Bangalee, V & Suleman, F 'Has the increase in the availability of generic drugs lowered the price of cardiovascular drugs in South Africa?' (2016) 21 *Health SA Gesondheid* 60

Charlebois, S and others 'Comparison of global food traceability regulations and requirements' (2014) 13 *Comprehensive Reviews in Food Science and Food Safety* 1104

Charon, S & Soustras, L 'An entire continent in need of cheap medicines. Africa's struggle for pharmaceuticals *Le Monde diplomatique* (2020) https://mondediplo.com/2020/12/09africa-pharma (accessed 15 December 2020)

Dooley DM and others 'FoodOn: A harmonized food ontology to increase global food traceability, quality control and data integration' (2018) 2 *Science of Food* 1

Drahos, P 'Developing countries and international intellectual property standard-setting' (2002) 5 *Journal of World Intellectual Property* 765

Drahos, P 'The Real News Network (2016) TRIPS: Linking intellectual property to trade' Peter Drahos 1/7 [Video] YouTube, https://www.youtube.com/watch?v=BCJ2cDgoZ_Q (accessed 20 December 2020)

Fink, C & Primo Braga, AC 'How stronger protection of intellectual property rights affects international trade flows' (1999) Policy Research Working Papers, World Bank Group eLibrary

Foroutan F, & Pritchett L 'Intra-sub-Saharan African trade: Is it too little?' (1993) 2 *Journal of African Economies* 74

Fulton, M 'The economics of intellectual property rights: Discussion' (1997) 79 *American Journal of Agricultural* 1592

Global Intellectual Property Centre 'The roots of innovation US Chamber International IP Index' (2017) Fifth Edition February 2017, US Chamber of Commerce GIPC_IP_Index_2017_Report.pdf (theglobalipcenter.com)

Gravitas Plus 'Vaccine hyper nationalism is helping no one' (2021) Palki Sharma - YouTube video, https://youtu.be/flugu1PyzwU (accessed November 2021)

Gravitas 'European Union blames China, Russia for vaccine disinformation' (2021) Palki Sharma - YouTube video, https://youtu.be/uzDXCMeW-LA (accessed 30 November 2021)

Drug Information Association (IDA) 'Harmonization, convergence and ICH reform (2015) 51st annual meeting 14-18 June, Washington DC

International Federation of Pharmaceutical Manufacturers Associations (IFPMA) 'Voluntary licences and non-assert declarations' (2010) Actions by R&D pharmaceutical companies that facilitate access to medicines 28 July 2010

Isemede, J 'West Africa not ready for single currency' Trade Expert Business Morning *Channels Television*, Nigeria (2017), https://youtu.be/Kdc6luxgeBU

Isemede, J 'Continental free trade zone will be to our disadvantage currency Trade Expert| Business Morning|. *Channels Television*, Nigeria (2017), https://youtu.be/uYWeS8QyPJY

Isemede, J 'Revisiting ECOWAS single currency plans' Business Morning *Channels Television*, Nigeria: Part 1 (2018), https://youtu.be/IpzqATCZbG4, Part 2 https://youtu.be/OAE0XWLKj6g

Kanavos, P & Vandorous, S 'Determinants of branded prescription medicine prices in OECD countries' (2011) 6 *Health Economics Policy and Law* 337

Lesser, C & Moisé-Leeman, E 'Informal cross-border trade and trade facilitation reform in sub-Saharan Africa final report OECD' (2009) Trade Policy Working Paper 86 download (psu.edu)

M de Castro Neto and others 'Traceability on the web – A prototype for the Portuguese beef sector' Proceedings of EFITA Conference, Debrecen, Hungary, 2003 607

Maskus, KE & Penubarti, M 'How trade-related are intellectual property rights?' (1995) 39 *Journal of International Economics* 227

Mazzucato, M and others 'Waiving COVID patents. Intellectual property and COVID-19' *The Economist* 20 April 2021, Mariana Mazzucato, Jayati Ghosh and Els Torreele on waiving covid patents _ The Economist.pdf (accessed 15 May 2021)

McMurry-Heath, M 'Maintaining intellectual property amid COVID-19' *The Economist* 23 April 2021, Michelle McMurry-Heath on maintaining intellectual property amid covid-19 _ The Economist.pdf

Monte, WN 'Compulsory licensing of patents' (2016) 25 *Information and Communication Technology Law* 247

