

KNOWLEDGE FOR DEVELOPMENT: A ROLE FOR INTELLECTUAL PROPERTY IN AFRICA?

V. Konde, ATDF

Abstract

Intellectual property rights (IPR) have become a subject of great public interest over the last decade or so. Some see IPR as necessary for promoting innovation, technology transfer, trade and investment, among others, in developing countries while others see such rules as a way of denying them access to technology and overpricing technology products such as medicines and improved seeds, among others. This overview looks at the potential and limits of using IPR as a tool for facilitating similar developments in Africa. It looks at recent trends in FDI flows, knowledge generation and protection abroad, and inter-firm and intra-firms technology transactions among regions.

Introduction

"A good name is better than riches" is perhaps one of the best known quotes. Even though its origins may be contested, the quote underlines the importance and value of intangible assets in social or economic undertakings. Intangible assets comprise a large proportion of the total wealth of a country. As Friedrich List, a 19th Century German Economist noted: *"The present state of the nations is the result of the accumulation of all discoveries, inventions, improvements, perfections and exertion of all generations which have lived before us: they form the intellectual capital of the present human race"* [1].

It is, therefore, expected that those who have invested in the generation and accumulation of such intangible assets will have an interest in controlling its exploitation by others. This is particularly true if such knowledge assets constitute or play a major part in the competitive advantage of a firm or a country. Ensuring that those that invest in the generation of knowledge are rewarded accordingly is necessary to promote further development of knowledge.

However, others argue that societies that have accumulated knowledge have a responsibility to promote development by sharing it with those in need. President John F. Kennedy (US) said in 1962: *"There is not enough money in all America to relieve the misery of the underdeveloped world in a giant and endless soup kitchen.... But there is enough know-how and knowledgeable people to help those nations help themselves"* [2].

Balancing these two goals ([1] [2]) has been at the core of major policy debates on endogenous development over the past years. These debates tend to confirm the

suspicion that developed countries are happier building endless soup kitchens for the poor than let the poor have access to their prized knowledge and agree with List that those who have *"attained the summit of greatness,... kicks away the ladder..to deprive [others] from climbing up."* [3]

As with many other issues, some tend to paint IPR as either necessary or unnecessary but, as in many cases, a bit of both could be the right policy mix. This is particularly true as IPR policies function alongside other industrial policy tools that collectively promote knowledge generation and use.

It may also be important to understand why countries are adopting ever tighter IP rules. There are several reasons that may underline this trend:

- ⇒ Trade secrets are insufficient to protect today's inventions
- ⇒ Investment in innovation has increased in value and importance
- ⇒ Technology is easier to copy
- ⇒ Technology is key to competitiveness in trade
- ⇒ Technology is changing and spreading rapidly in the marketplace and [4]
- ⇒ The shift from extraction-based to manufacturing/service-based industries.

It is for these reasons that trade has been the central driver of stronger IP rules over the years.

As the number of products that embody some form of protected knowledge increases and competitiveness is increasingly determined by differences in manufacturing know-how, firms will choose to seek stronger protection to further enhance their ability to compete. Estimates suggest that the proportion of United States' exports that depend on some form of IP protection has increased from about 10% to above 50% in the last 50 years [5] and about 20% of the world manufactured exports were classified high-technology in 2004.

Therefore, it is not surprising that developed countries, whose firms are the major exporters of products that contain protected knowledge, are seeking a greater IP protection in developing countries. Developing countries, on the other hand, see it as an erosion of their right to access knowledge and learn to produce their own products. They consider it as a threat to their bid to develop, and in some cases, to survive.

However, the ability of a country to copy, imitate and learn from leading countries depends on its domestic technological capacity and human capital. There are indi-

cations that Africa's ability to use and generate new knowledge has declined. For example, between 2001 and 2005, only inventors from four out of the fifty three African countries obtained one or more patents from the United States Patents and Trademarks Office (USPTO), representing about 0.08% of the total non-resident patents granted during that period (See table 1). And that is 4 out of 53 countries.

Another way of looking at Africa's ability to use technology is to track payments for intangible assets. Africa's share of global royalty and licensing fee payments fell from 1.4% in 1998 to 0.6% in 2004. It also declined in absolute terms from \$840 million to \$765 million while globally payments doubled over the same period - reaching \$120 billion. This gap in knowledge use is much wider if one considers that about \$382 million was paid by firms in South Africa, \$64 million by firms in Nigeria and \$50 million by firms in Kenya in 2004.

Such large knowledge gaps in knowledge use and generation casts some doubt on the extent to which most African countries could mould their IP legislations to promote innovation and development. This overview will use global trends in trade, investment and technology transfer to see areas where of IP could play a role in Africa's development.

