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The economic importance and impacts of intellectual property rights (IPRs) in Sudan

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(January 30, 2013)

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Abstract

This paper explains the importance of IPRs and examines the factors hindering and those contributing toward enhancing IPRs in Sudan. We find that the inadequacy of IPRs protection in Sudan is attributed to low integration in the international institutions, lack of legal issues, lack of government concern, lack of private sector concern, weak institutions setting, lack of public awareness, lack of resources, weak culture for IPRs, lack of cooperation between universities and industry and lack of coordination. The inadequate IPRs protection in Sudan leads to poor national system of innovation, hindering FDI and hindering transfer of technology. The factors contributing toward enhancing IPRs in Sudan include promotion of adequate IPRs legislations and enforcement; planning, commitment to international IPRs agreements; finance, investment and resources; social partnership to encourage IPRs protection, government concern, private sector concern, public awareness, cooperation between universities and industry, institutions setting, coordination and culture for IPRs protection.

Keywords: IPRs, economic importance, economic impacts, Sudan, Africa.
JEL classification: O3, O30, O34

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The Economic Importance and Impacts of Intellectual Property Rights (IPRs) in Sudan

1. Introduction

There is increasing concern amongst economists about the importance of IPRs and their related impacts on economic, social and innovation development in both developed and developing countries. The history of IPRs dates back to the pre-industrial era. So that all the technological development that took place since the First Industrial Revolution were indeed shaped by the various IPRs regimes in place in various countries throughout the history.[2, 3]

This paper is important in view of the fact that IPR is a very important topic in the discussion of economic development, and therefore understanding the strength or weakness of IPR in a developing country like Sudan is of great significance. This paper combines data on patents, industrial designs and trade marks for Sudan with survey data on the importance of IPR in Sudan. Moreover, this paper focuses on the importance of strengthening IPR, and therefore develops a case for it. The paper discusses the arguments in favor of and against the role of a strong IPR in development. This is discussion is both interesting and useful and can be used to offer insights for later discussions in the paper. It leads to the general conclusion is that provided that Sudan government gives a firm commitment to institutional reform and sound plans to strengthen IPRs, there are more advantages and arguments in favor of than disadvantages and arguments against strengthen IPRs to boost economic development in Sudan.

This paper discusses from economic perspective the importance of promoting IPRs in Sudan and differs in several ways from the several studies in the literature, which provides an interesting analysis of IPRs in the developing countries. First, different from the studies in the literature we focus on IPRs in Sudan as a new case of the African countries. Secondly, we compare the case of Sudan with other Arab, African and world countries. Thirdly, different from the few studies in the Sudanese literature (cf. Makki, 2006; Atta-Al-Mannan, 1999; Ali, 1995; Yusuf, Babiker, Mater) that examine the importance of IPRs in Sudan from legal perspective, we examine the importance of IPRs in Sudan from economic perspective using more recent data wherever possible. Particularly, we provide a more in-depth analysis of the intensity, structure and trend of industrial property. Finally, different from the studies in the Sudanese literature, a novel element in our analysis is that we use new survey data based on primary data and interviews with the official and academics experts in IPRs in Sudan to examine the main factors

[2] See for instance, Verspagen (1999) pp. 2, 14, 16. See also Freeman and Soete (1997).
[3] See for example, The OECD (1997) "The Second European Report on Science & Technology Indicators," (1997).

hindering and those contributing towards the promotion of IPRs in Sudan. The main purpose of this survey is to collect primary data to examine the causes of poor IPRs and to provide some recommendations to improve IPRs in Sudan. We are aware of the limited scope of our analysis that focuses on industrial property, but due to lack of relevant data, it would not be possible to cover other types of IPRs in Sudan; we leave that for future studies, when adequate data are available.

We are aware of the importance of focusing on the pros and cons of a strong IPR in different sectors of the economy; argue that strong IPR in traditional medicine, weak IPR in areas where technology transfer to local firms are necessary. This seems like a meaningful strategy, and comparisons with practices followed by successful countries in the past would be most appropriate. But because of the limited implementation of IPR in different sectors of the economy and due to the lack of awareness across the different sector of the economy on the importance of IPR in Sudan, we could not cover these issues in this paper, but we hope to cover these issues in our future research when adequate data are available.

The factors constraining IPR in Sudan and the implications of weak IPR are discussed towards the end of the paper and the survey data does not necessarily reflect the opinion of the industry; it is based on the feedback academic experts. We are aware of the limitation with regards to survey data as it does not reflect the opinion of the industry, because of the limited information on the implementation of IPR in the industrial firms and the lack of awareness within the industrial firms on importance of IPR in Sudan, we could not cover these issues in this paper, but we hope to cover these issues in our future research when adequate data are available. Mainly, the limited implementation and awareness about IPRs in industry in Sudan appears from the results of the firms survey conducted by Nour (2010) and discussed in Nour (2011, 2013).[4] For instance, Nour (2011, 2013) indicate the weak technology output indicator as measured by patent applications.[5] For instance, in the year 2008, only 6% of all respondent firms applied for a patent; the low degree of patenting may be attributable to low R&D efforts.

Based on the above, the rest of this paper will be organized as follows: Section 2 explains the conceptual framework and review the literature on the economic importance and economic impacts of IPRs. Section 3 discusses the importance, implications and constraints of IPRs in Sudan. Section 4 provides the conclusions.

[4] The firm survey (2010) on 'Technological Change and Skill Development in Sudan's Manufacturing Sector' aims to assess skill and technology indicators and the impacts of unskilled workers amongst the food, textile, chemical and metal small, medium and large size establishments in Sudan.

[5] As reported by 6%, 8%, 3%, 8%, 6%, 7% and 5% of the all firms, chemical, food, metal, large, medium and small respondent firms respectively. This includes five firms: one small chemical, one medium chemical, one medium metal, two large chemical and one large food firms applied for patents.

2. The conceptual framework and literature review

Before explaining the economic importance and impacts of IPRs in Sudan in Section 3 below, it is worthwhile in this section to begin with the conceptual framework and brief definition of the concept IPRs and then discuss the literature on the economic importance and impacts of IPRs.[6], [7]

The concept Intellectual Property (IP) refers to creations of the mind: inventions, literary and artistic works, and symbols, names, images, and designs used in commerce. IP is divided into two main categories: industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source; and copyright and rights related to copyright. The innovations and creative expressions of indigenous and local communities are also IP, yet because they are "traditional" they may not be fully protected by existing IP systems. Access to, and equitable benefit-sharing in, genetic resources also raise IP questions.[8] In addition, IPRs include the category of Plant Breeder's Rights (PBRs) that also known as Plant Variety Rights (PVR) that allows plant breeders the right to protect new varieties of plants.

Based on the definition of the concept of IPRs presented above, the literature explain the economic importance and economic impact of the various items of IPRs from different perspectives, micro and macro perspectives, user (consumer) and producers and national economy perspectives, and developed and developing countries perspectives.[9] From economic perspective, Intellectual Property can be perceived as a powerful tool for economic growth, IPR — in the form of patents, copyrights and trademarks — has come to perform a vital function in the global economy and form a cornerstone of the knowledge economy. From the economic point of view the economic importance of intellectual property rights (IPRs), as source of innovation, creativity, growth and progress stems from the fact that almost everybody in society is a user and potential creator of intellectual property, so protection, through a system of national and

[6] As indicated by WIPO 'The need for international protection of intellectual property became evident when foreign exhibitors refused to attend the Intellectual Exhibition of inventions in Vienna in 1873, because they were afraid their ideas would be "stolen" and exploited commercially in other countries. That year marked the birth of Paris Convention for the protection of industrial property, the first major international treaty designed to help the people of one country obtain protection in other countries for their intellectual creations in the form of industrial property rights, known as inventions (patents), trademarks and industrial design. These efforts lead to the birth of the World Intellectual Property Organization (WIPO) in 1883," (WIPO 1999, p.3). According to WIPO Report "every country needs a well-developed and healthy intellectual property system for economic and social well-being. Intellectual property protection encourages the use and further development of local inventive and artistic talents and assets; nurtures and safeguards local intellectual property assets, such as traditional knowledge and folklore; and attracts investment, providing a stable environment in which investors, both local and foreign can be confident that their intellectual property rights will be respected. In addition, an intellectual property infrastructure allows participation in the exchange of commercially valuable information at the international level as promoted by WIPO, including the quick and easy access to information in new technology such as international patent applications and abstracts available under PCI. Beyond national boundaries, a well- functioning intellectual property system contributes to great stability and security for protected rights in an increasingly competitive global market place, allowing efficient enforcement of those rights. In addition, the system can aid in combating illegal activities such as counterfeiting and piracy," (WIPO, 1999, p.11).

[7] See for example, Idriss Kamil (2003) "Intellectual Property – a Powerful Tool for Economic Growth," WIPO, 2003:24).pp. 150-151.

[8] The formal definitions of the different domains of intellectual property (IP) in the Convention of WIPO (1967) defines the terms intellectual property (IP) as including the rights relating to: literary, artistic and scientific works; performances of performing artists, phonograms, and broadcasts; inventions in all fields of human endeavor; scientific discoveries; industrial designs; trademarks, service marks, and commercial names and designations; protection against unfair competition; and all other rights resulting from intellectual activity in the industrial, scientific, literary or artistic fields. See: http://www.wipo.int/about-ip/en/, accessed on May 10, 2012.

[9] See for example, Idriss (2003), pp. 150-151.

international rules called intellectual property rights, is necessary to provide incentives and financing for innovation and creation, which in turn lead to economic, cultural and social progress. Protection for intellectual property also encourages the production and dissemination of knowledge and a wide range of quality goods and services, intellectual property rights add value for consumers and can provide a guarantee of source and quality. Intellectual property protection contributes to economic growth in both developed and developing countries by stimulating innovation, cultural diversity and technical development as part of a larger policy framework. Properly used, intellectual property rights can also be key tools for the alleviation of poverty through trade. The immense adverse economic and social impact of intellectual property theft requires that a priority for combating counterfeiting and piracy is necessary for the intellectual property system and society to reap the benefits from IPRs. [10]

From economic perspective, a rationale for "intellectual property" rests on incentive effects to overcome the "free rider problem". From the economic point of view the system of IPRs can be considered as an institution tries to solve the problem of market failure –especially for technological knowledge as a good which is characterized by non-rivalry and non-excludability- by providing private producers with incentives to supply public goods. So IPRs is one of the possibilities to solve the problem of market failure.[11, 12] There is considerable controversy over the economic importance and economic implication of stronger IPRs in both developed and developing countries. In the literature there are three ways that the strength of the IPRs regime could affect economic growth and development indirectly: IPRs regime may affect the innovative activity and thus contribute to growth, affect the inflows of Foreign Direct Investment (FDI) and technology transfers and enhance the growth, the IPRs regimes, enhance the ability of countries to export certain goods, and affect redistribution of income between the countries and between communities within the country.[13, 14] The literature indicates that the observed effects could be subject to the causality problem as developed countries are likely to have stronger IPRs regime than the poorer ones, in other words, the level of development is likely to be a determinant for strength of IPRs regime rather than the other way round.[15]

[10] See for instance, Idris (2003) p. 24.
[11] See for example, Verspagen (1999) p.5.
[12] See for instance, David (1993) p.33.
[13] See Kumar (2002).
[14] Several recent studies show the relationship between IP protection and economic growth (Siwek, 2005; Shapiro and Hassett, 2005; OECD, 2005). Moreover, report by WIPO (2007) indicate a positive correlation between the strengthening of the IP system and subsequent economic growth and examine the impact of the IP system on areas such as R&D, FDI and technology transfer in six Asian countries– China, India, Japan, Malaysia, the Republic of Korea and Vietnam.
[15] See for example, Van Wijk and Junne, (1993), p.22. Verspagen (1999) pp. 18-20, 23, 26, Ginarte and Park (1997), Maskus and Penubarti (1995), Gould and Gruben (1996), Rapp and Rozek (1990), Park and Ginarte (1997), Thompson and Rushing (1996, 1999), Kumar (2002), Park Walter G, Ginarte, Juan Carlos (1997), Kanwar (2006). In addition other studies discusses the effect of IPRs in FDI inflows, technology licensing and trade and indicate that there are controversies, however, surrounding the importance of IPRs to trade and FDI Kumar (2002), Asid, Rozilee - Yusoff, Yusnieza Syarmila - Saiman, mohd Safri (2004), Popovici (2006); OECD,

Concerning the developed countries, the policy debate has been expressed around two opposite views. On the one hand, supporter of the view claim that stronger IPR (such as patents) are necessary to give the proper incentives to inventors as, if inventions are not protected, imitation will flourish and reduce the rewards accruing to inventors. On the other hand, opponents to stronger IPR point to the obstacles they would be creating for the access and diffusion of knowledge and information, which is a basic condition for sustained innovation.[16] As for the developing countries, there is increasing debate about the potential positive and negative effects of the international strengthening of IPRs.[17] On the one hand, the potential positive effects and benefits are that stronger IPRs provides competitive advantages for innovative firms, allowing them to appropriate larger returns from creative activity and generating incentives for additional invention, reducing contracting costs, allowing for international technology transfer, expansion of investment and technology flows to developing countries, raising closer integration of the developing countries with global sources of technology, enabling imitation, absorption and assimilation of foreign inventions and enhancing technological learning and economic growth- e.g. East Asian countries- Japan, Korea and Taiwan. On the other hand, the negative implications for the developing countries are that stronger IPRs protection could limit the access to patented products and ability to imitate expensive foreign product and technology, raise the costs of acquiring new technology and products, worsening their terms of trade by shifting the global terms of trade in favour of technology producers and against technology consumers, and has negative impacts on foreign direct investment, technology transfer, and affecting market price. Studies in the literature present mixed results concerning the economic impacts of IPRs (notably patent). Some studies argue that the absence or weakness of patent protection encourages technology transfer and technological learning through copying and imitation. While others argue that the patent system provides a mechanism, which encourages technology transfer from abroad through direct investment or licensing, and the indirect effects are an effective means of technological learning, so the strength or weakness of the IP (e.g., patent) system has a strong effect on foreign direct investment, and that a low level of IP protection will preclude certain types of investment in various industries to be made. Other experts argue that the role of the patent system in economic development is likely to be case-specific, in the context of both

(2002), Van Wijk and Junne (1993). In addition other countries discusses the failure of the role of IP and patent in developing countries, see for example, Verspagen, (1999), UNCTAD (1975), European Commission (1997) , Mansfield (1993, 1994, 1995). The Weak IPRs may be an important barrier to technology transfer (Mansfield, 1995; Primo Braga 1990). The literature provides new evidence linking protection of IPRs to economic growth (Rod Falvey, Neil Foster, David Greenaway, 2004), innovation and technology diffusion (Rod Falvey, and Neil Foster and Olga Memedovic, 2006). See also Primo (1990), Duguet (2004), Giovanni, (1998), Freeman and Soete (1994, 1997)

[16] See for instance, OECD (2003) "IPR, Innovation and Economic Performance" DSTI/STP Technology Policy Brief, Volume 3.