OECD/EUIPO 'Trends in trade in counterfeit and pirated goods. Illicit trade' (2019) A report by the OECD and the EU's Intellectual Property Office

Onyema, AI 'How a Nigerian established West Africa's biggest airline (Air Peace)' (2021), https://youtu.be/AGmh8bdiGfI (accessed 20 December 2021)

Prajneshu, M & Gupta, VK 'Patenting on cloves' (2002) 7 *Journal of Intellectual Property Rights* 24

PriceWaterhouseCoopers 'The impact of intellectual property infringement on businesses and the Nigerian economy' (2019) Impact of Intellectual Property Infringement on Businesses and the Nigerian Economy (pwc.com) (accessed 20 October 2020)

Primo Braga, CA & Fink, C 'The economic justification for the grant of intellectual property rights: Patterns of convergence and conflict (1997) in Abbott, FM & Gerber, DJ (eds) *Public policy and global technological integration* (Kluwer Academic Publishers 1997) [439-461]

Romer, PM 'Endogenous technological change' (1990) 98 *Journal of Political Economics* 71

Sikoyo, MG and others 'Intellectual property protection in Africa. Status of laws, research and policy analysis in Ghana, Kenya, Nigeria, South Africa and Uganda' (2006) African Centre for Technology Studies (ACTS) Ecopolicy

Series 16, series editor Judi W Wakhungu, Nairobi.ecopolicy16_1.pdf (africaportal.org)

Takeyama, LN 'The welfare implications of unauthorized reproduction of intellectual property in the presence of network externalities' (1994) 42 *Journal of Industrial Economics* 155

Tapscott, D., A. Tapscott 'Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money' (2016), Business, and the World. Penguin, London.

Tripoli, M & Schmidhuber, J 'Optimising traceability in trade for live animals and animal products with digital technologies' (2020) 39 *Revue Scientifique et Technique* 235, Optimising-traceability-in-trade-for-live-animals-and-animal-products-with-digital-technologies-EN--FR-Optimiser-la-tracabilite-des-animaux-vivants-et-des-produits-dorigine-animale-faisant-lobjet-d.pdf (researchgate.net)

Trouiller, P and others 'Drug development for neglected diseases: A deficient market and a public-health policy failure' (2002) 359 *The Lancet* 2188

WHO-Africa 'Africa COVID-19 daily vaccination daily update dashboard' (2021) @ 2021 WHO AFRO VPD. Update COVID-19 26 April 2021 | WHO | Regional Office for Africa

WHO 'Global price reporting mechanism' (2021), GPRM (who.int)

WorldBank 'Doing business – Trading across borders' (2010), https://www.doingbusiness.org/ExploreTopics/TradingAcrossBorders/ (accessed 20 October 2021)

WorldBank 'Logistics Performance Index (LPI)' https://www.worldbank.org/lpi/ (accessed 20 October 2021)

World Intellectual Property Organisation (WIPO) 'A stitch in time. Smart use of intellectual property by textile companies' (2005) Intellectual Property in the Textile Industry 34, 794E (wipo.int)

WTO 'TRIPS and pharmaceutical patents: Obligations and exception' (2006), http://www.wto.org/english/tratop_e/trips_e/factsheet_pharm02_e.htm#art31 (accessed 20 November 2021)

World Trade Organisation (WTO) 'WTO negotiations on trade facilitation: Compilation of members' textual proposals' (2009) (Negotiating Group on Trade Facilitation, WTO, 2009), TN/TF/W/43/Rev.19.

World Trade Organisation for Economic Co-operation and Development (WTO/OECD) 'Doha Development Agenda Trade Capacity Building Database (TCBDB)' (WTO/OECD, 2010)

Yang, L & Maskus, EK 'Intellectual property rights, technology transfer and exports in developing countries' (2009) 90 *Journal of Development Economics* 231

Yeung, S and others 'Quality of antimalarials at the epicenter of antimalarial drug resistance: Results from an overt and mystery client survey in Cambodia' (2015) 92 *American Journal of Tropical Medicine and Hygiene* [39-50] DOI:https://doi.org/10.4269/ajtmh.14-0391

Yuan, C and others 'The impact of food traceability system on consumer perceived value and purchase intention in China' (2020) 120 *Industrial Management and Data Systems* 810, https://doi.org/10.1108/IMDS-09-2019-0469