2. Glance at IP trends.

The term intellectual property rights encompasses numerous exclusive legal rights awarded to inventors or creators by government for a given period of time and territory in which the use of the creations is controlled by the rights holders. The common ones include:

- ⇒ Patents - for inventions only and usually for about 20 years
- ⇒ Utility model or industrial design rights - for forms of appearance, style or design of an industrial object (e.g. furniture or textiles)
- ⇒ Trademark - for a sign that distinguishes the product or service and whose protection may be indefinite.
- ⇒ Copyright - for creative and artistic works (e.g. movies and paintings).
- ⇒ Trade secrets - may be used to protect undisclosed commercial products or processes; it is illegal to disclose a trade secret.
- ⇒ Other forms of rights, among them; breeders, traditional knowledge or geographical indications.

In general, IP rules are designed to promote innovation and fair competition to facilitate economic growth. The first patent law, for instance, passed in Venice in 1474 was intended to protect inventions after their use were demonstrated. The law was passed at the time Venice was sought to promote manufacturing. Other measures developed within the same period included tax holidays for two years for skilled immigrant workers and controlling the migration of domestic skilled workers. [6]

Table 1. Patents granted to inventors in Africa between 2001 - 2005 by USPTO (by country of origin)

Country	Patent holder	Patents granted
Egypt	Individually	10
	Firms	0
Kenya	Individually	14
	Firms	9
Nigeria	Individually	8
	Firms	0
South Africa	Individually	197
	Firms	90
Total		328

Source: USPTO

Many developed countries still use their IP rules largely as a tool to promote industrial development and trade. They continuously review their IP rules to meet the changing needs of industry. For instance, in 2006, the United Kingdom Patent Office launched a consultative initiative with stakeholders on how the "inventive step in [its] patents can [be used to] maximize innovation".. and "whether any aspect of the inventive step requirement should be modified." [7] It has also launched consultations on how to support innovation in the country and on the potential of representative action in terms of litigation costs, among others. [8]

Such reviews of IP rules are meant to strengthen the role of IP as a tool for economic development rather than for creating monopolies. [9] African countries seem to address their IP rules largely with a view to meet their obligations under the World Trade Organization (WTO), World Intellectual Property Organization (WIPO) and bilateral agreements. Moreover, the IP debate in Africa is largely not driven by industries in Africa but rather non-commercial interest groups addressing specific needs, such as, access to medicine and the rights of farmers to save seeds.

While firms are not the only stakeholders with interest in IP rules, they play an important role in enabling any IP regime to contribute to development. They also bear some of the costs associated with changes in IP. For example, the World Bank estimated that the full implementation of the WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) would increase transfers of licensing fees to technology exporting countries by more than \$20 billion per year. [10] Almost all this increase would be borne by firms. Firms may pass on those costs to consumers through increases in unit prices. Such changes could affect decision to invest in R&D, access to new knowledge and alter competitiveness of products in the marketplace.

This overview will only focus on some of the broad assumptions of the impact of IPR on development. Some have argued that stronger IPR promotes innovation, investment and trade which are the major conduits for the transfer of advanced technologies. They also argue that

this may lead to increased production and exports over time, and improve the living standards of people. Many African countries have greater interests in many of these benefits of stronger protection of IPR, if they indeed occur.

2.1 IP and innovation.

IP is largely seen as an incentive to inventors. This assumption is based on the belief that a temporary monopoly use of the invention could enable inventors to recoup most of their investment. [11] Some of these profits or benefits may be ploughed back to stimulate additional innovation.

It is argued that the disclosure requirement, such as that in patents, play an important role in knowledge diffusion and promoting innovation. Such disclosure may stimulate interest in other areas beyond the original research. Without such rights, the knowledge embodied in many products will not be disclosed and, as a result, the technological insights it may stimulate will not occur.

IP may also serve as success benchmarks in some industries. In some markets and industries related to biotechnology and information technology, IP is used as a measure of success because they primarily survive by continuously churning out new products and services. Strong IP rules may therefore be essential to stimulating innovation.

IP is also used as a bargaining chip in technology transfer and partnership deals. Firms or institutions may use some of their IP assets to gain access to other key IP assets owned by their competitors or pool their IP assets and form alliances or joint ventures. Such arrangements could accelerate commercialization of inventions and further development.

These assumptions are likely to hold true for some fields or industries and markets. For instance, nearly 90% of all the industrial technology alliances [12] involve European, American and Japanese firms and about 91% of such alliances were in three industries: automotive, biotechnology and information and communication technology in 2003. There is little evidence that strengthening IP regimes will facilitate alliances between the technology-developing ones and those without.

The extent to which current IP regimes stimulate or hinder innovation is a subject of great interest.[13] There is little argument that IP rules are needed but not everyone agrees on what should be covered and on the use of IP to create what has been termed "intellectual monopolies". For example, 'George Selden obtained a U.S. patent in 1895 for "putting a gasoline engine on a chassis to make a car". Thousands of dollars were paid in royalties - increasing costs and reducing production output. It was not until 1911 that Henry Ford and others challenged the validity of such a broad patent'. [14]

Similarly, patent thickets or de facto monopolies could be used to block or discourage others, in particular potential competitors, in a field of interest or stifle technological development. Peter Ringrose, Chief Scientists at Bristol-Myers is quoted saying: "*there are more than 50 proteins possibly involved in cancer that the company [Bristol-Myers] was not working on because the patent holders either would not allow it or were demanding unreasonable royalties.*" [15]

When abused, IP may cause others not to practice their inventions until the blocking IPR expires or is invalidated. Similarly, demanding a high price for IPR increases the cost of innovation - hindering it rather than promoting. IP rules do provide some relief in cases where the IP owner is not willing to provide the technology on reasonable commercial terms and conditions, such as compulsory licensing. However, many potential users that may fail to obtain technology on reasonable and fair terms are unlikely to exploit protected technology using the flexibility provided by law for fear of paying the legal costs, for example those that may arise to prove that the terms were unreasonable.