[17] See for instance, Keith Maskus (2000) "Intellectual Property Rights in the Global Economy,"

variations from industry to industry and variations among countries. Patent statistics are not sufficient evidence to explain the causal effect of the patent system with regard to economic growth. However, there is at least a strong correlation between the level of research and development (R&D) expenditure and the level of patenting activity according to the pattern of business R&D investment in the Organization for Economic Cooperation and Development (OECD) countries.[18, 19]

Arguments for intellectual property rights have generally taken one of three forms (Hughes 1988; Moore 2008). *Personality theorists* maintain that intellectual property is an extension of individual personality. *Utilitarians* ground intellectual property rights in social progress and incentives to innovate. *Lockeans* argue that rights are justified in relation to labor and merit. While each of these strands of justification has its weaknesses, there are also strengths unique to each. Concerning the general critiques of Intellectual Property, there are several general critiques of the rights to control intellectual property. The first criticism is related to the argument that *information wants to be free*: many have argued that the non-rivalrous nature of intellectual works grounds a prima facie case against rights to restrict access. Since intellectual works are not typically consumed by their use and can be used by many individuals concurrently (making a copy does not deprive anyone of their possessions), we have a strong case against moral and legal intellectual property rights (Kuflik 1989; Hettinger 1989; Barlow 1997). One reason for the widespread pirating of intellectual works is that many people think restricting access to these works is unjustified….. [But] Moore argues that it false to claim that just because this information can be used and consumed by many individuals concurrently, a prima facie moral claim to maximal access is established. The second claim is related to the *Free Speech Argument against Intellectual Property*: according to some, permitting intellectual property rights are inconsistent with our commitment to freedom of thought and speech (Nimmer 1970; Hettinger 1989; Waldron 1993). Hettinger argues that intellectual property "restricts methods of acquiring ideas (as do trade secrets), it restricts the use of ideas (as do patents), and it restricts the expression of ideas (as

[18] See for example, Keith E. Maskus, Intellectual Property Rights in the Global Economy (2000), see also Mansfield (1994).

[19] Patent system stimulates economic development, facilitates technology transfer and FDI and stimulates R&D at universities and research centers, see for example, Idriss (2003), p. 84). Patents are important for dynamic performance of the economy and have special importance, because it generates open externalities or spillovers effects that are especially valuable from an economic point of view, because, they are an important impetus to economic growth. See for instance, Verspagen (1999) pp. 9, 11-12). However, a monopoly provided by patents enables firms to charge too high prices from a societal point of view and this causes welfare loss for consumers (see for instance, Verspagen (1999), pp. 2-3, 6, 11, 16-17, 33). Several studies show the positive effects and benefits of patent system (Van Dijk, 1994) and argue in support of patents. Other studies present mixed results concerning the impacts of patents in technological development (Mazzoleni and Nelson, 1998. p.281). On the other hand, there is an argument that firms have alternative options for appropriating the return to R&D investment, and that these alternative options are often used more than patents. Levin, Klevorick et al. (1987), in a survey among large firms in U.S. and Arundel and Van de Paal (1995) for European large firms found that secrecy establishing a lead- time, an effective marketing compaign, and learning effects were measures of protecting knowledge that were considered to be more effective than patent by many (although not all) firms. Similar conclusion had been reached by in earlier studies such as Taylor and Silberston (1973). See for example, Verspagen (1999), pp. 7-8 and Mazzoleni and Nelson (1998) p. 281.

do copyrights)—restrictions undesirable for a number of reasons" (Hettinger 1989). … Two sorts of replies have been offered to this kind of worry (Himma 2006, Moore 2010). The first notes that it is the incentives found in providing limited protection that fosters the creation and dissemination of information—a system of intellectual property protection may cause restricted access in the short run, but overall, the commons of thought and expression is enhanced. Second, it is not at all clear that free speech is so presumptively weighty that it nearly always trumps other values. The third claim is related to the *Social Nature of Information Argument*: according to this view, information is a social product and enforcing access restrictions unduly benefits authors and inventors. Individuals are raised in societies that endow them with knowledge which these individuals then use to create intellectual works of all kinds. On this view the building blocks of intellectual works—knowledge—is a social product. Individuals should not have exclusive and perpetual ownership of the works that they create because these works are built upon the shared knowledge of society. Allowing rights to intellectual works would be similar to granting ownership to the individual who placed the last brick in a public works dam. The dam is a social product, built up by the efforts of hundreds, and knowledge, upon which all intellectual works are built, is built up in a similar fashion (Proudhon 1840; Grant 1987; Shapiro 1991; Simmons 1992)…. Finally, even if a defender of this view can justify societal ownership of general pools of knowledge and information, it could be argued that we have already paid for the use of this collective wisdom when we pay for education and the like (Moore 1998, 2001).[20]

Moore (2011) discusses Intellectual Property, innovation, and social progress and the case against incentive based arguments. He offers an internal and external critique of Anglo-American systems of intellectual property protection. Internally, it will be argued that incentive-based social progress justifications for intellectual property fail – alas, if we are to conduct a cost benefit analysis it appears that a different model or a different set of rights would be better than our current system. Social progress incentive-based arguments do not justify current copyright, patent, and trade secret models of intellectual property protection. Moreover, even if these arguments could be modified, they would seem to require allowances for multiple patents for the "same" intangible work, not patent monopolies. Externally, it will be argued that consequentialism – more specifically, rule-utilitarianism – is beset with numerous seemingly insurmountable difficulties and cannot provide an adequate foundation for intellectual property. If the internal or external arguments succeed, then we will have to either find a different justification or abandon systems of intellectual property protection altogether. … One alternative

[20] See Moore, Adam, D. "Intellectual Property", *The Stanford Encyclopedia of Philosophy* (Summer 2011 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/sum2011/entries/intellectual-property/>.: http://plato.stanford.edu/entries/intellectual-property/accessed on 25 April 2013. *First published Tue Mar 8, 2011.*

to granting patent rights to inventors as incentives is government support of intellectual labor. This would result in government- funded research projects, with the results immediately becoming public property. It is obvious that this sort of funding can and does stimulate the production of intellectual property without allowing initial restricted control to authors and inventors. The question becomes: Can government support of intellectual labor provide enough incentive to authors and inventors so that an equal or greater amount of intellectual products are created compared to what is produced by conferring limited property rights? Better results may also be had if fewer intellectual works of better quality were distributed to more people. If so, then intellectual property rights should not be granted on grounds of utility. In response to this kind of charge, defenders of the argument based on incentives have claimed that government support of intellectual labor does not and will not create the requisite incentives. It is only by holding out the promise of huge profits that society obtains maximal progress for all. Governments may be able to provide some incentives by paying authors and inventors in advance, but this kind of activity will never approach the incentive created by adopting a system that affords limited monopoly rights to intellectual property. … Building on the work of Michael Polanvyi and Brian Wright, Steven Shavell and Tanguy Van Ypersele offer a compelling case for a reward model. As Shavell and Ypersele note, reward models may be able to avoid the worries mentioned above while providing incentives. "Under a reward system innovators are paid for innovation directly by the government (possibly on the basis of sales), and innovations pass immediately into the public domain." This system avoids the monopoly power provided by patents while maintaining strong incentives. If rewards, paid annually, are based on sales, then both of the worries mentioned above would fall away. Innovators would still burn the midnight oil chasing that pot of gold, and governments would not have to decide which projects to fund or determine the amount of the reward before its "social value" was known. Taxes or collecting percentages of the profits of these innovations may provide the funds necessary to pay the rewards. Two other benefits are also obvious. One criticism of the patent system is that monopoly power allows monopoly prices. Under a reward system, consumers would avoid these prices and likely purchase other goods and services. A second criticism is that patents hinder subsequent innovations and improvements of intellectual works. As with monopoly pricing, a reward system avoids this social cost because the intellectual works pass immediately into the public domain. [21]

[21] See Moore, Adam D., Intellectual Property, Innovation, and Social Progress: The Case Against Incentive Based Arguments (December, 15 2011). The Hamline Law Review, Vol. 26, pp. 602-630, 2003. Available at SSRN: http://ssrn.com/abstract=1973405 or http://dx.doi.org/10.2139/ssrn.1973405. See Michael Polanvyi, Patent Reform, REV. ECON. STUD. 61 (1943). See also Brian Wright, The Economics of Invention Incentives: Patents, Prizes, and Research Contracts, ECON. REV. 1137 (1998). See Michael

Ghosh (2006) discuses the Intellectual Property incentive and argues that there are big problems with the justification of intellectual property through a story about incentives. The most obvious, that invention and creation occurs absent the grant of intellectual property, is perhaps the least interesting. The problem with the incentives story is that it predicts very little about the structure of intellectual property rights, except for the implication that intellectual property rights need to be strong as possible in order to maximize the incentives. While there may be some limits on rights in order to protect cumulative innovation and improvements, consistent with the incentives story, these limits are, in practice, introduced as an afterthought and as ad hoc exceptions to the assumption that intellectual property rights need to be as strong as possible. Empiricism, however, belies the justification of strong rights. The development of Western economies, for example, is marked with instances of appropriation of know-how and books that facilitated the transfer of knowledge and the growth of Western industries. Even if strong intellectual property rights do promote more creation, there is a question of whether strong rights effectively promote the distribution and consumption of the fruits of intellectual property. Because of these limitations, the incentives story is either completely false or at least misguided in shaping our understanding of intellectual property systems. Ghosh (2006) focuses on one of the errors in the incentive story. The error is that intellectual property protection is needed in order to correct the market failures arising from the combination of the high fixed costs of creating and the low marginal costs of distributing the new products that are the subject of intellectual property. Ghosh (2006) argument is that this error appears in many critical intellectual property cases and academic commentary. When strong intellectual property rights are justified in terms of the prevention of free riding, a version of this error is made. The error is also made when intellectual property is limited in order to give the owner enough of an incentive to create the work initially. In both instances, intellectual property rights are being determined by the costs of creating and distributing the work. Ghosh (2006) is not denying that industries in which intellectual property rights are common (e.g. pharmaceuticals, entertainment, software) have unusual cost structures that make competition difficult to implement and hence intellectual property necessary. Ghosh (2006) point is that cost structure by itself tells us very little about the details of how to structure intellectual property systems and implement policies. An emphasis on cost structure alone ignores the broader market and institutional arrangements which intellectual property helps to shape.

Kremer, Patent Buyouts: A Mechanism for Encouraging Innovation, Q.J. ECON. 1137 (1998). See Steven Shavell & Tanguy Van Ypersele, Rewards Versus Intellectual Property Rights, J. LAW & ECON. 525 (2001

Basing intellectual property law on a consideration of cost overemphasizes the importance of cost and trivializes the role of distribution and consumption.[22]

Martin (1998) presents the case against intellectual property, approaching the issue from a different background to most of us in the free software movement. He mentioned some of the problems arising from ownership of information, and shows the weaknesses in its standard justifications, mainly, by an overview of problems with the so-called "marketplace of ideas," which has important links with intellectual property. He indicates that there is a strong case for opposing intellectual property. Among other things, it often retards innovation and exploits Third World peoples. Most of the usual arguments for intellectual property do not hold up under scrutiny. In particular, the metaphor of the marketplace of ideas provides no justification for ownership of ideas. He outlines some alternatives to intellectual property and some possible strategies for moving towards them. He indicates that the alternative to intellectual property is that intellectual products not be owned, as in the case of everyday language. Strategies against intellectual property include civil disobedience, promotion of non-owned information, and fostering of a more cooperative society.[23]

3 The importance of IPRs in Sudan

Based on the conceptual framework and the review of the international literature on the economic importance and impacts of IPRs as discussed in Section 2 above, in Section 3 below it is worthwhile to discuss the importance of IPRs in Sudan. We begin with brief outline about the development of IPRs in Sudan compared to Arab and world emerging countries in Section 3.1. Next, we provide a brief background investigating IPRs in Sudan in Section 3.2, and then discussing the importance, implications and constraints of IPRs in Sudan in Section 3.3.

3.1 Development of IPRs in Sudan compared to Arab and world emerging countries

Before analyzing data on patents, trademarks and industrial designs that provide useful indicators about the process of innovation in Sudan (see Tables 4-6); we begin our analysis by international comparison. We use across countries comparison, and we compared IPR in Sudan with that in an emerging country like China or South Korea when they were at a similar level of development as Sudan was. This may involve relating IPR to the stage of development. Tables (1-2) show the number of patent and trademark applications in Sudan compared to Arab and world countries.

[22] See S. Ghosh, "The Intellectual Property Incentive: Not So Natural As To Warrant Strong Exclusivity", (2006) 3:2 *SCRIPTed* 96 <http://www.law.ed.ac.uk/ahrc/script-ed/vol3-2/ghosh.asp> accessed 25 April 2013.

[23] **See** Martin, B (1998) "Against intellectual property," Chapter Three in" information liberation," London: Freedom Press, 1998. , http://danny.oz.au/free-software/advocacy/against_IP.html.

Table 1 - Patent applications by residents and non-residents in Sudan compared to selected Arab and world countries (1983-2007)

Patent applications, residents

Country Name	1983	1999	2000	2001	2002	2003	2004	2005	2006	2007
Arab World										
Algeria	30	36	32	51	43	30	58	59	58	84
Bahrain										
Egypt	88	536	534	464	627	493	382	428		516
Iraq	33									
Jordan			71	52	21	25	42	49	75	59
Morocco	16		104				104	140	178	150
Saudi Arabia		72	76	46	61	56	81	119	119	128
Sudan	7	2	6	1	2	6	4	6	3	3
Syria		87	247	189	183	213	205	105	124	
Tunisia	19	67	47	22	45	35	46	56		
Yemen		9	7	6	9	16	10	20	14	11
Arab World	193	809	1124	831	991	874	932	982		951
China		15626	25346	30038	39806	56769	65786	93485	122318	153060
Korea	1599	55970	72831	73714	76570	90313	105250	122188	125476	128701
Malaysia		218	206	271	322	376	522	522	531	670
Singapore	5	374	516	523	624	626	641	569	626	696
India		2206	2206	2379	2693	3425	4014	4721	5686	6296
South Africa	4240	138	895	966	983	922	956	1003	866	915

Patent applications, nonresidents

Country Name	1983	1999	2000	2001	2002	2003	2004	2005	2006	2007
Arab World										
Algeria	278	248	127	94	291	296	334	465	611	765
Bahrain	28									
Egypt	727	1146	1081	923	788	626	312	1008		1589
Iraq	128									
Jordan			127	147	117	157	141	169	428	507
Morocco	300						457	520	732	782
Saudi Arabia		1144	797	683	552	487	395	374	419	642
Sudan	67	4	16	13	20	11	17	16	13	13
Syria			48	39	47	36	40	34	133	
Tunisia	197	190	210	156	58	120	223	282		
Yemen		30	22	18	19	13	27	23	34	24
Arab World	1725		2428	2073	1892	1746	1946	2891		4322
China		34418	26560	33412	40426	48548	64598	79842	88183	92101
Korea	4795	24672	29179	30898	29566	28338	34865	38733	40713	43768
Malaysia		5621	6021	5663	4615	4686	4920	5764	4269	1702
Singapore	852	6679	7720	8133	7575	7248	7944	8036	8537	9255
India		2620	6332	8213	8772	9188	13452	19661	23242	28922
South Africa	5479	3002	2400	5427	5617	5303	5833	6001	6739	7402

Patent applications, total

Country Name	1983	1999	2000	2001	2002	2003	2004	2005	2006	2007
Arab World										
Algeria	308	284	159	145	334	326	392	524	669	849
Bahrain	28									
Egypt	815	1682	1615	1387	1415	1119	694	1436		2105
Iraq	161									
Jordan			198	199	138	182	183	218	503	566
Morocco	316		104				561	660	910	932
Saudi Arabia		1216	873	729	613	543	476	493	538	770
Sudan	74	6	22	14	22	17	21	22	16	16
Syria		87	295	228	230	249	245	139	257	
Tunisia	216	257	257	178	103	155	269	338		
Yemen		39	29	24	28	29	37	43	48	35
Arab World	1918	809	3552	2904	2883	2620	2878	3873		5273
China		50044	51906	63450	80232	105317	130384	173327	210501	245161
Korea	6394	80642	102010	104612	106136	118651	140115	160921	166189	172469
Malaysia		5839	6227	5934	4937	5062	5442	6286	4800	2372
Singapore	857	7053	8236	8656	8199	7874	8585	8605	9163	9951
India		4826	8538	10592	11465	12613	17466	24382	28928	35218
South Africa	9719	3140	3295	6393	6600	6225	6789	7004	7605	8317

Source: The World Bank – World Development Indicators Database (2013), Accessed April 20, 2013.