Many African countries may have to tailor their IP regimes and support policies that promote firms and institutions capable of inventing new products and services derived from inventions. This may eventually enable them to enter into industrial technology alliances and to leverage their limited R&D expenditure. There are fears that the continent is remaining behind in innovation and IP alone is unlikely to help the content to innovate.

2.2 IP and technology transfer

The argument that IP facilitates technology transfer stems from two broad assumptions: 1. disclosure and 2. its impact on trade, FDI and licensing decisions. It is assumed that disclosure plays an important role in promoting diffusion of knowledge. The later role of IP in technology transfer stems from the assumption that the IP regime of a host country may influence the decision of a technology owner to export their technologies. A stronger intellectual property regime (i.e. legislation and enforcement) is thought to act as an incentive or source of comfort to technology exporters to transfer their technology without fear of losing control or revenue.

There is increasing doubts about the role IP disclosure requirements in patents play in facilitating technology transfer. Some inventions that were granted protection do not always contain new information that could be regarded as innovative or technology. In addition, detail of disclosure, whether the best mode of making the invention requirement is disclosed or not, does not necessarily represent how the invention will be used in industry (i.e. there is usually no requirement to update the mode).

In the second assumption, it is observed that firms have continued to prefer transferring technologies intra-firm. Roughly 70% of all royalty and licensing fee receipts by the major technology exporting countries (e.g. United

States and Japan) are intra-firm. In the case of the United States (accounting for half of all receipts), inter-firm royalty and licensing fee receipts for industrial processes (or manufacturing know-how) as a proportion of the total has steadily declined from about 15% to about 11% between 1987 and 2004 (see figure 1a).

In the case of Africa, the trend is even more dramatic. Inter-firm payments as a proportion of the total of Africa's payment for intangible assets to the United States have declined from about 50% in the late 1980s to about 27% in 2004 (see figure 1b). However, Inter-firm payments for manufacturing know-how by Africa to the United States have fallen in absolute value from \$33 million to 1987 to \$20 million in 2004 and, has fallen as proportion of total payments, has fallen from 46% to 5% over the same period.

In many ways, the strengthening of IP rules has had little impact on the mode by which major firms transfer their technology at the global level.

The transfer of technology is often accompanied by contractual agreements that detail the nature of the technology, payment methods, period of use, liabilities, territories in which it could be deployed and how to deal with third-parties, among others. Other than sale or assignment of IP rights, most arrangements such as licensing, franchise and joint-venture, among others, include many other clauses that deal with knowledge disclosure to third parties, access to technology enhancements, use of inputs from other parties etc.

These clauses, often termed restrictive business practices, are also acceptable market mechanisms employed by firms to control the use of their technology or stay competitive, irrespective of the unique country-IP regulations. Earlier efforts to regulate the use of such practices through government screening of contractual

agreements [16] have largely been abandoned in favour of market-based approaches (see TRIPS Agreement Article 40). One could also include software and genetic use restrictive technologies among restrictive business practices, perhaps of a higher level.

It is also often forgotten in the debate on IP and technology transfer that domestic firms import technologies to enhance their own performance. They are not necessary technology transfer agents for other firms. Other than public enterprises, most private firms are unlikely to share their imported technologies with competitors in the domestic market.

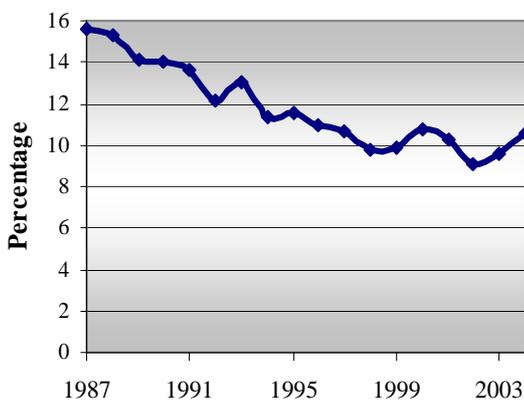
Overall, the strengthening of IP rules following the entry into force of the TRIPS Agreement do not seem to have been accompanied by increase in inter-firm transfers of manufacturing know-how and reduction in the use of restrictive business practices and/or government lists of dual-use products. It also remains unclear whether the increase in intra-firm royalty and licensing fee receipts by TNCs are due to improvements in national IPR regimes [17] or the growing trend in outsourcing manufacturing activities abroad.