Table 2 - Trademark applications by residents and non-residents in Sudan compared to selected Arab and world countries (1963-2007)

Trademark applications, direct nonresident										
Country Name	1963	1973	1977	1984	2002	2003	2004	2005	2006	2007
Arab World										
Algeria		645	1166	678	1258	920	1308	1693	1415	
Bahrain				776	2089	2176	2493	3011	3169	3627
Egypt		404	936	1141						
Iraq	556	451	458	364						
Jordan	430	426	734		2279	2386	3051	3078	3850	4633
Kuwait	505	776								
Lebanon	997	1247								
Libya	336	471								
Morocco	276	310	470				1239	1397	1421	1502
Qatar				742						
Sudan	494	469	620	424	1503	708	869	1133	1570	1503
Syria	869	513								
Tunisia	284	270	604	352						
Yemen			145		1092	1063	1261	1278	1737	1934
Arab World		5982	5133							
China				3077	37221	33912	44938	52166	56840	59714
Korea	303	3352	2733	8840	17862	16549	16529	16454	16840	20131
Malaysia	926		1866		8785	9439	10337	11668	12840	13605
Singapore			2221	4451	8321	8561	9252	9885	10279	11170
India	1308	1331	721	1612	5930	15450	15090	12361	15209	6500
South Africa	887	3341	2773	4135	7832	8092	8844	10850	11778	17921
Trademark applications, direct resident										
Country Name	1963	1973	1977	1984	2002	2003	2004	2005	2006	2007
Arab World										
Algeria		108	144	174	1333	1488	1266	1676	2235	
Bahrain				36	289	382	300	323	411	340
Egypt		339	383	581						
Iraq	501	327	166	630						
Jordan	100	95	77		2353	2690	3206	3638	4163	4512
Kuwait	66	35								
Lebanon	299	409								
Libya	28	27								
Morocco	273	357	381				4163	4993	4297	5020
Qatar				10						
Sudan	206	74	161	81	1852	965	1067	1349	1810	1852
Syria	184	283								
Tunisia	52	64	350	128						
Yemen					842	1025	1120	1312	1867	2441
Arab World		2118	1662							
China				26487	321034	405620	527591	593382	669276	604952
Korea	992	6210	6682	15924	90014	92368	91935	99435	105544	112157
Malaysia	1142		1687		7661	8327	10406	10479	11209	12289
Singapore			1775	2140	3343	4254	4839	5067	4852	5383
India	5399	6810	9680	14694	88190	76801	63906	73308	88210	117014
South Africa	3550	3312	2983	5071	12535	14676	14982	16985	20017	17080
Trademark applications, total										
Country Name	1963	1973	1977	1984	2002	2003	2004	2005	2006	2007
Arab World										
Algeria		753	1310	852	2591	2408	2574	3369	3650	
Bahrain				812	2378	2558	2793	3334	3580	3967
Egypt		743	1319	1722						
Iraq	1057	778	624	994						
Jordan	530	521	811		4632	5076	6257	6716	8013	9145
Kuwait	571	811								
Lebanon	1296	1656								
Libya	364	498								
Morocco	549	667	851				5402	6390	5718	6522
Qatar				752						
Sudan	700	543	781	505	3355	1673	1936	2482	3380	3355
Syria	1053	796								
Tunisia	336	334	954	480						
Yemen			145		1934	2088	2381	2590	3604	4375
Arab World		8100	6795							
China				29564	358255	439532	572529	645548	726116	664666
Korea	1295	9562	9415	24764	107876	108917	108464	115889	122384	132288
Malaysia	2068		3553		16446	17766	20743	22147	24049	25894
Singapore			3996	6591	11664	12815	14091	14952	15131	16553
India	6707	8141	10401	16306	94120	92251	78996	85669	103419	123514
South Africa	4437	6653	5756	9206	20367	22768	23826	27835	31795	35001

Source: The World Bank – World Development Indicators Database (2013), Accessed April 20, 2013.

Table (1) shows the number and trend of patent applications by residents and non-residents in Sudan over the period (1983-2007). Table (1) indicates a substantial decline and decreasing trend in total patent applications from 74 in 1983 to 22 in (2000-2005) and to 16 in (2006-2007). That attributed to decline and decreasing trend in patent applications by residents in Sudan from 7 in 1983 to 6 in (2000-2005) and to 3 in (2006-2007). But also mainly attributed to decline and decreasing trend in patent applications by non-residents in Sudan from 67 in 1983 to 16 in (2000-2005) and to 13 in (2006-2007). The substantial decline and decreasing trend in total patent applications in Sudan is opposite to the observed substantial increasing trend in world countries such as, China, Korea, India, Singapore and Arab countries (see Table 1 and Figure 1).

Table (2) shows the number and trend of trademark applications by residents and non-residents in Sudan over the period (1963-2007). Table (2) indicates an increase and increasing then constant trend in total trademark applications from 700 in 1963 to 781 in 1977 and to 3355 in (2002-2007). That attributed to increasing then constant trend in trademark applications by residents in Sudan that showed declining then increasing and then constant trend from 206 in 1963 to 161 in 1977 and to 1852 in (2002-2007). That also mainly attributed to increasing then constant trend in trademark applications by non-residents in Sudan, that showed increasing and then constant trend from 494 in 1963 to 620 in 1977 and to 1503 in (2002-2007). The increasing and then constant trend in Sudan is similar to the observed increasing trend in the world countries such as China, Korea, India, Singapore Malaysia and South Africa (see Table 2 and Figure 2).

Tables (1-2) show the limited number of patent applications by residents and non-residents in Sudan and Arab countries over the period (1983-2007) and the limited number of trademark applications by residents and non-residents in Sudan and Arab countries over the period (1963-2007). The levels in all Arab countries fall below the standard rate of China, Korea and India. Table (3) shows the poor status of IP laws in all Arab countries and the limited adhesion to international bodies and conventions. For instance, for the case of Sudan, Sudan is committed to domain names registration, trademark law, industrial design law, patent law, copyright law, Berne copyright (1886). Madrid IP Marks (1891), Paris PIP (1883) and PCT Patent (1970), WIPO bodies and law (1967) but Sudan is still not committed to WTO bodies and law (1995 which includes 150 world countries), thought Sudan is among the observatory governments for WTO bodies and law (1995). Moreover, for all Arab countries, the majority of Arab countries (except Djibouti, Iraq, Mauritania, and Somalia) are committed to domain names registration. All Arab countries are committed to trademark law. Majority of Arab countries (except Djibouti and Qatar) are committed to industrial design law and patent law. Majority of Arab countries (except Djibouti and Somalia) are committed to copyright law. Only few of the

Arab countries (Egypt, Jordan, Saudi Arabia, Oman, Morocco and Tunisia) are committed to plant variety law, while, the majority of Arab countries (Djibouti, Bahrain, Iraq, Kuwait, Lebanon, Libya, Mauritania, Palestine, Somalia, Sudan, Syria, UAE and Yemen) are not committed to plant variety law. Majority of Arab countries (except Palestine) are committed to WIPO bodies and law (1967), which includes 184 world countries. Majority of Arab countries (except Algeria, Iraq, Lebanon, Libya, Saudi Arabia, Sudan and Yemen that are still observatory governments) are committed to WTO bodies and law (1995), which includes 150 world countries. The majority of Arab countries (except, Iraq, Kuwait, Somalia, and Yemen) are committed to Berne copyright (1886). Only few of Arab countries (mainly, Algeria, Egypt, Lebanon, morocco, Syria, and Tunisia) are committed to Madrid False indications (1891), while, the majority of Arab countries (mainly, Djibouti, Bahrain, Iraq, Jordan, Saudi Arabia, Oman, Kuwait, Libya, Mauritania, Palestine, Somalia, Sudan, UAE and Yemen)) are not committed to Madrid False indications (1891). Only few of Arab countries (mainly, Algeria, Bahrain, Egypt, Morocco, Syria, and Sudan) are committed to Madrid IP Marks (1891), while, the majority of Arab countries (mainly, Djibouti, Iraq, Jordan, Saudi Arabia, Oman, Kuwait, Lebanon, Libya, Mauritania, Palestine, Somalia, Tunisia, UAE and Yemen)) are not committed to Madrid IP Marks (1891). Majority of Arab countries (except Kuwait, and Somalia) are committed to Paris PIP (1883). All Arab countries (except Egypt) are not committed to Strasbourg Patent Classification (1971) and Phonograms Convention (1971) and all Arab countries (except Tunisia) are not committed to Vienna Figurative Marks (1973) and Budapest Treaty IRDMPPP (1977). All Arab countries (except Algeria, Bahrain, Egypt, Lebanon, Morocco, Syria and Tunisia) are not committed to Nice Classification of Goods and Services (1957). All Arab countries (except Algeria, Egypt, Morocco, Oman, Qatar, Syria and Tunisia) are not committed to Nairobi Olympic Symbol (1981). All Arab countries (except Egypt, Morocco and Tunisia) are not committed to Hague industrial design (1925), and all Arab countries (except Algeria and Tunisia) are not committed to Lisbon appellation of origin (1958). Only some of the Arab countries (Algeria, Bahrain, Egypt, Libya, Mauritania, Morocco, Oman, Sudan, Syria, Tunisia and UAE) are committed to PCT Patent (1970), while the other some of the Arab countries (Djibouti, Iraq, Jordan, Kuwait, Lebanon, Palestine, Qatar, Saudi Arabia and Somalia and Yemen) are not committed to PCT Patent (1970). All Arab countries (except Lebanon and UAE) are not committed to Rome Convention ICPPPPBO (1961). All Arab countries (except Morocco) are not committed to Brussels convention (1974), and all Arab countries (except Bahrain and Egypt) are not committed to Trademark Law Treaty (TLT) (1994), and all Arab countries (except Bahrain) are not committed to Patent Law Treaty (2000). All Arab countries (except Bahrain, Jordan, Oman, Qatar

and UAE) are not committed to WCT (1996) and WPPT (1996), while none of the Arab countries are committed to Locarno Agreement (ICID) (1968). All Arab GCC countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE) are committed to GCC/Patent (see Table 3). Hence, in Sudan as in most Arab and African countries, the protection of IPRs, IP laws and adhesion to international bodies and conventions are still limited and inadequate, so, further efforts are still important to encourage adhesion to international IP laws and conventions.

Table 3- IP laws in Sudan and Arab countries and adhesion to international bodies and conventions

IP Laws in Arab Countries and Adhesion to International Bodies & Conventions

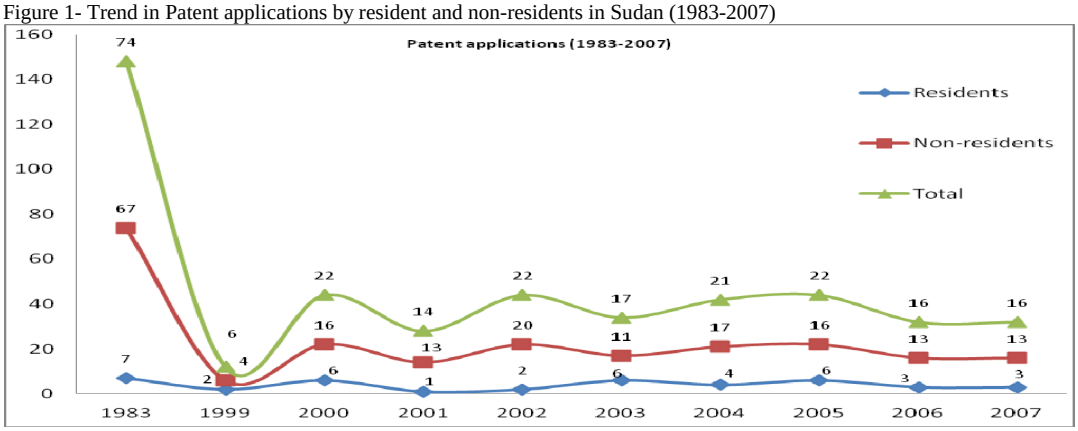
		YEAR	STATE	Algeria	Bahrain	Djibouti*	Egypt	India	Iraq	Jordan	Kuwait	Lebanon	Libya	Mauritania	Morocco	Oman	Pakistan	Palestine**	Qatar	Saudi Arabia	Somalia	Sudan	Syria	Tunisia	Turkey	UAE	Yemen
Domain Names Registration				×	×		×	×		×	×	×	×		×	×	×	×	×	×		×	×	×	×	×	×
Laws	Trademark			×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×	×
	Patent			×	×		×	×	×	×	×	×	×	×	×	×	×	×		×	×	×	×	×	×	×	×
	Industrial Design			×	×		×	×	×	×	×	×	×	×	×	×	×	×		×	×	×	×	×	×	×	×
	Copyright			×	×		×	×	×	×	×	×	×	×	×	×	×	×	×	×	×		×	×	×	×	×	×
	Plant Variety						×	×		×					×	×				×					×		
GCC	GCC / Patent				×						×					×			×	×						×	
Bodies	WIPO	1967	184	×	×	×	×	×	×	×	×	×	×	×	×	×	×		×	×	×	×	×	×	×	×	×
	WTO	1995	150	o	×	×	×	×	o	×	×	o	o	×	×	×	×		×	o		o		×	×	×	o
Berne Copyright		1886	163	×	×	×	×	×		×		×	×	×	×	×	×	×	×	×		×	×	×	×	×	
Madrid False Indications		1891	35	×			×					×			×								×	×	×		
Madrid IR Marks		1891	57	×	×		×								×							×	×		×		
Paris PIP		1883	171	×	×	×	×	×	×	×		×	×	×	×	×	×		×	×		×	×	×	×	×	×
Strasbourg Patent Classification		1971	57				×																		×		
Nice Class. Goods/Services		1957	80	×	×		×					×			×								×	×	×		
Nairobi Olympic Symbol		1981	46	×			×	×							×	×			×				×	×			
Vienna Figurative Marks		1973	23																					×	×		
Phonograms Convention		1971	76				×	×																			
Hague Industrial Designs		1925	47				×								×									×	×		
Lisbon Appellation of Origin		1958	26	×																				×			
PCT Patents		1970	137	×	×		×	×					×	×	×	×						×	×	×	×	×	
Rome Convention ICPPPPBO		1961	86									×													×	×	
Brussels Convention		1974	30												×												
Budapest Treaty IRDMPPP		1977	67					×																×	×		
Trademark Law Treaty (TLT)		1994	38		×		×																		×		
Locarno Agreement (ICID)		1968	49																						×		
Patent Law Treaty		2000	14		×																						
WCT		1996	64		×					×						×			×							×	
WPPT		1996	62		×					×						×			×							×	

* FILING SYSTEM
O: OBSERVER GOVERNMENTS

** OTTOMAN LAW FOR COPYRIGHT, THOUGH NOT IMPLEMENTED
IR: INTERNATIONAL REGISTRATION

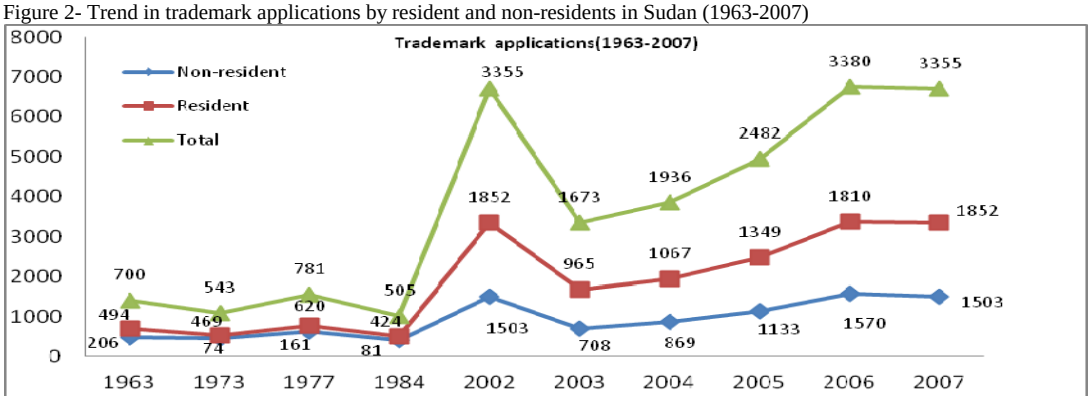
Source: Abu-Ghazaleh Intellectual Property (AGIP), May 2007: http://www.agip.com/site_content.aspx?page_key=key_summary_table_link1&lang=en, Accessed March 13, 2008.

Figure 1- Trend in Patent applications by resident and non-residents in Sudan (1983-2007)



Source: The World Bank – World Development Indicators Database (2013), Accessed April 20, 2013.

Figure 2- Trend in trademark applications by resident and non-residents in Sudan (1963-2007)



Source: The World Bank – World Development Indicators Database (2013), Accessed April 20, 2013.

3.2 Background about IPRs in Sudan

The growing recognition of the importance of IPRs in Sudan can be perceived at the national, regional and international levels. At the national level the recognition of the importance of IPRs can be perceived from the existing legal framework, legislations and laws issued to support IPRs in Sudan. For instance, Sudan issued the Trademarks Law (1931, 1969), Patent Law (1971), Copyright Law (1974), Industrial Designs Law (1974), Civil Procedures Law (1983), Civil Transactions Law (1984), Copyright and Related Rights Law (1996), Criminal Law (1991), Criminal Procedure Law (1991) and Literary and Artistic Works Law (2000). Moreover, at the regional and international levels the recognition of the importance of IPRs in Sudan is also perceived from Sudan's membership of several IPRs international and regional organizations and international conventions and agreements on IPRs. For instance, on a regional scale, Sudan joined the Organization of African Regional Intellectual Property Organization (ARIPO) in 1978. Moreover, at the international scale, Sudan joined the agreement of establishing the World Intellectual Property Organization (WIPO) (1967) in 1974, Paris Convention for the Protection of Industrial Property (1883) in 1974, the Berne Convention for protection of Literary and Artistic works (1886) in 2002, the Madrid Agreement on International Registration of Marks (1891) in

1984 and the Patent Cooperation Treaty (PCT) (1970) in 1984 and showed interest to join the (TRIPS) agreement.[24]

Based on the above background it is useful to explain the intensity, trend and structure of industrial property rights including trademarks, industrial design and patents in Sudan (see Tables 4-6). Concerning the intensity of industrial property in Sudan we find that the high intensity, most common and widely used type of industrial property as measured by the total number of application and granting is for trademarks, followed by industrial design and patents respectively. The low intensity of patents appears from the fewer number of patent applications made between 1988 and 2010 by residents and non-residents of Sudan (see Figures 11-12). Regarding the trend we find that the application and grant of both trademarks and industrial designs show considerable fluctuation over the periods (1999-2010) and (2003-2008) respectively and general decline over the periods (2008-2010) and (2007-2008) respectively, while by contrast the application and grant of patents show constant increasing trends over the period (2005-2007). Despite the growth in the number of both filling and granting of patents over the period (1990-2010) at the home level, but this should not hide the fact that the grant of international patents is very limited, particularly, international patents application for PCT by residents of Sudan is limited during the period (2003-2007) (see Figures 11-18, Table 6). Concerning the structure as measured by the structure of ownership we find that the share of national is higher than the share of foreign in the application and grant of industrial design, whereas by contrast, the share of foreign is higher than the share of national in the application and grant of patent, while for the application and grant of trademarks, the share of foreign is higher than the share of national over the period (1999-2004) and the opposite is true for the period (2005-2009). Particularly, the structure of ownership of trademarks imply that trademarks are overwhelmingly foreign residents owned, as the total number of trademarks applications filed and granted of residents (6014) (4783) are less than those of non-residents (6643) (3529) in Sudan over the period (1999-2010) (see Table 4 and Figures 3-6). By contrast, the structure of ownership of industrial design imply that industrial designs are overwhelmingly national residents owned, as the total number of industrial design applications filed and granted of residents (916) (98) are more than those of non-residents (90) (36) in Sudan over the period (1988-2010) (see Table 5 and Figures 7-10). Whereas, the structure of ownership of patent imply that patents are overwhelmingly foreign residents owned, as patent application from residents is lowest than those of the non-residents during the period (1988-2010) (see Table 6

[24] See Sudan intellectual property office web site: http://www.ipsudan.gov.sd/interna_agree.html, accessed on May 12, 2012. See also Makki (2006) pp. 151, 153, 154, 230.

and Figures 11-18 above). In addition Figure 19 shows that the share of patent applications by top fields of technology in Sudan over the period (1997 - 2011) implies heavy concentration on pharmaceuticals (35.48), followed by other special machines (12.9); basic materials chemistry (9.68); furniture, games (9.68); audio-visual technology (3.23); telecommunications (3.23); IT methods for management (3.23); control (3.23); medical technology (3.23); macromolecular chemistry, polymers (3.23) and others (12.88) respectively (see Figure 19).

Our findings from the data from the national and international sources regarding the low number of patent applications made by Sudan are consistent with the findings in the literature (see Figures 11- 18). Nour (2004, 2005a; b; c, 2010, 2011) find that the poor application to patent in Sudan and Arab countries (*168)* compared to advanced and leading developing countries like Singapore (27), Korea (*931*) and China (*793*) over the period (1990-1999) can be attributed to the low percentage share of spending on R&D to GDP and the small number of scientists and engineers in R&D in the Arab countries compared to advanced and developing countries like Singapore, Korea and China.[25] The low patenting applications imply insufficient science and technology (S&T) infrastructure, low S&T output indicators and low innovative activities in Sudan and all Arab countries compared to advanced and leading developing countries like Singapore, Korea and China. Moreover, Figure 13 shows that Sudan and African countries together have filed far fewer patents than South Africa, the highest numbers of patent applications were made by South Africa; it is followed by Zimbabwe; Mali; Tunisia; Tanzania; Sudan and Libya. According to USPTO report, Sudan produced only seven patents in about 40 years with no patents at all in the period 1992 – 1995 and this puts it much lower than most African countries in terms of patents (see Figure 13).

Moreover, our findings concerning the low number of patent application from residents than those of the non-residents of Sudan is consistent with the findings in the literature, which indicate that in all developing countries, however, patent applications made and patents held by residents of developing countries (domestic applications or patents) are few. Patents are overwhelmingly foreign residents owned. In most developing countries, domestic applications accounted only for 1 to 8% of total applications. Thus, the role of the patent system is less visible to domestic users of the patent system in developing countries. The reason for the low level of patenting in developing countries by their nationals and residents can be explained by a number of grounds, including non-use of the system by universities and local research institutions.[26]

[25] See for example, US Patent and Trademark office web site: www.uspto.gov.

[26] See for instance, WIPO Patent Agenda Study by Mr. Getachew Mengistie, Acting Director General of the Ethiopian Intellectual Property Office, A/39/13 Add.1 available at http://www.wipo.int/documents/en/document/govbody/wo_gb_ab/doc/a_39_13add1.doc, accessed March 20, 2008.

Table 4-Trademarks applications, grants and certificates for national and foreign in Sudan (1999-2010)

Total	Filing (new Applications)			Granting			
	National	Foreign	Total	National	Foreign	Total	Certificates
1999	70	402	472	60	306	366	307
2000	513	760	1273	228	676	904	822
2001	187	507	694	200	312	512	418
2002	485	525	1010	200	278	478	398
2003	217	708	925	141	316	457	402
2004	60	1007	1067	20	478	498	366
2005	780	479	1259	215	406	621	540
2006	1010	800	1810	810	717	1527	1507
2007	1022	728	1750	340	640	980	725
2008	970	578	1548	773	566	1339	1306
2009	700	149	849	542	88	630	612
1999-2009	6014	6643	12657	3529	4783	8312	7403
1999-2009	5204	6643	11847	4007	6625	10632	1688-10927
2010			886			606	399
March-June-2010	242	239	481				

Source: Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010)

Table 5- Industrial design applications and grants for national and foreign in Sudan (1988-2010)

	Filling [a]			Granting [a]	Filling [b]			Granting [b]		
Year	National	Foreign	Total	Total	National	Foreign	Total	National	Foreign	Total
1988	2	0	2	45						
1997	2	0	2							
1998	2	0	2							
1999	1	0	1							
2000	9	0	9							
2001	25	4	29							
2002	51	6	57	43						
2003	37	2	39	11	37	3	40	6	3	9
2004	63	7	70	7	59	6	65	8	-	8
2005	87	17	104	38	86	16	102	15	1	16
2006	79	9	88	33	76	7	83	34	7	41
2007	31	21	52	45	40	21	61	20	21	41
2008	73	6	79	44	19	2	21	15	2	17
2009	115	12	137	104						
2010	64	9	75	42						
1988-2008			836	481	317[1]	55[1]	372[1]	98[1]	34[1]	132[1]
1997-2010	916	90	1048	367						
1998-1997			831	480						

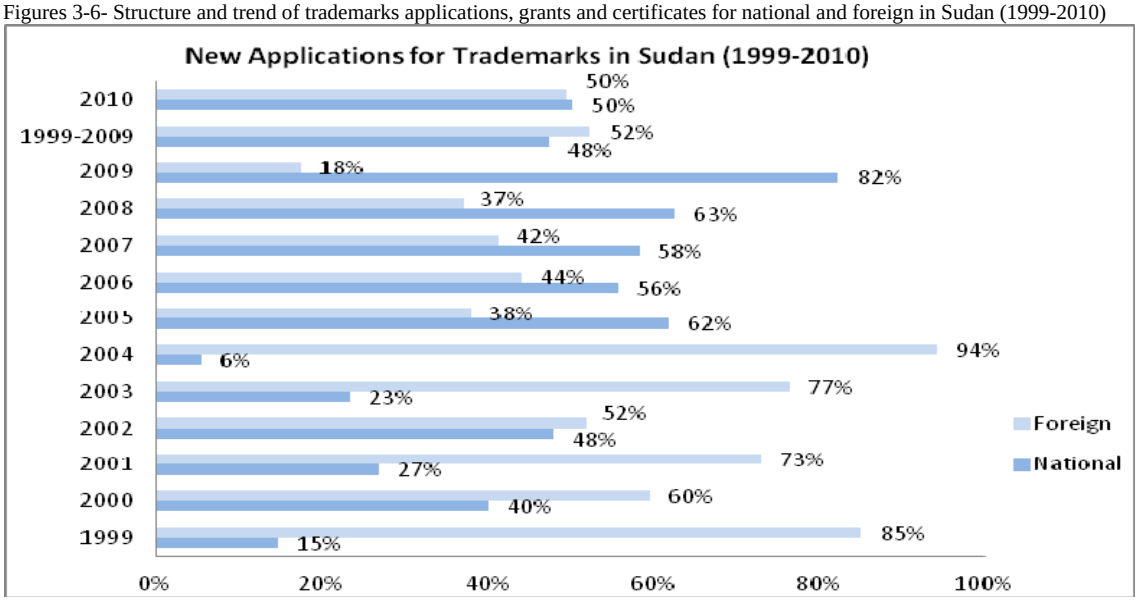
Source: (a) Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010), and (b) IPS Sudan web site: http://www.ipsudan.gov.sd/design_stat.htm. Accessed on 12 May 2012. Note: (1) refers to 2003-2008.

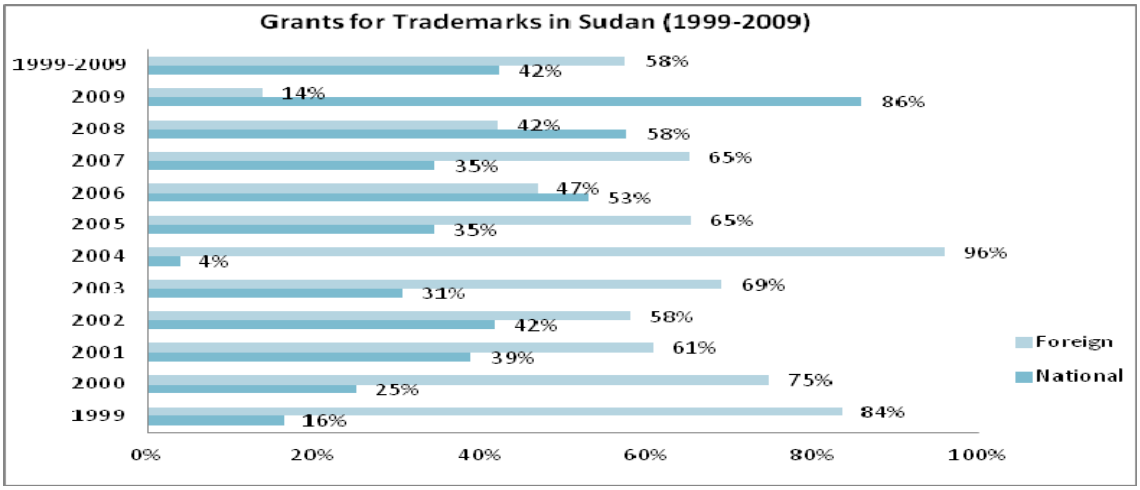
Table 6- Patent applications by non resident and patent granting for non resident and residents in Sudan (1989-2010)

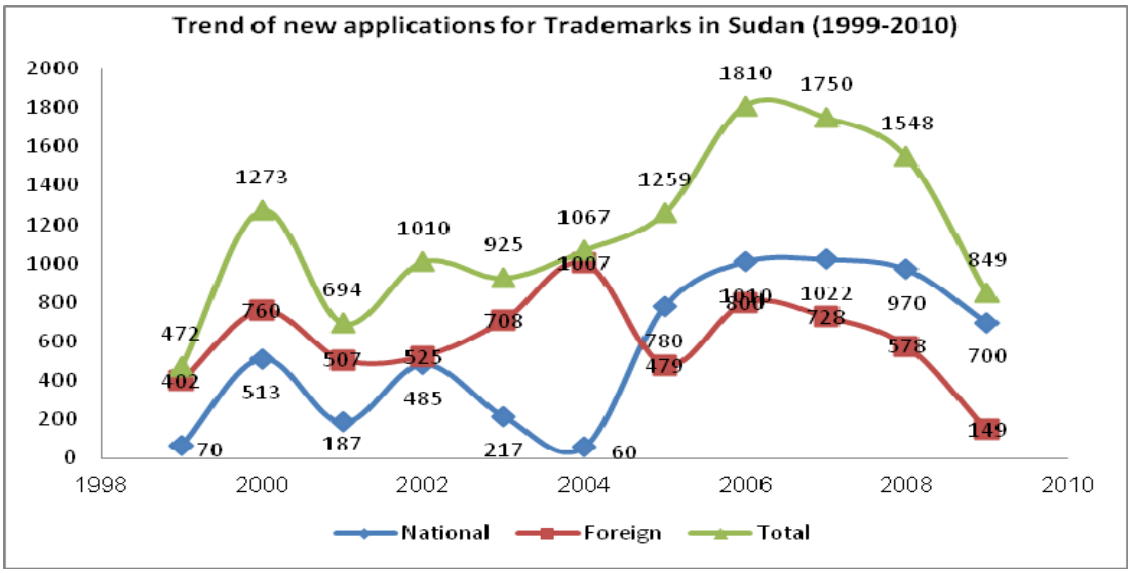
	Filling [a]	Granting [a]	Countries [a]	Local granting [a]	Filling [b]	Granting [b]
1989		36	Sweden , USA, Netherlands, Italy, France, USSR, Norway, England, Australia			
1990		47	Germany, Sweden , USA, British, England, Australia, European Patent			
1991		70	Sweden , USA, UK, Belgium, Greek, Australia			
1992		99	Sweden , USA, Japan, France, Norway, England, Mauritania, Hungarian, Spain, Denmark			
1993		124	Spain, Sweden , USA, Italy, England, British			
1994		156	Sweden , USA, Swiss, Italy, Canada, Norway, New Zealand, France			
1995		183	USA, Canada, Australia			
1996		204				
1997		213				
1998		224				
1999		237	South Africa, Sweden, Australia			
2000		262	South Africa, Sweden , Swiss, Belgium, Germany, Great Britain, USA			
2001		279	Swiss, USA, Netherlands, Italy,	107		
2002	345	296	Swiss, USA, Netherlands, Italy, India, China, Denmark	117	112	102
2003	356	306	India, Canada, Swiss, Australia	72	110	76
2004	373	321	India, Swiss, Germany, UK, USA, Emirates	128	157	108
2005	386	331	Sweden , USA, France, Hungarian, Korea	153	168	78
2006	392	346	Egypt, India, Swiss, Italy, China, Japan, Korea, Russia	90	170	91
2007	415	352	Germany, Great Britain, England	112	220	123
2008	430	361	China, Japan, Russia	78	937[1]	578[1]
2009	441	371	Sweden , USA, Netherlands, England, Japan	52	419[2]	355[2]
2010	452	374	China, Germany, Australia	37		