2.3 IP and foreign direct investment

It is clear that protecting one's invention in today's knowledge economy is playing an increasing role in attracting investment needed to take the invention to market. As the Director of Nordisk put it:

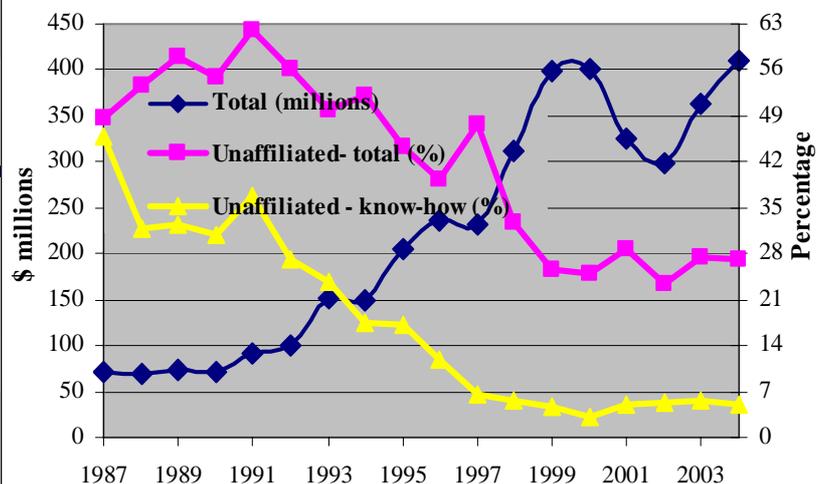
"Anyone who has tried to create a biotech company knows just how important patents are. You learn this when you're studying, and again at your first job, and if you haven't done so before, you realise it the first time you meet potential investors." ...But patents are more than just important. They are crucial in deciding whether your invention has a com-

Figure 1a. Percentage of inter-firm royalty and licensing fee for manufacturing know-how in total receipts by United States



Source : US Bureau of Economic Analysis

Figure 1b Royalty and licensing fee payment to the US by Africa, and proportion for unaffiliated



mercial future.” [18]

However, the role IPR in stimulating foreign direct investment (FDI) remains unresolved. There are several observations that cast doubt on the role IPR plays in FDI flows. It has been observed that foreign firms rarely transfer all their technologies to their affiliates irrespective of the national IPR regime. If anything, investors are more likely to consider important factors such as market size, technological development, sophistication of consumers and economic and political stability in their decisions to transfer their technologies.

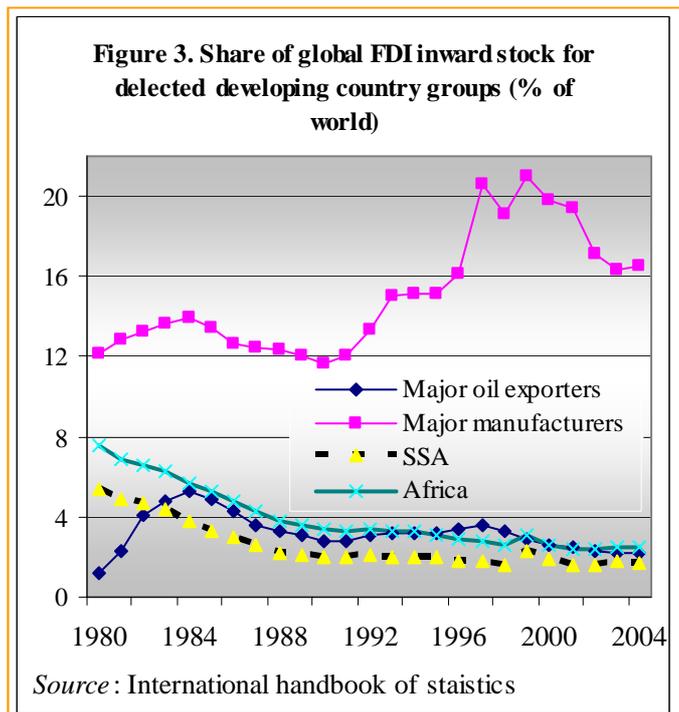
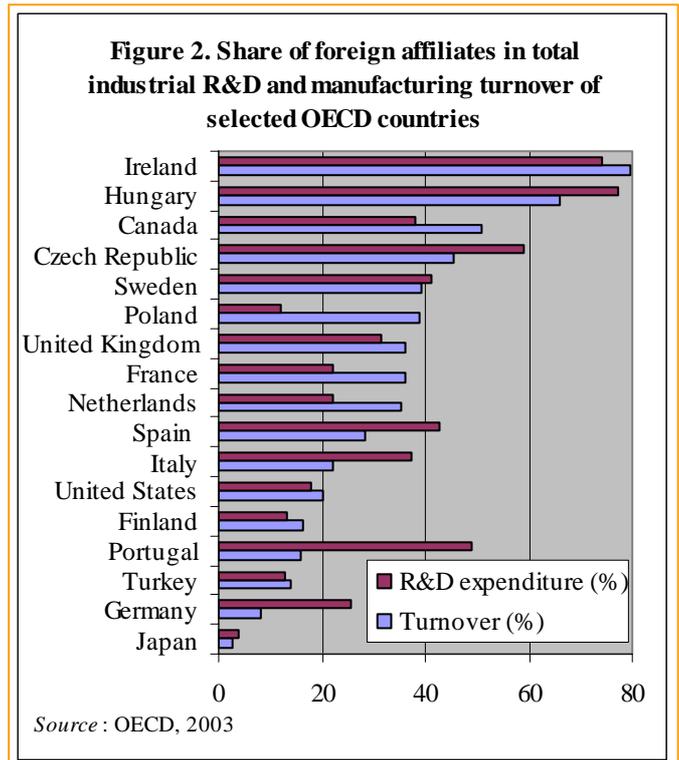
The second observation stems from the actual trends in flows of FDI over the last decades. It is difficult to explain using IPR arguments alone why Thailand attracted more FDI than the Republic of Korea throughout most of the 1990s and the 2000s. Similarly, countries such as China and Russia have continued to attract greater amount of FDI despite their perceived weak IPR regimes.