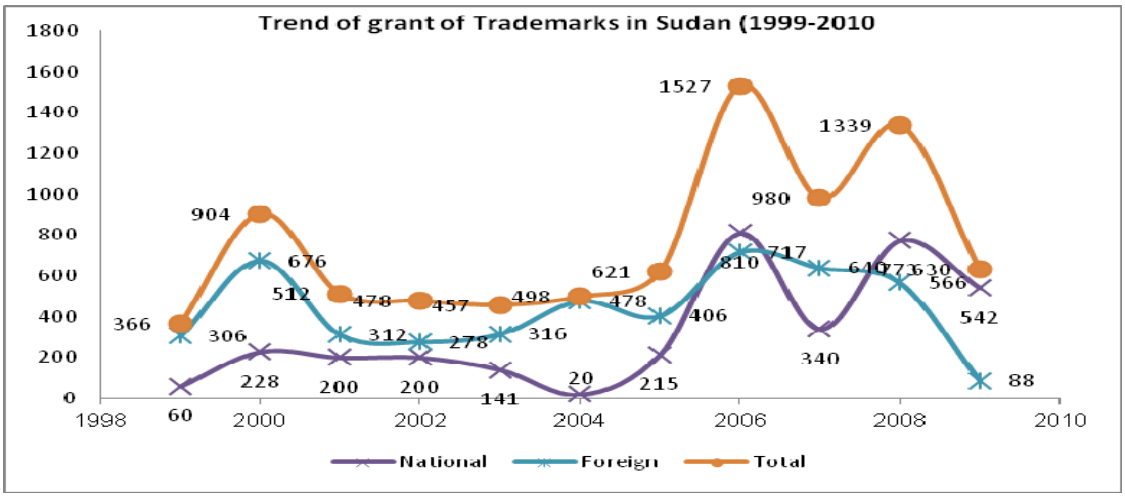
Source: (a) Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010), (b) IPS-Sudan web site: http://www.ipsudan.gov.sd/patent_stat.htm. Accessed 12 May 2012. Note (1) refers to 2002/2007, and (2) refers to PCT.

Figures 3-6- Structure and trend of trademarks applications, grants and certificates for national and foreign in Sudan (1999-2010)



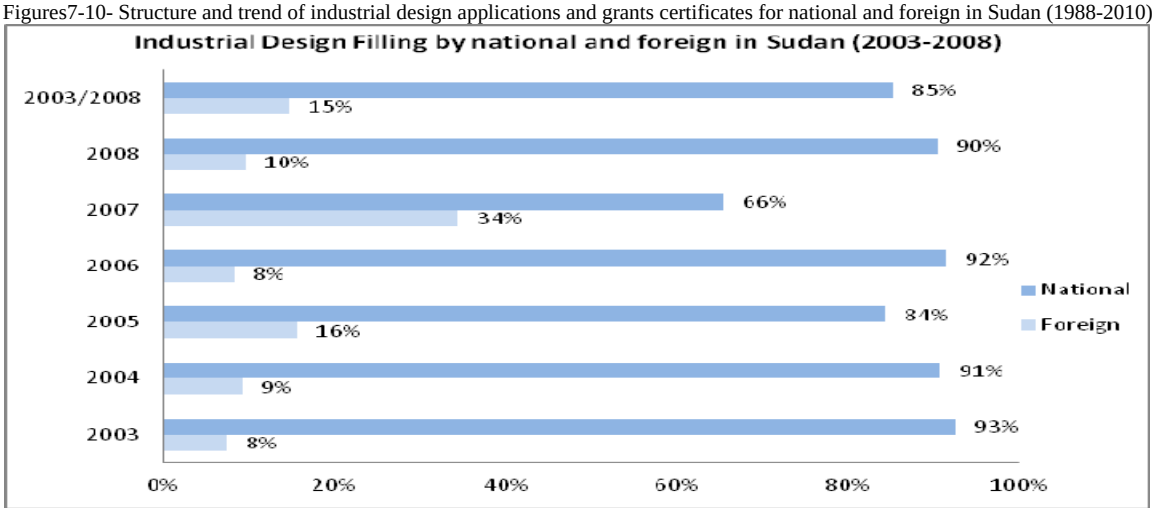


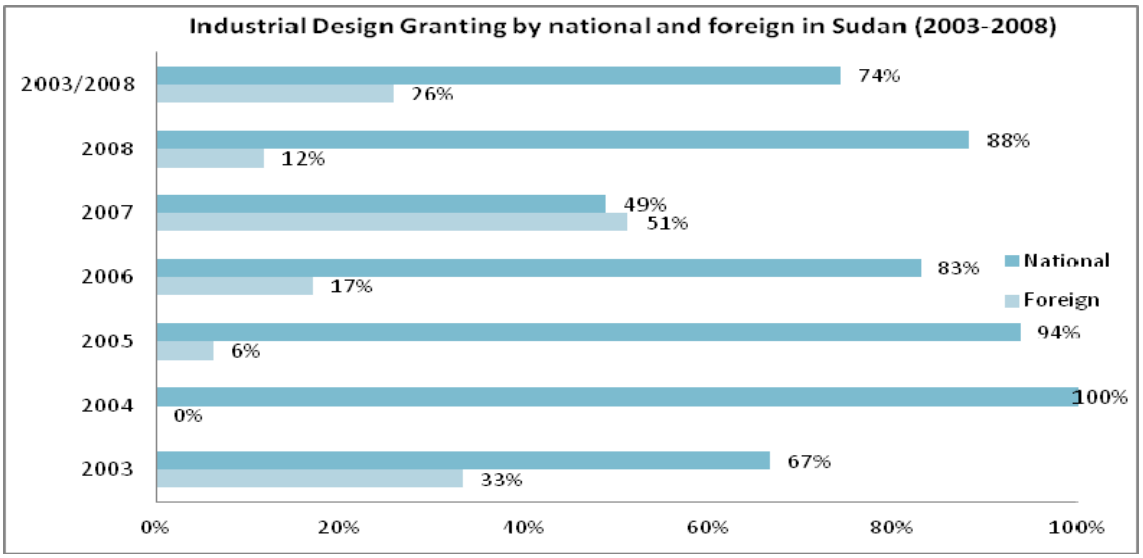


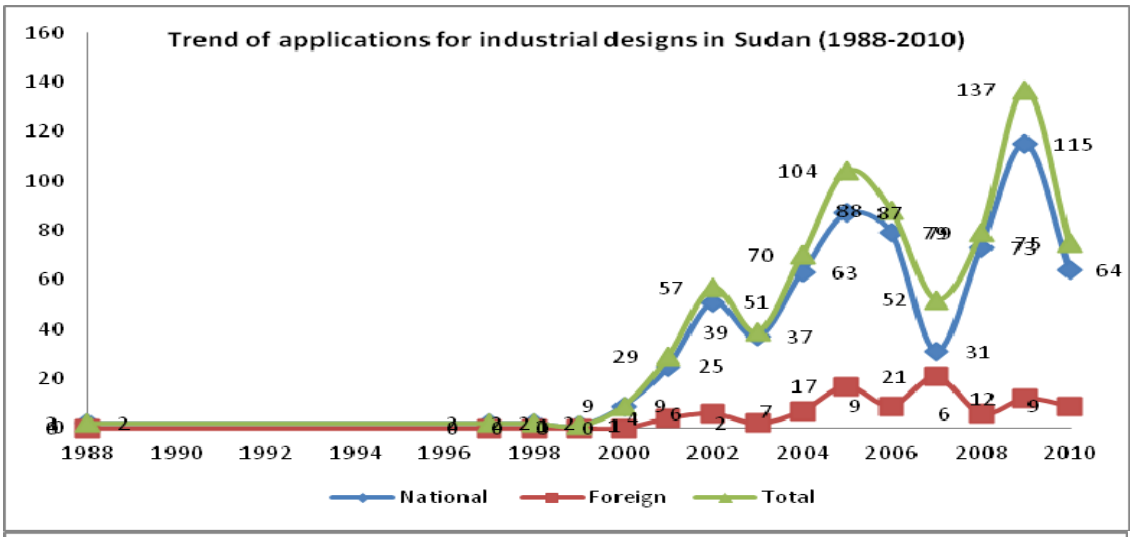


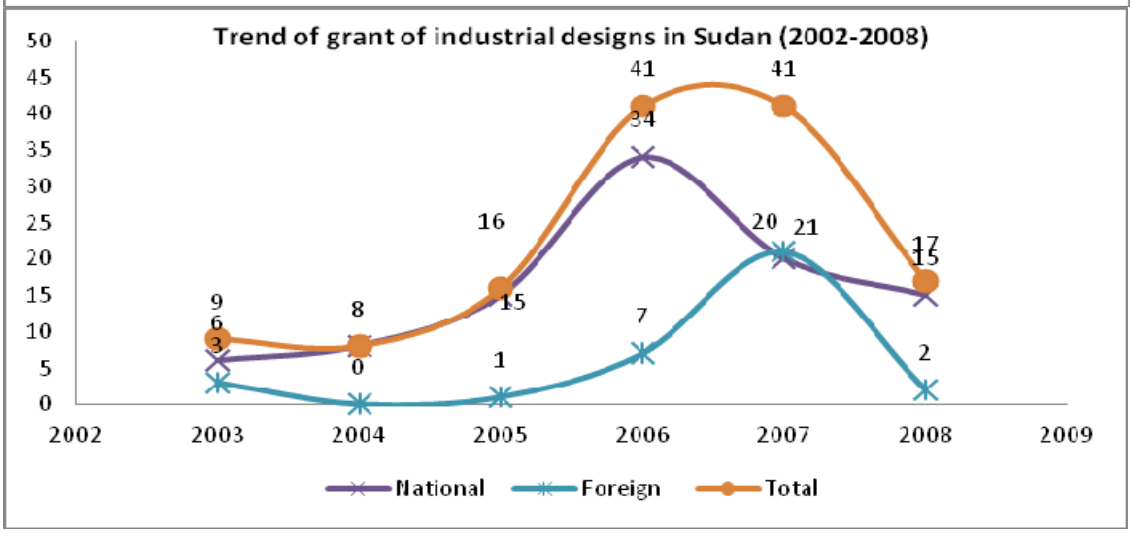
Source: Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010)

Figures7-10- Structure and trend of industrial design applications and grants certificates for national and foreign in Sudan (1988-2010)



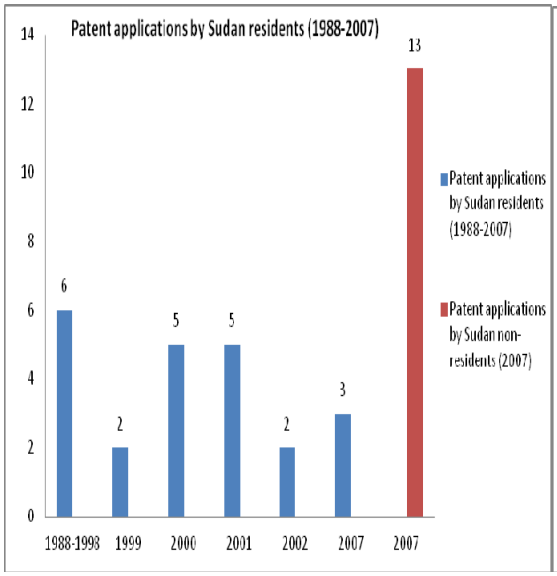


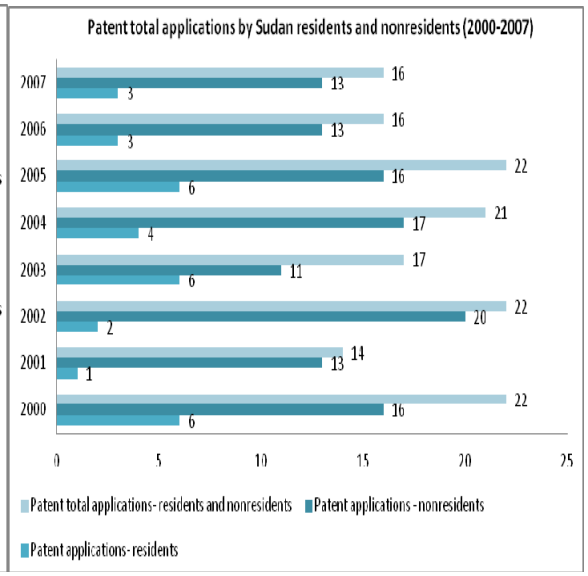




Source: Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010)

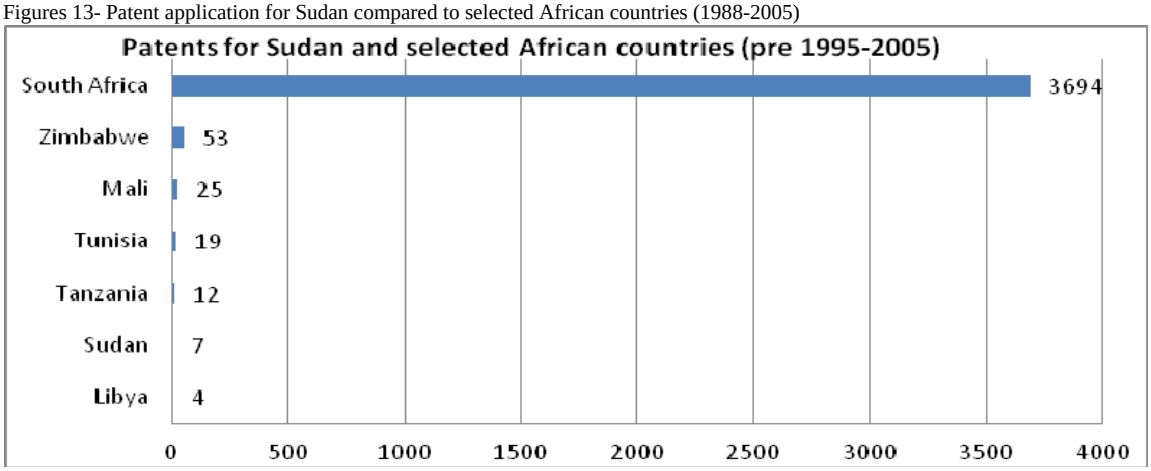
Figures 11-12- Patent applications by residents and non-resident for Sudan (1998-2007)[a] (2000-2007)[b]





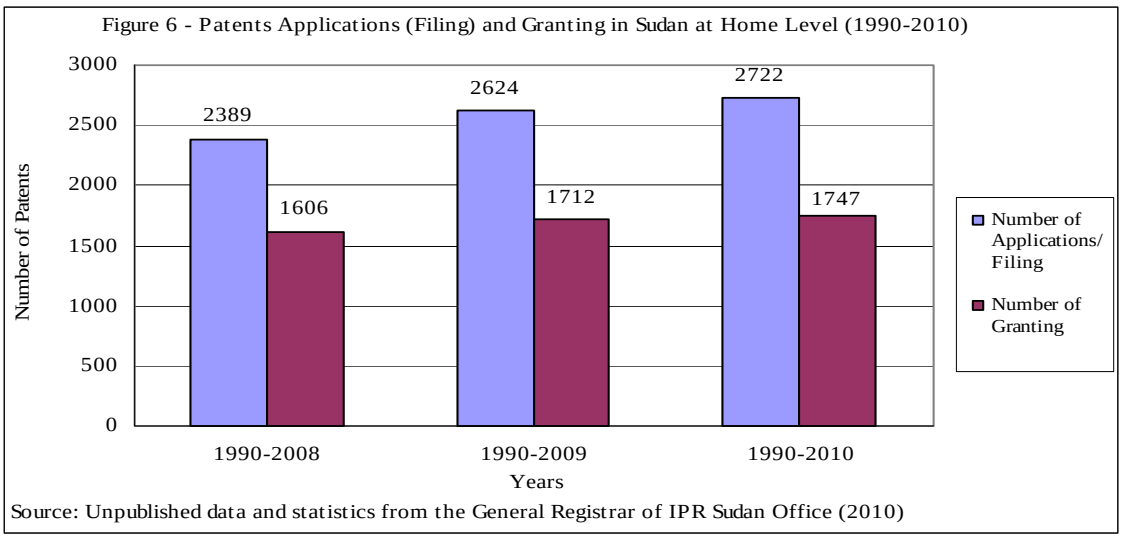
Sources: (a) World Development Indicators database (2005); (b) World Development Indicators database (2012).