A third observation is based on the varying decisions of investors to spend a proportion of their sales on technology development. A survey among OECD countries revealed wide differences in the ratio of foreign affiliates' expenditure in national R&D in comparison to their proportional in sales turnover (see figure 2). Foreign firms' proportion in national R&D expenditure of Germany, Italy and Portugal is higher than their proportion in sales turnover. In a way, foreign affiliates prefer these countries for R&D performance than for manufacturing.

The above observation is also backed by the varying choice of firms to establish an R&D or manufacturing facility in a given country. Between September 2004 and October 2005, India attracted 146 R&D and 32 manufacturing investment projects while United States attracted 24 R&D and 69 manufacturing projects. Differences in national IP rules cannot adequately explain the decisions of investors to establish technology development or product manufacturing facilities in a country or another.

It is also observed that firms seek IP protection in strategic markets, such as China, European Union and United States. Inventors could undertake their innovation in a country with a weak IP regime but strategically seek protection in the potential markets for products or services where enforcement may be more effective. An increasing number of foreign affiliates are filing for non-resident patents in key markets. In the case of foreign affiliates in India, between 2001 and 2005, IBM has seen its annual patents granted by the USPTO increase from 8 to 26, Texas Instruments from 9 to 25 and General Electric 6 to 23, according to the USPTO database. A similar picture is emerging for foreign affiliates in China and Singapore as well. Domestic inventors too are seeking protection abroad where they are likely to export/sale their technologies or products.

Finally, UNCTAD's Inward FDI performance index,[19] which compares the countries' actual inward FDI flows to its potential to attract investment, for 2004, was topped by Azerbaijan followed by Belgium and Luxemburg, Brunei, Angola, Ireland and Gambia while South Africa and Kenya, ranked 126 and 127, respectively, out of 140 economies. [20] Perhaps other factors influence investment decisions much more than IP rules, otherwise countries such as South Africa and Kenya, perceived to have better IP regimes should score higher Angola or Gambia.



However, as other factors of interest to investors become more equal, IPR may become a major consideration especially in information technology and biotechnology. Furthermore, as African countries move up the technological ladder - from extraction-based industries to manufacturing ones, which attracts most of the global FDI and technology, IP may become an issue.

It is observed that developing countries that are major exporters of manufactures [21] attract more FDI than the top oil exporters or Africa (see figure.3). In the extraction-based industries such as mining, investors' main concerns are very simple and few: presence of natural resources, basic infrastructure, security and a government, or a resemblance of it that they could work with.

On the other hand, IP regulations could play a major role in domestic investment decisions. For instance, the infant African entertainment industry, e.g. music and video, is said to suffer from piracy, especially those in small economies. Although piracy is not the major factor slowing the development of the entertainment industry, it is assumed to be taking a large bite off the profits of an infant industry that is also exposed to competition from cheaper but high quality products from abroad. Since domestic investment tends to lead foreign investment, enforcing IP rules, such as copyrights in the case of the entertainment industry, could indirectly be a way of attracting domestic and foreign investment.

2.4 IP and trade

It is assumed that IP is critical in promoting trade in IP-intensive products and services. Some argue that producers are unlikely to export knowledge-intensive products to countries where IP rules do not protect the inventions embodied in the products. It is therefore, assumed that strengthening the IP regime would encourage trade and fair competition.

The argument that weak IPR protection will discourage export of knowledge-intensive products may be true if there are other players in the host economy capable of imitating or copying the technology or the mode of transfer would expose the technology to competitors likely to copy it. In addition, such copying or imitation has to attain an industrial scale to threaten the market share of the original exporter and thus discourage trade.

A survey by Lesser, conducted for WIPO, [22] revealed that most firms ranked product market potential first, followed by IPR enforcement and the cost of IP protections. The actual IP legislation was ranked lower. Most firms, other than producers of self-reproducing seeds (non-F-1 hybrids), indicated that they will export their products to countries with weak IP regimes.

The survey revealed that a firm will export to a given country if the perceived profits exceeding the cost of serving the market - taking into account the risk of not serving the market may increase the risk of losing out to

counterfeit products. In other words, if gaining some market share is profitable, it may be wiser to export than lose the market to imitators. Therefore, large markets attract ever growing volumes of high-tech exports irrespective of their IP legislation and enforcement.

Others see some copying as inevitable or as another ways of opening up new markets. As Charles Igwe, Executive Producer of The Big Picture Ltd (Nigeria), said: *"We're not worried about piracy. We realised that the only reason why people would make copies is that they can't easily get to the cities to buy more. We know that with every illegal copy you create a new market."* [23]

While recognizing that IP is important in trade, Igwe also argues that it could also hinder growth of the industry. He argues the success of the Nigerian film industry - producing over 1000 movies a year and raking in about \$400 million in sales - largely depends on its ability to creatively and efficiently adapt. Some of its features include: 1. targeting home use due to lack of Cinemas or theatres, 2. distribution through social networks, 3. Keeping production costs low, 4. focus on African themes that speak directly to the public. [24] Any IP regulation has to recognize such differences if it has to save as a tool for development.

It should be noted that not all technologies are available for sale, irrespective if the IP regulation of the importing country. For instance, the Pakistani Physics Nobel laureate Abdus Salam recalled that 'Pakistan failed to buy the technology for the production of penicillin in 1955. A few chemists had to re-invent the process - and due to their inexperience - manufactured penicillin at 16 times the world market price.[25] The number of technologies that could not be easily bought range from simple enzymes and personal computers to that for producing vaccines and launching satellites into space (often falling under dual-use restrictions). IP does not seem to have loosened such technology export-restrictions.

There is a tendency to look at trade as exports by one country to another. In reality, firms decide to sell or buy from other firms at home or abroad. It is observed that many firms prefer to transfer their technologies within their network of firms and, to some extent, partners. It has been shown that most United States TNCs imported their high-tech intermediate inputs from affiliates abroad. In a way, intra-firm trade is higher in high-technology intermediate inputs than in other categories of inputs. [26]

Many African countries do not far offer the market size China or Russia present to many exporters. Therefore, lowering the costs of doing business, including offering good IP protection has to be considered to promote exports of technology-products into their markets.

Domestic firms, too, are unlikely to import products into a market where cheaper copies are sold and thus under-

mine their competitiveness unless they are subsidized or shielded from such competition (e.g. government contracts for medicines or enforcement of IP). Therefore, a case for strengthening IP regulations could be made to protect domestic producers while maintaining space to permit learning.

IP regulations may be tailored, for example, to allow greater latitude for R&D and learning at home (e.g. to include initial sales) while largely permitting imports of original products in certain sectors of interest. For example, some developed countries' legislations allow generic drugs manufacturers to test and submit for approval and registration of their generic drugs before the patent expires. For many African countries, an extension to allow them to stock pile or distribute the generic medicine may be necessary for a smooth transition, given the small size of domestic drug producers.

The purchasing power of consumers may also have to be considered. A situation such as that witnessed in the health sectors where millions of people who cannot afford medicines die even when legal flexibilities exist to produce cheaper versions has led to the distorted view that IP protection merely serves as an exploitative tool of TNCs. In many African countries, more government intervention or brokering of technology deals in areas of interest should be used to take advantage of the flexibilities.

2.5 IP and enforcement of product standards

Although IP is often seen in terms of innovation and trade, it also plays a role in maintaining and assuring the quality of product and service standards. The enforcement of trademarks and copyrights in particular, play a role in ensuring that products do not sound or look so alike that it confuses customers. If the confusing products are of good quality or performance, among other properties, the issue is largely violation of IP and competition rules.

However, if the products that appears like the genuine one is of poor quality or performance, it may be dangerous or risky to use. A recent paper highlighted a few examples from Africa:

"During the 1995 meningitis epidemic in Niger, the authorities received a donation of 88,000 Pasteur Merieux and SmithKline Beecham vaccines from neighbouring Nigeria. The drugs were found to be counterfeit, with no traces of active product. Some 60,000 people were inoculated with the fake vaccines.

The recent discovery of counterfeit antiretrovirals (stavudine-lamivudine-nevirapine and lamivudine-zidovudine) in central Africa raises the prospect of a disastrous setback in the treatment of AIDS in sub-Saharan Africa, unless vigorous action is taken now". [27]

Chisokone market, Kitwe, Zambia.



The market sits in the heart of Zambia's second largest city, next to modern shopping outlets. Its a one-stop shopping outfit for carpenters, pupils, patients, welders, trackers and do-in-yourself enthusiasts.

Any room for IP?

The problem is not restricted to developing countries. In March, 2006, the European Commission issued a warning (IP/06/375) that several websites were selling *Rimonabant* - a treatment for obesity and smoking cessation - before it was approved for use in the European Union. In 2004, three men were jailed in the United Kingdom for running an illegal facility that could produce up to half-a-million tablets a day and appeared to be part of an international operation that produced counterfeit diazepam, steroids and Viagra.