Figures 13- Patent application for Sudan compared to selected African countries (1988-2005)



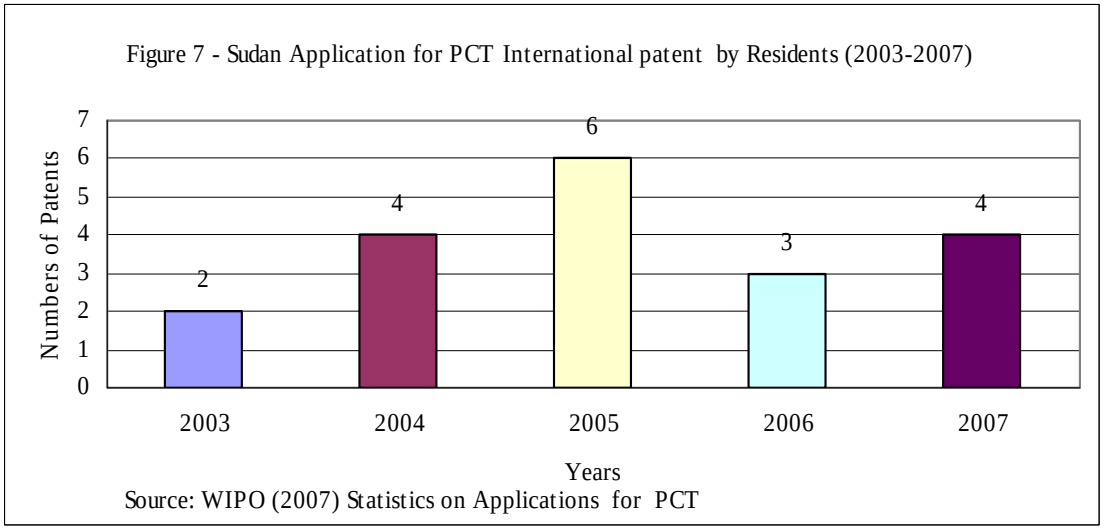
Source: UNESCO (2006)

Figure 14 - Patents Applications (Filing) and Granting in Sudan at Home Level (1990-2010)



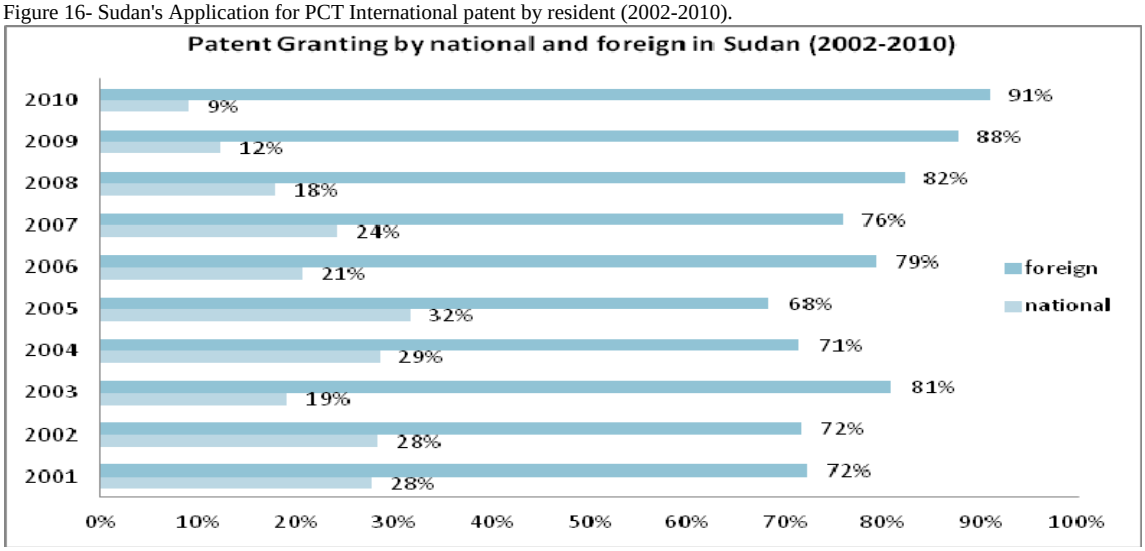
Source: Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010)

Figure 15 - Sudan's Application for PCT International patent by resident (2003-2007).



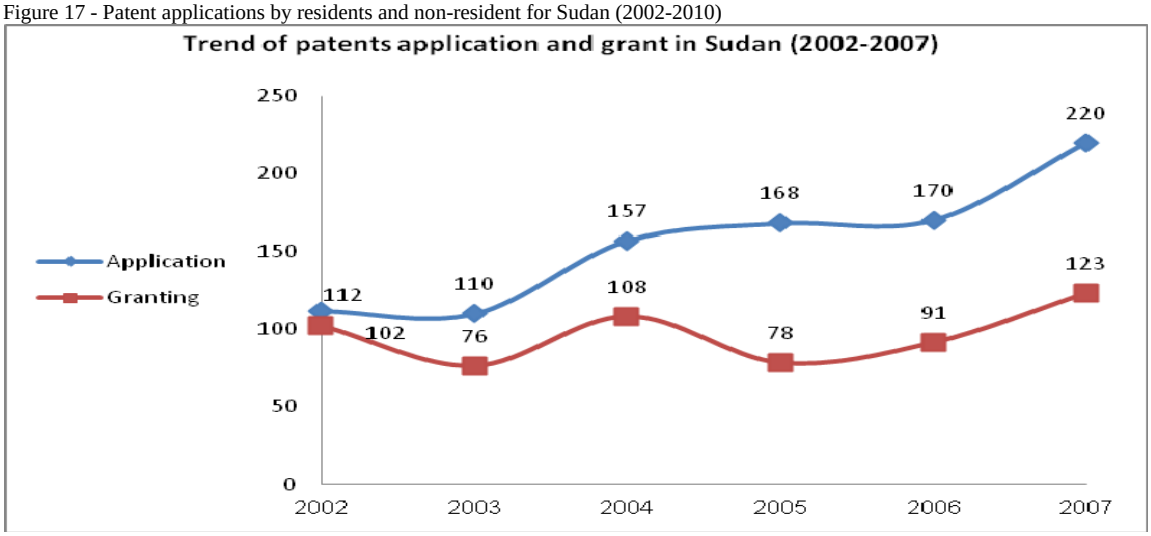
Source: WIPO (2007) Statistics on Applications for PCT

Figure 16- Sudan's Application for PCT International patent by resident (2002-2010).



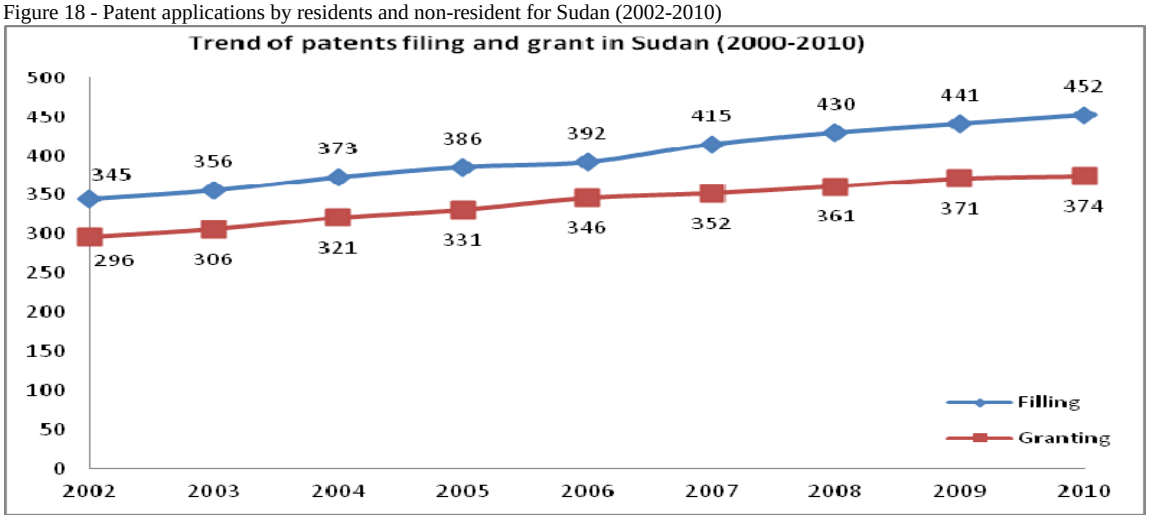
Source: Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010)

Figure 17 - Patent applications by residents and non-resident for Sudan (2002-2010)



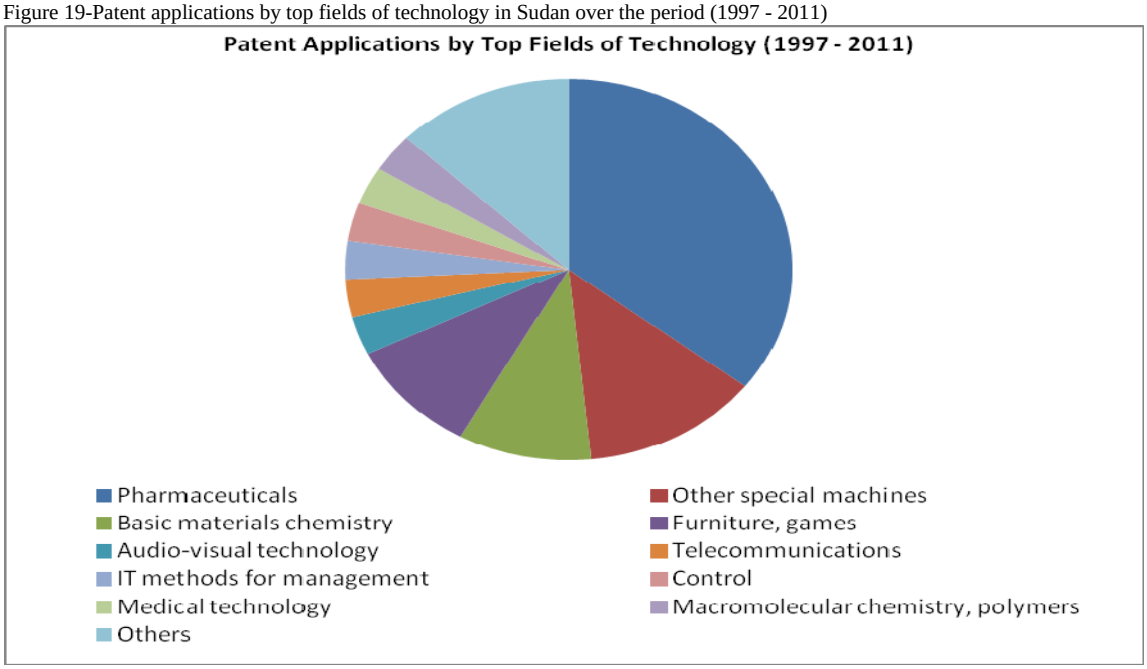
Source: Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010)

Figure 18 - Patent applications by residents and non-resident for Sudan (2002-2010)



Source: Unpublished data and statistics from the General Registrar of IPR Sudan Office (2010)

Figure 19-Patent applications by top fields of technology in Sudan over the period (1997 - 2011)



Source: WIPO statistics database. Last updated: 12/2012, Accessed April 20, 2013.

Hence, in Sudan as in most Arab and African countries, the protection of IPRs, IP laws and adhesion to international bodies and conventions are still limited and inadequate (see Tables 1-6). Further efforts are still important to encourage adhesion to international IP laws and conventions.

3. 3. Importance, implications and constraint to IPRs in Sudan

The questionnaire and interview with IPRs experts in Sudan and the survey data based on primary data and 12 face-to-face interviews with the official and the academics experts in the IPRs in Sudan aims to improve the understanding about the economic importance of IPRs and to examine the factors hindering and those contributing toward enhancing the IPRs in Sudan. The main purpose of this survey is to collect primary data to examine the causes of poor IPRs protection and then to provide some recommendations to improve IPRs in Sudan.[27]

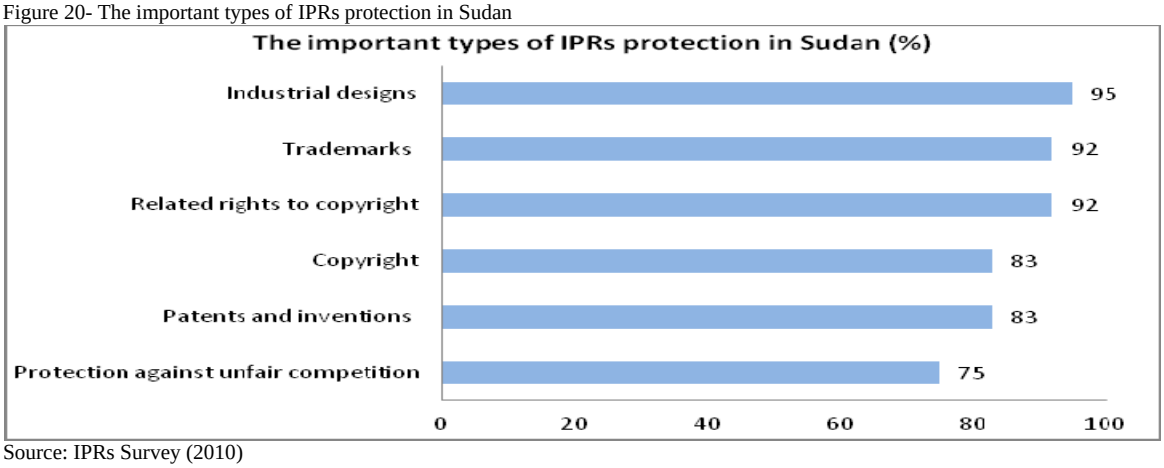
The results of the IPRs survey indicate that the important types of IPRs implemented in Sudan are industrial designs, trademarks, related rights to copyright, copyright, patents and invention and protection against unfair competition respectively (see Figure 20).[28] The results of IPRs survey recognize the importance of strengthening IPRs for achieving economic development objectives in Sudan. For instance, IPRs has the potential to assist industrial prosperity through the creation of industrial design and agricultural development through plant

[27] The interviews were conducted with the officials and experts (83%) and academics staff in the universities (17%) and indicate a total response rate of 83%. The design of the questionnaire in the IPRs survey includes three two types of questions: nominal (Yes/No), and scalar or categories questions.