It is possible that counterfeiters establish illegal production, distribution and marketing systems that are protected by corrupt officers and other criminal elements. [28] For instance, In Nigeria, where about half of all the drugs on the market were counterfeits in the late 1990s, early efforts to control counterfeiting were met with stiff resistance. Some of buildings of the national food and drug authority torched and the director almost killed in an assassination attempt. [29] A strict enforcement of IP rules and, registration and approval systems of products or services could help fight such a scourge.

IP rights, especially trademarks, could help stem the flow of fake products in the market. Trademarks are also a more useful tool in educating the public, tax authorities and marketing chains identify fake products than patents and copyrights. Such IP rights may also enables injured individuals to claim damages in the case the products cause harm or do not perform.

However, one has to underscore that in some cases, such illegal products fill a vacuum created by both IP and

non-IP measures. For instance, many lives could be lost in Africa if anti-malarial drugs required a prescription or were sold only in legal pharmacies for two simple reasons: 1. Few people have access to health centre or imitations of one, let alone access to qualified doctors and laboratories capable of diagnosing malaria and 2. Malaria infection rates are high - in some areas, infections could reach up to 1 in 3. In such cases, the makeshift stalls selling anti-malarial tablets become life-savers.

A similar debate has raged in Africa on the effect of second-hand clothes and used cars on ailing infant industries. Any fight against counterfeiting in Africa has to include empowerment and capacity-building initiatives, not only to prosecute illegal vendors, but to develop the technological and industrial bases as well as key infrastructure for delivery of decent services to the public.

3. Moving up the technological ladder

There are some who argue that for many African countries IP is not the major issue until they develop some capacity to use current knowledge. [30] For example, Taiwan is thought to have largely used older machines imported from advanced countries and focused on re-engineering non-proprietary product technologies in its early stages of development and conducted little research up to the 1970s. [31]

A recent report indicates that Taiwan had a limited budget and research personnel scattered in various institutions, more like Africa today. To solve this problem, it established the Industrial Technology Research Institute (ITRI) in 1973 with about 450 employees. [32] By 2000, ITRI had 6100 employees of which 900 had PhDs and 3600

had bachelor's or master's degrees. Government provides ITRI with contracts to develop generic technologies that are then transferred to private sector under non-exclusive arrangements.

Korea is another country that has made major technological leaps in the recent years. Korea seems to have targeted process rather than product technologies. Korea imported industrial processing technologies (i.e. manufacturing know-how) that it then used to produce or deliver its research output to market. For example, in the car industry, Korea first learnt how to assemble and mass produce foreign models of cars before moving to increasing local content, and engine and vehicle designing. Like Taiwan, most research is designed, financed and conducted with significant private sector participation.

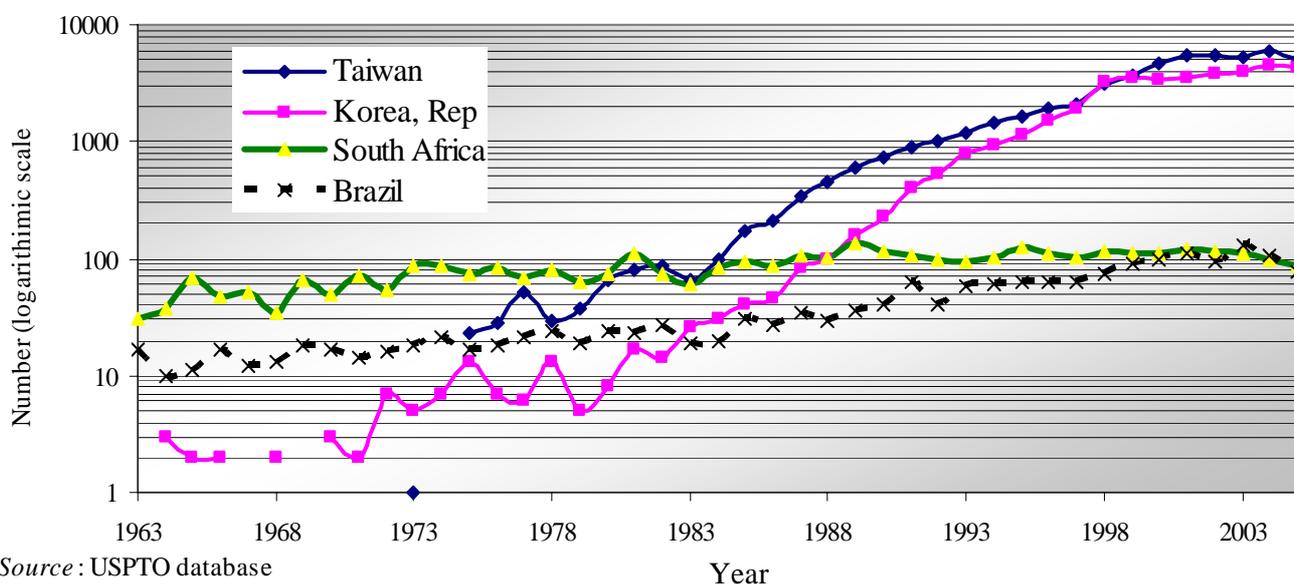
It is thought that Taiwan and Korea placed a great emphasis on:

- ⇒ human capital development
- ⇒ Importing or acquiring foreign technology from developed countries
- ⇒ Building indigenous science and technology capabilities and
- ⇒ Perfecting the conversion of research output into commercial products and services.