[28] As indicated by 95%, 92%, 92%, 83%, 83%, and 75% of the respondent official policy makers and academic experts respectively.

varieties and hence contribute to Gross Domestic Products. Moreover, IPRs provides incentives for innovative producers, provides good quality products for consumers, generates revenues for innovative producers and promotes economic growth, prosperity and development. Furthermore, IPRs protection has the potential to promote R&D, S&T development, networks, private industrial investment, flow of FDI, promote technology transfer, generate revenues for government, contribute to export, increasing employment opportunities and cooperation between universities and industry. Moreover, IPRs protection has the potential to promote fair competition, development of expressions of local culture, folklore, and traditional knowledge, cultural heritage, integration in regional institutions, and integration in the international institutions respectively (see Table 7).[29]

Figure 20- The important types of IPRs protection in Sudan



Source: IPRs Survey (2010)

Table 7- The important factor encouraging and strengthening IPRs for achieving development objectives in Sudan

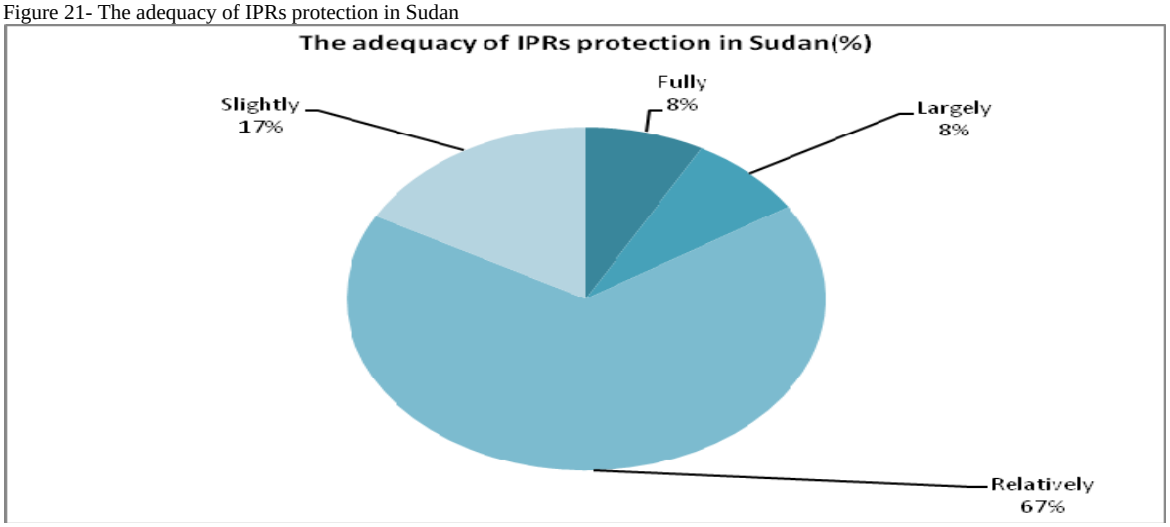
Importance of strengthen IPRs in Sudan		%
1.	Industrial prosperity and the creation of industrial design	95
2.	Agricultural development through plant varieties	95
3.	Contributes to Gross Domestic Products	92
4.	Incentives for innovative producers	92
5.	Good quality products for consumers	92
6.	Generates revenues for innovative producers	92
7.	Economic growth, prosperity and development	92
8.	R&D	92
9.	S&T development	92
10.	Networks	92
11.	Private industrial investment	83
12.	Flow of FDI	83
13.	Promotes technology transfer	83
14.	Generates revenues for government	83
15.	Contributes to export	83
16.	Increasing employment opportunities	83
17.	Cooperation between universities and industry.	83
18.	Fair competition	83
19.	Development of expressions of local culture, folklore, and traditional knowledge	83
20.	Cultural heritage	83
21.	Encourages the integration in the international and regional institutions	75

Source: IPRs Survey (2010)

[29] As indicated by 95%, 95%, 92%, 92%, 92%, 92%, 92%, 92%, 92%, 92%, 92%, 83%, 83%, 83%, 83%, 83%, 83%, 83%, 83%, 83%, 83%, and 75% of the respondent official policy makers and academic experts respectively.

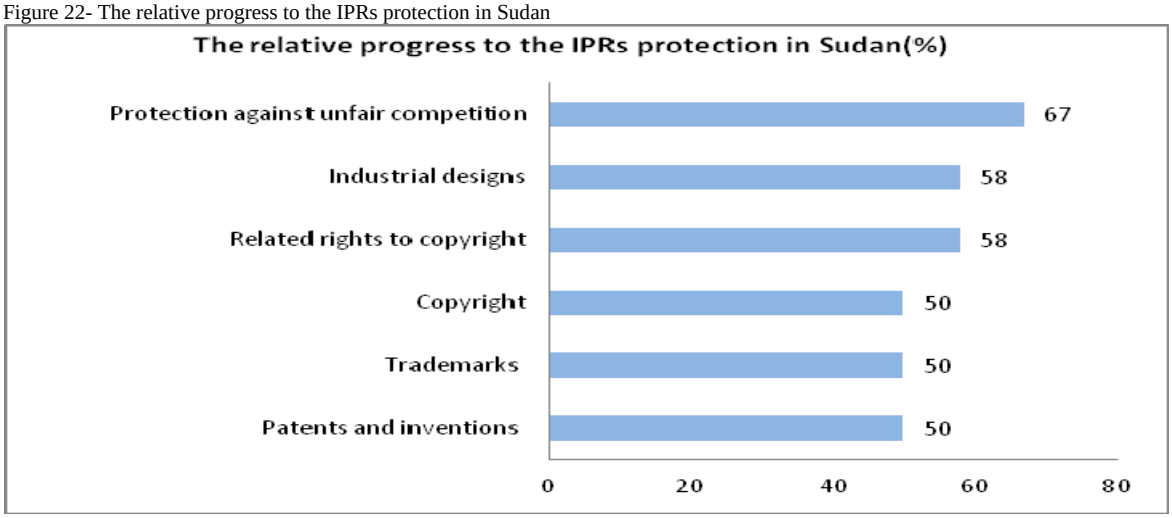
The prevalence of important types of IPRs and recognition of the importance of IPRs protection for economic development should not hide the fact that IPRs is still limited in Sudan. For instance, the results of IPRs survey indicate that the official efforts to promote IPRs have been only relatively successful in some sectors in Sudan (see Figure 21).[30] Particularly, relative progress has been made toward protection against unfair competition, industrial designs and related rights to copyright, copyright, patents and invention, and trademarks respectively (see Figure 22). [31]

Figure 21- The adequacy of IPRs protection in Sudan



Source: IPRs Survey (2010)

Figure 22- The relative progress to the IPRs protection in Sudan



Source: IPRs Survey (2010)

The follow up interview for the IPRs survey indicates the inadequacy of IPRs legislations in Sudan that appears from the lack of laws concerning the protection of plant breeders' rights: plant varieties, geographical indications and traditional cultural expressions; expressions of folklore;

[30] As reported by 67% of the respondent official policy makers and academic experts respectively.
[31] As indicated by 67%, 58%, 58%, 50%, 50%, and 50% of the respondent official policy makers and academic experts respectively.

traditional knowledge and genetic resources. The lack of laws for protection of plant breeders' rights and plant varieties is somewhat surprising in view of the international recognition that the protection of new plant varieties creates incentives for investment in breeding and producing more and better varieties for farmers and incentives for development of new plant varieties and quantitative and qualitative development of agricultural production, that would be particularly useful for Sudan, because since long the structure of Sudan economy has been heavily dependent on the agricultural resources. The results of IPRs survey indicate the serious shortcoming and inadequacy in IPRs protection in Sudan, which is mainly attributed to several hindering factors. These include for instance, the low integration in the international institutions, lack of legal issues, lack of legal issues in plant varieties, high costs for innovative producers (e.g. application for patents), lack of government concern, lack of private sector concern, weak institutions setting, lack of public awareness and concern, difficult control of illegal products, low integration in the regional institutions and wide spread of unfair competition. In addition to lack of resources, investment and finance, low incentives for innovative producers, lack of universities concern, weak R&D, lack of networks, weak enforcement of IPRs, weak culture for IPRs protection, lack of national system of innovation and poverty and law purchasing power encourages the use of the illegal products. In addition to the low industrial prosperity, lack of cooperation between universities and industry, lack of coordination and harmonization for IPRs related policies, easy infringement of IPRs and low returns for innovative producers respectively (see Table 8).[32] The inadequate IPRs in Sudan lead to several implications. These include for instance, the low incentives for producers, poor national system of innovation, hindering FDI, hindering access to protected medicines, lack of cooperation between universities and industry, financial loss for innovative producers, lack of networks, low R&D, low agricultural prosperity, low plant varieties and low industrial prosperity. In addition to poor S&T development indicators, lack of coordination and harmonization policies related to IPRs, brain drain: migration of researchers, skills, experts and creators, hindering transfer of technology, wide spread of unfair competition, difficult control of illegal protected products, easy infringement of IPRs, weak enforcement of IPRs, low integration in the regional institutions and low integration in the international institutions respectively (see Table 9).[33]

[32] As indicated by 83%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 58%, 58%, 58%, 50% and 42% of the respondent official policy makers and academic experts respectively.

[33] As indicated by 92%, 83%, 83%, 83%, 83%, 83%, 83%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 75%, 67%, 67% and 58% of the respondent official policy makers and academic experts respectively.

Table 8- The important factors and constraints hindering IPRs in Sudan

The important Constraints hindering IPRs in Sudan		%
1.	Low integration in the international institutions	83
2.	Lack of legal issues	75
3.	Lack of legal issues in plant varieties	75
4.	High costs for innovative producers (e.g. application for patents)	75
5.	Lack of government concern	75
6.	Lack of private sector concern	75
7.	Weak institutions setting	75
8.	Lack of public awareness and concern	75
9.	Difficult control of illegal products	75
10.	Low integration in the regional institutions	75
11.	Wide spread of unfair competition	75
12.	Lack of resources, investment and finance	67
13.	Low incentives for innovative producers	67
14.	Lack of universities concern	67
15.	Weak R&D	67
16.	Lack of networks	67
17.	Weak enforcement of IPRs.	67
18.	Weak culture for IPRs protection	67
19.	Lack of national system of innovation	67
20.	Poverty and law purchasing power encourages the use of the illegal products	67
21.	Low industrial prosperity	58
22.	Lack of cooperation between universities and industry.	58
23.	Lack of coordination and harmonization for IPRs related policies	58
24.	Easy infringement of IPRs	50
25.	Low returns for innovative producers	42

Source: IPRs Survey (2010)

Table 9- The important implications of weak IPRs in Sudan

Implications of weak IPRs in Sudan		%
1.	Low incentives for producers	92
2.	Poor national system of innovation	83
3.	Hindering FDI	83
4.	Hindering access to protected medicines	83
5.	Lack of cooperation between universities and industry.	83
6.	Financial loss for innovative producers	83
7.	Lack of networks	83
8.	Low R&D	75
9.	Low agricultural prosperity and low plant varieties	75
10.	Low industrial prosperity	75
11.	Poor S&T development indicators	75
12.	Lack of coordination and harmonization policies related to IPRs	75
13.	Brain drain: migration of researchers, skills, experts and creators.	75
14.	Hindering transfer of technology	75
15.	Wide spread of unfair competition	75
16.	Difficult control of illegal protected products.	75
17.	Easy infringement of IPRs	75
18.	Weak enforcement of IPRs.	67
19.	Low integration in the regional institutions	67
20.	Low integration in the international institutions	58

Source: IPRs Survey (2010)

Apart from the hindering factors and implications of inadequate IPRs in Sudan, the results of the IPRs survey imply the important role of several factors contributing toward enhancing the IPRs in Sudan. These include for example, the factors related to legislations and enforcement; education and training systems; planning IPRs protection, learning from international experiences in IPRs protection; commitment to international IPRs treaties; monitoring current efforts toward IPRs protection; finance, investment and resources allocation; research institutions and social partnership and collaboration between educational and training institutions, judiciary authorities, IPRs related institutions and the State to encourage IPRs protection and the most effective ways

of meeting and financing them respectively (see Table 10).[34] In addition the enhancement of IPRs in Sudan can be facilitated with the important role of several supporting institutions. These include for example, the Ministry of Justice, WIPO, international organizations, government, Ministry of Industry, universities, educational, training and other related institutions, Ministry of Culture, independent research centres, Ministry of Finance and National Economy, Ministry of Higher Education, Ministry of Science and Technology, private sector, Sudanese Standards and Metrology Organization, civil society and community and non-Governmental Organizations respectively (see Table 11).[35] Moreover, strengthening IPRs in Sudan can be facilitated by several important mechanisms, instruments or policies. These include for instance, promote government concern, adequate legislation for enforcement of IPRs to reduce infringement of IPRs, fair competition, legal issues in plant varieties, new instruments to encourage the transfer of technology. In addition to promote industry and creation of industrial design, private sector concern, public awareness and concern, R&D, cooperation between universities and industry, institutions setting, control for IPRs protected products: control for illegal products and encourage the use of technology to reduce the costs for innovative producers. In addition to increasing the returns for innovative producers/creators, increasing the information about IPRs, coordination and harmonization policies related to IPRs, culture for IPRs protection, new instruments to encourage access to protected medicines, prevent piracy, universities concern, providing adequate incentives for innovative producers/creators and networks respectively (see Table 12).[36] Moreover, one important mechanism and instrument for IPRs protection is the use of internet that creates opportunities and challenges for IPRs protection and for the producers and the consumers of IPRs protected products. For instance, the major opportunities that the use of internet creates for IPRs protection are the easy collection of revenues for producers, easy communications, cheap products, high quality products, easy exchange of IPRs protected products and easy access to IPRs protected products respectively. Whereas, the major challenges that the use of internet creates for IPRs protection are easy infringement of IPRs protected products and financial rights and financial loss for producers, difficult control of illegal products imitating IPRs protected products, easy piracy, the need for more legislations and legal framework, weak enforcement of

[34] As indicated by 92%, 83%, 83%, 83%, 83%, 75%, 75%, 75%, 75% and 75% of the respondent official policy makers and academic experts respectively.
[35] As indicated by 92%, 92%, 92%, 83%, 83%, 75%, 75%, 67%, 67%, 67%, 67%, 67%, 58%, 58% and 58% of the respondent official policy makers and academic experts respectively.
[36] As indicated by 83%, 75%, 75%, 75%, 75%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 67%, 58%, 58%, and 58% of the respondent official policy makers and academic experts respectively.