It may partly explain why these two countries have emerged as major technological powerhouses, over taking established ones such as Brazil and South Africa (see figure 4). Today, they are among countries that are calling for strengthened IP rules, separating them from countries such as Brazil, India and South Africa which still need more space for learning.

Most African countries' technological prowess is well below that of South Africa. They have to focus on build-

Figure 4. Patents granted by USPTO for four selected economies



ing their technological capabilities and industrial base. Africa is remaining behind other developing regions not only in patent counts but also in scientific publications (see figure 5). It is the only region whose science and engineering article counts fell between 1988 and 2001.

At first glance one will call for increased R&D expenditure to enable the continent to catch-up. However, increasing R&D budgets without clearly defined targets could lead to what have been termed 'Solow Paradox', 'Productivity Puzzle' or 'European Disease' – a situation where increased investment leads to major scientific breakthroughs that is not necessarily commercialized or result in increased productivity. [33] Africa already displays some of such failure where even the little research outputs seems not to be commercialized.

However, if African countries are serious about scientific and technological development of their countries or to use IP for national development, they may have ask their "co-operating partners" or donors to deliver most of their aid in form of technologies in areas of interest. Countries could use part of the aid to pay for technology licenses in areas such as health, energy and agriculture. They could also utilize some of such resource to import skills, and refurbish and/or refocus their public research institutions to become technology delivery vehicles to emerging firms. In return, developed countries will be meeting their obligations under the TRIPS Agreement (Articles 7, 66 and 67).

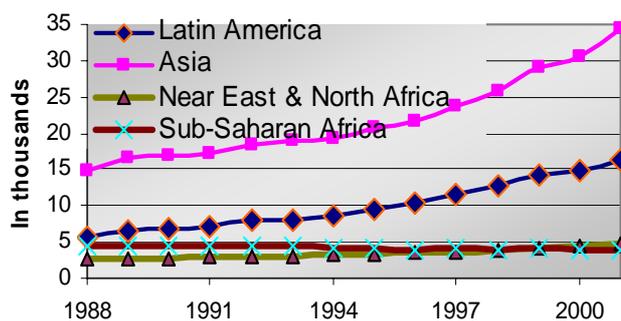
Of course, their sensitive areas such as health and agriculture where IP could become a challenge in meeting development targets. Countries could expand their bills of rights or strengthen their competition laws accordingly to meet food security and health needs. Recent cases in South Africa and Brazil highlight the importance of public interest or pressure in such negotiations.

Concluding remarks.

IP has to be considered in its rightful place as a tool for rewarding inventors, protecting knowledge assets and promoting innovation. It could therefore be used to promote development of industries and give value to domestic knowledge (e.g. herbal medicines and traditional designs). In this case, IP tools could be used to give commercial value to natural resources and promote creativity.

Awareness and enforcement of some of the often forgotten IPR components, such as utility models, trademarks and copyrights, could play an important role in promoting fair competition and industrial development. In particular, trademarks are important in protection of technology or non-technology based products, increasing market penetration and extending the protection beyond patent life. For example, aspirin continued to earn Bayer some money a century after the patent expired.

Figure 5. Science and engineering articles published by developing region authors



Source: US NSFbrief 04-336, 2004

The extent to which IP could be used as a tool for industrial development in Africa will depend on how IP rules are allowed to interact with other industrial and economic policies essential for building a viable technological base.. In this case, deliberate government policies to stimulate investment in R&D and human capital development in public and private institutions will be required. As of now, some African countries treat R&D expenditure by firms in their tax policies in the same way as expenditure on luxury cars. Incentives, such as those offered to attract FDI (e.g. tax holidays and duty free imports of machinery) may be needed to stimulate investment in R&D.

The ability of many African countries to use their IP rules to promote trade, investment and technology transfer is limited. For instance, Egypt is the only African country among the 48 countries the United States Trade Representative has designated as Priority Watch List, Watch List or Section 306 monitoring countries with respect to IPR infringements, in the 2006 report. The absence of almost all African countries from this list which includes countries such as Brazil, Canada and India, either suggests African countries do not have the capacity to exploit technology or their IP legislation and enforcement is excellent. The former is likely to be true.

Africa's greatest challenges is perhaps balancing the interest of its trade partners that are calling for ever stronger IP rules with its needs to develop industries that will compete in global trade in future. Meeting these conflicting needs may require an investment in diplomacy skills to negotiate for space to learn and develop a sound technological base while guaranteeing some fair market to its trade partners.

The former may prove challenging but not impossible. African countries could develop international R&D collaborations with developed countries in a specific industry or technology. They could also use some of their bilateral aid packages, aid for trade and, for some, debt savings to subsidies specific technology transfers or transactions. And where they hit a block, they could mobilize pressure groups, such as NGOs, to accelerate the process. Such measures could offset any costs associated with IP while meeting their WTO obligations.

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