IPRs, easy infringement to moral rights, easy imitation, and easy modifications of IPRs protected products and wide spread of unfair competition (see Table 13).[37]

Table 10- the role of important factors for promoting IPRs in Sudan

Factors related to the IPRs institutions	%
1. Legislations and enforcement.	92
2. Education and training systems.	83
3. Planning IPRs protection.	83
4. Learning from international experiences in IPRs protection.	83
5. Commitment to international IPRs treaties.	75
6. Monitoring current efforts toward IPRs protection.	75
7. Finance, investment and resources allocation.	75
8. Research institutions.	75
9. Social partnership and collaboration between educational and training institutions, judiciary authorities, IPRs related institutions and the state to encourage IPRs protection and the most effective ways of meeting and financing them.	75

Source: IPRs Survey (2010)

Table 11 - The role of important institutions for promoting IPRs in Sudan

Role of institutions in promoting IPRs in Sudan	%
1. Ministry of Justice	92
2. WIPO	92
3. International organizations	92
4. Government.	83
5. Ministry of Industry	83
6. Universities, educational, training and other related institutions.	75
7. Ministry of Culture	75
8. Independent research centres	67
9. Ministry of Finance and National Economy.	67
10. Ministry of Higher Education	67
11. Ministry of Science and Technology	67
12. Private sector	67
13. Sudanese Standards and Metrology Organization	58
14. Civil society and community.	58
15. Non-Governmental Organizations	58

Source: IPRs Survey (2010)

Table 12- The important mechanisms, instruments or policies for strengthening IPRs in Sudan

Mechanisms for strengthen IPRs in Sudan	%
1. Government concern	83
2. Adequate legislation for enforcement of IPRs to reduce infringement of IPRs	75
3. Fair competition	75
4. Legal issues in plant varieties	75
5. New instruments to encourage the transfer of technology	75
6. Industry and creation of industrial design	67
7. Private sector concern	67
8. Public awareness and concern	67
9. R&D	67
10. Cooperation between universities and industry.	67
11. Institutions setting	67
12. Control for IPRs protected products: control for illegal products	67
13. The use of technology to reduce the costs for innovative producers	67
14. Increasing the returns for innovative producers/creators	67
15. Increasing the information about IPRs	67
16. Coordination and harmonization policies related to IPRs.	67
17. Culture for IPRs protection	67
18. New instruments to encourage access to protected medicines.	67
19. Prevent piracy	67
20. Universities concern	58
21. Adequate incentives for innovative producers/creators	58
22. Networks	58

Source: IPRs Survey (2010)

[37] As indicated by 67%, 58%, 50%, 50%, 42%, 42%, 83%, 83%, 83%, 83%, 75%, 75% and 58% of the respondent official policy makers and academic experts respectively.

Table 13- The important implications of the use of Internet on IPRs in Sudan

Implications of the use of Internet on IPRs in Sudan	%
The use of Internet creates the following opportunities	
1. Easy collection of revenues for producers	67
2. Easy communications	58
3. Cheap products	50
4. High quality products	50
5. Easy exchange of IPRs protected products	42
6. Easy access to IPRs protected products	42
The use of Internet creates the following challenges	
7. Easy infringement of IPRs protected products and financial rights and financial loss for producers	83
8. Difficult control of illegal products imitating IPRs protected products	83
9. Easy piracy	83
10. Need for more legislations and legal framework	83
11. Weak enforcement of IPRs	75
12. Easy infringement to moral rights, easy imitation, and easy modifications of IPRs protected products	75
13. Wide spread of unfair competition	58

Source: IPRs Survey (2010)

Table 14- The important enforcement procedures for IPRs in Sudan

Importance of enforcement procedures for IPRs in Sudan	IPRs	copy right	Patents	industrial design	trademarks
1. Provisional measures to prevent an infringement of IPRs from occurring	92	92	83	92	92
2. Expeditious remedies to deter further infringement	83	92	67	83	83
3. Expeditious remedies to offer adequate compensation to the right-holder.	83	83	83	92	92
4. Civil and administrative procedures, actions, proceedings and remedies	83	92	83	83	95
5. Provisional measures	83	92	75	92	92
6. Provisional measures to preserve relevant evidence with regard to the alleged infringement	83	92	67	92	95
7. Border measures	83	83	75	92	92
8. Damages to offer the right-holder adequate financial compensation for the injury suffered by infringement.	83	75	67	75	83
9. Interlocutory injunctions.	83	83	75	75	83
10. Civil remedies may include:	75	83	83	83	92
11. Final injunctions	75	83	67	83	92
12. Criminal procedures.	67	83	83	83	95
13. Injunctions	67	75	67	83	92
14. Account of profit.	67	58	58	67	67
15. Measures of self-help.	58	75	75	75	95
16. Delivery up	42	58	58	67	67

Source: IPRs Survey (2010)

The observed inadequacy and the presence of several factors hindering adequate IPRs imply the importance of further efforts for the enforcement of IPRs in Sudan. These include for instance, the provisional measures to prevent an infringement of an intellectual property right from occurring, expeditious remedies to deter further infringement, expeditious remedies to offer adequate compensation to the right-holder. In addition to the civil and administrative procedures, actions, proceedings and remedies, provisional measures, provisional measures to preserve relevant evidence with regard to the alleged infringement, border measures, damages to offer the right-holder adequate financial compensation for the injury suffered by infringement, interlocutory injunctions and the civil remedies that may include: final injunctions, criminal

procedures, injunctions, account of profit, measures of self-help and delivery up respectively (see Table 14).[38, 39, 40, 41, 42]

4. Conclusions

This paper explains the importance of IPRs and examines the factors hindering and those contributing toward enhancing IPRs in Sudan. Our findings from IPRs survey discussed in Section 3 indicate the recognition of the importance of strengthening IPRs for achieving economic development objectives in Sudan and show that the important types of IPRs protection implemented in Sudan are industrial designs, trademarks, related rights to copyright, copyright, patents and invention and protection against unfair competition respectively. We explain that the prevalence of important types of IPRs and recognition of the importance of IPRs for economic development should not hide the fact that IPRs is still limited and only relatively successful in some sectors in Sudan. We find that the inadequacy of IPRs in Sudan is attributed to several hindering factors, such as, the low integration in the international institutions, lack of legal issues, high costs for innovative producers, lack of government concern, lack of private sector concern, weak institutions setting, lack of public awareness, lack of resources, weak enforcement of IPRs, weak culture for IPRs, lack of cooperation between universities and industry and lack of coordination and harmonization for IPRs related policies. The inadequate IPRs in Sudan lead to several implications such as poor national system of innovation, hindering FDI and hindering transfer of technology. Our results show that the factors contributing toward enhancing the IPRs in Sudan include promotion of adequate IPRs legislations and enforcement; planning IPRs protection, commitment to international IPRs agreements; monitoring current efforts toward IPRs protection; finance, investment and resources allocation; and social partnership to encourage IPRs protection. Moreover, strengthening IPRs in Sudan can be facilitated by increasing government concern, increasing private sector concern, public awareness and concern, cooperation between universities and industry, institutions setting, coordination and harmonization policies and culture for IPRs protection.

[38] As indicated by 92%, 83%, 83%, 83%, 83%, 83%, 83%, 83%, 83%, 75%, 75%, 67%, 67%, 67%, 58% and 42% of the respondent official policy makers and academic experts respectively.
[39] As indicated by 92%, 92%, 83%, 92%, 92%, 92%, 83%, 75%, 83%, 83%, 83%, 83%, 75%, 58%, 75%, and 58% of the respondent official policy makers and academic experts respectively.
[40] As indicated by 83%, 67%, 83%, 83%, 75%, 67%, 75%, 67%, 75%, 83%, 67%, 83%, 67%, 58%, 75% and 58% of the respondent official policy makers and academic experts respectively.
[41] As indicated by 92%, 83%, 92%, 83%, 92%, 92%, 92%, 75%, 75%, 83%, 83%, 83%, 83%, 67%, 75%, and 67% of the respondent official policy makers and academic experts respectively.
[42] As indicated by 92%, 83%, 92%, 95%, 92%, 95%, 92%, 83%, 83%, 92%, 92%, 95%, 92%, 67%, 95% and 67% of the respondent official policy makers and academic experts respectively.

References:

Ali, M. S. "Explaining the Sudanese Civil Transactions Act" Part I,Omdurman Islamic University House Publishing, 1995.

Arundel, A. and G. Van de Paal (1995) "Innovation Strategies of Europe's Largest Industrial Firms," Maastricht, MERIT, unpublished manuscript.

Atta Al-Mannan, A. "Commercial Law" Khartoum 1999.

Asid, Rozilee - Yusoff, Yusnieza Syarmila - Saiman, mohd Safri (2004) "Impact of Intellectual Property Protection, Domestic Market Condition and R&D Expenditure on Foreign Direct Investment Inflow: A Preliminary Evidence in Selected Cross-Countries Data," University Library of Munich, Germany, MPRA Paper series No. 1008, 2004.

Babiker T. I. "Industrial property rights between theory and practice in Sudan,".

David, P. A. (1993) "Intellectual Property Institutions and Panda's Thumb: Patents, Copyrights, and Trade Secrets in Economic Theory and History" in M. B. Wallerstein, M. E. Mogee and R. A. Schoen *Global Dimensions of Intellectual Property Rights in Science and Technology*, Washington, D.C., National Academy Press: 19-64.

Duguet Emmanuel (2004) and Lelarge Claire (INSEE) "Does patenting increase the private incentives to innovate? A microeconometric analysis" EPEE - University of Evry EconWPA series of Development and Comp Systems number 0411019, 16 Nov 2004.

Freeman, C. (1994) "Technological Revolutions and Catching-Up: ICT and NICs, the Dynamic of Trade, Technology and Growth," J. Fagerberg, B. Verspagen and N. Von Tunzelmann Aldershot, Edward Elgar: 198-221.

Freeman, C. and L. Soete (1997) "The Economic of Industrial Innovation," third Edition, Cassell, London.

Giovanni, D. (1998) "Sources, Procedures and Microeconomic Effect of Innovation" Journal of Economic Literature, Vol. XXVI, September 1998, p.1139.

Idris, Kamil (2003) "Intellectual Property – a Powerful Tool for Economic Growth," WIPO, 2003, p. 24.

Ioana Popovici (2006) "Impact of Intellectual Property Rights Reforms on the Diffusion of Knowledge through FDI" Florida International University, Department of Economics Working Papers series number 0602, May 2006.

IPRs Survey (2010).

Kumar, Nagesh (2002) "Intellectual Property Rights, Technology and Economic Development: Experiences of Asian Countries," Study Paper 1b, UK Commission on Intellectual Property Rights.

Levin, R. C., A. K. Klevorick, et al. (1987) "Appropriating the Returns from Industrial Research and Development," Brookings Papers on Economic Activity 3: 783-820.

Mansfield, E. (1993) "Unauthorized Use of Intellectual Property: Effects on Investment, Technology Transfer and Innovation," in M. B. Wallerstein, M. E. Mogee and R. A. Schoen *Global Dimensions of Intellectual Property Rights in Science and Technology*, Washington, D.C., National Academy Press: 107-145.

Mansfield, E. (1994) "Intellectual Property Protection, Foreign Direct Investment and Technology Transfer," International Finance Corporation Discussion Paper No. 19.

Mansfield, E. (1995) "Intellectual Property Protection, Direct Investment and Technology Transfer: Germany, Japan and the United States," International Finance Corporation Discussion Paper No. 27.

Mazzoleni, R. and R. R. Nelson (1998) "The benefits and costs of strong patent protection: a contribution to the current debate," Research Policy 27:273-284.

Makki, H. A. H. (2006) "intellectual property, according to Sudanese law" Sudan Printing Press Company Limited of the. Khartoum, Sudan.

Mater, A. "the copyright law in the Sudan".

Nour, Samia (2004), "Science and Technology (S&T) Development Indicators within the Arab Mediterranean countries" Paper prepared for the Fifth Mediterranean Social and Political Research Meeting, organised by the Mediterranean Programme of the Robert Schuman Centre for Advanced Studies at the European University Institute, Italy- Florence March 24–28, 2004.

Nour, Samia (2005a), "Science and Technology (S&T) Development Indicators in the Arab Region: A comparative Study of Arab Gulf and Mediterranean Countries," Published in *UNU-INTECH Discussion Paper Series UNU-INTECHDPS2005-3*, Maastricht, the Netherlands, August 2005). (English).

Nour, Samia (2005b), "Science and Technology (S&T) Development Indicators in the Arab Region: A comparative Study of Arab Gulf and Mediterranean Countries," *The Journal of Science, Technology and Society* (SAGE Publications), Vol.10; No. 2; September 2005; pp. 249-274 (Published in *UNU -INTECH Discussion Paper Series* UNU-INTECHDPS2005-3,Maastricht, the Netherlands, August 2005)

Nour, Samia, (2005c), "Technological Change and Skill Development in the Arab Gulf Countries," *Doctoral Dissertation*, *Maastricht University Press*, Maastricht, The Netherlands, November 2005.

OECD, European Commission (1997) "The Second European Report on Science & Technology Indicators," OECD, Paris, 1997. p. 464 DG XII.

OECD (2002) "The impact of trade-related intellectual property rights on trade and foreign direct investment in developing countries" OECD/ TRADE DIRECTORATE/TRADE COMMITTEE/WORKING PARTY OF THE TRADE COMMITTEE/(2002) NO. 42.

OECD (2003) "IPR, Innovation and Economic Performance" DSTI/STP Technology Policy Brief, Volume 3.

OECD (2005), Intellectual Property as an Economic Asset: Key Issues in Valuation and Exploitation (Background and Issues) (Report of the European Patent Office) (2005): http://academy.epo.org/schedule/2005/e02/background_report.pdf .

Park, Walter G, Ginarte, Juan Carlos (1997) "Intellectual Property Rights and Economic Growth" - Oxford University Press, Journal of Contemporary Economic Policy, Volume (Year): 15 (1997), Issue (Month): 3 (July), pp: 51-61:

Primo Barga, C. (1990) "Guidance from the economic theory Strengthening Protection of Intellectual Property in developing countries" A survey of the literature E. W. Siebeck Washington D.C. World Bank Discussion Paper No. 112.

Robert J. Shapiro and Kevin Hassett, *The* Economic *Value of* Intellectual Property (USA for Innovation) (Oct. 2005) http://www.usaforinnovation.org/news/ip_master.pdf

Rod Falvey, Neil Foster, David Greenaway (2004) "Intellectual Property Rights and Economic Growth" Internationalisation of Economic Policy Research Paper No. 2004/12, 2004

Rod Falvey, and Neil Foster and Olga Memedovic (2006) "The Role of Intellectual Property Rights in Technology Transfer and Economic Growth: Theory and Evidence," UNITED NATIONS Industrial Development Organization (UNIDO), Vienna, 2006.Stephen Siwek of Economists Incorporated entitled.

Stephen E. Siwek (Economists Inc.), (2002) "Copyright Industries in the U.S. Economy; the 2002 Report"

Stephen E. Siwek (Economists Inc.), (2005) "Engines of Growth: Economic Contributions of the U.S. Intellectual Property Industries" (Nov. 2005): http://nbcumv.com/corporate/Engines_of_Growth.pdf .

Sunil Kanwar (2006) "Innovation and Intellectual Property Rights" Centre for Development Economics, Delhi School of Economics in its series Working paper number 142, Aug 2006.

Taylor, C. and A. Silberston (1973) "The Economic Impact of the Patent System," Cambridge, Cambridge University Press.
The United States Patent and Trademark office web site: www.uspto.gov.

UNCTAD (1975) "The Role of the Patent System in the Transfer of Technology to Developing Countries," New York, United Nations.

Van Dijk, T. (1994) "The Limits of Patent Protection Essays on the Economics of Intellectual Property Rights," Ph.D. thesis, Faculty of Economics, Maastricht, University of Limburg.

Van Wijk, J. and G. Junne (1993) "Intellectual Property Protection of Advanced Technology Changes in the Global Technology System: Implications and Options for Developing Countries," Maastricht, UNU/INTECH Working Paper No. 10.

Verspagen, B. (1999), "Intellectual Property Rights in the World Economy," MERIT, Maastricht University, MERIT Research Memorandum No. RM 2/99- 017, 1999.

World Intellectual Property Organization (WIPO) (1999) "General Information," WIPO Publication No. 400 (E).Geneva, Switzerland, April 1999 WIPO Geneva, Switzerland.

WIPO's Japan Office (2007) "Measuring the Economic Impact of IP Systems" joint project between WIPO and UNU, September.

WIPO statistics database. Last updated: 12/2012**,** Accessed April 20, 2013: http://www.wipo.int/ipstats/en/statistics/country_profile/countries/sd.html.

Yusuf, D.A.. "Sudanese experience in enforcement of industrial property rights".

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