



THE ECONOMICS OF INTELLECTUAL PROPERTY IN SOUTH AFRICA



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The present publication is the result of a WIPO project on “The Economics of Intellectual Property in South Africa” coordinated by Prof. David Kaplan, under the auspices of the Policy Research in International Services and Manufacturing (PRISM) at the University of Cape Town. Professor Kaplan was responsible for securing authors for the chapters, providing guidance, writing the first chapter that provides an overall framework for this book and organizing the workshop on the Economics of Intellectual Property that gave rise to this book.

The project was coordinated within WIPO by Esteban Burrone and Pushpendra Rai, who supervised the publication, commented on individual papers and wrote the Introduction.

Disclaimer: The views and comments expressed in the papers contained in this publication are those of the authors and do not necessarily reflect those of the World Intellectual Property Organization.

TABLE OF CONTENTS

INTRODUCTION	v
CONTRIBUTORS	xii
CHAPTER 1 Intellectual Property Rights and Innovation in South Africa: A Framework DAVID KAPLAN	1
CHAPTER 2 Value Adding in the Southern African Natural Products Sector: How Much do Patents Matter? RACHEL WYNBERG, JUDITH SILVESTON and CYRIL LOMBARD	18
CHAPTER 3 An Economic Analysis of the Evolution in Intellectual Property Strategies in the South African Agricultural Sector: The <i>Rooibos</i> Industry. CERKIA BRAMLEY, ESTELLE BIÉNABE and JOHANN KIRSTEN	56
CHAPTER 4 The Development and Management of an Intellectual Property Strategy in a Developing Country Context: The Case of Sasol HELENA BARNARD and TRACY BROMFIELD	84
CHAPTER 5 Intellectual Property, Commercialization and Institutional Arrangements at South African Publicly Financed Research Institutions MCLEAN SIBANDA	113

INTRODUCTION

This publication is the first in a series that aims to promote the development of empirical research on the economics of intellectual property and strive toward more evidence-based policy-making in this field. Its origins can be traced back to the National Roundtable on the Economics of Intellectual Property that took place in Cape Town on May 3 and 4, 2007. The Roundtable was an opportunity for a group of South African economists to discuss areas of possible empirical research in the field of intellectual property with a view to identifying promising research avenues. In addition to the national economists, two renowned international economists and a number of representatives from South African governmental institutions were present at the Roundtable and participated in the discussions on different methodological approaches for undertaking such research in South Africa.

Following the Roundtable, participants and other interested researchers were invited to submit research proposals to the World Intellectual Property Organization (WIPO). All research proposals were peer-reviewed and a number were selected for WIPO funding and inclusion in this publication, which therefore brings together a series of empirical papers developed in the course of the project. It represents a first attempt at exploring a set of specific economic questions on intellectual property within the context of the South African innovation system.

The focus of the papers is quite varied. While some focus on a specific sector (e.g. natural products) or a single product (*Rooibos*), one paper devotes attention to public sector research institutions and another focuses on a single company, albeit South Africa's largest R&D spender (i.e. Sasol). While some rely on interviews, others use patent and trademark databases or published economic data as the points of departure for further analysis. In terms of intellectual property rights (IPRs), the papers devote their attention to patents, trademarks and geographical indications (GI). Issues relating to the protection of traditional knowledge are present in at least two papers and the importance of trade secrets and disclosure through publication is central to the case study on Sasol.

The papers are not meant to provide a comprehensive understanding of the economics of intellectual property in South Africa, but rather an initial exploration of a number of issues which could be the subject of further research. One of the objectives of this publication is to motivate researchers in South Africa and in other developing countries and countries with economies in transition to study the economics of intellectual property empirically. At various stages the researchers have identified areas that could be studied further so that a clearer picture can emerge. The conclusions from each paper are not and cannot be definitive, but provide, it is hoped, valid observations that emerge from the empirical research undertaken by the authors.

Due to the interdisciplinary nature of the subject matter, the publication, while remaining primarily focused on economics, has also ventured into a number of other fields,

including law, business and natural sciences, which explains the interdisciplinary background of the researchers involved in this endeavor. It is felt that in many areas of intellectual property it is crucial that economic research rely on expertise from other disciplines to ensure that the analysis takes into consideration the full range of issues that may be relevant to any specific research question.

Main Findings

In **Chapter 1**, David Kaplan provides an overview of the recent performance of South Africa's innovation system and the role of the IP system, in order to place the subsequent empirical papers in context. Dr. Kaplan indicates that South Africa's innovation system is at a critical juncture and it is important to understand what role IPRs have played and can play in the current context. The author points out that the performance of the national innovation system has generally not been as strong as might be desired, in terms of innovation outputs (such as publications, patents, high-technology exports and royalty income) when compared with the increases in resources committed. While it is possible that a time-lag may occur until policy changes begin to have an effect on outputs, the author expresses some concern. In particular, he highlights some of the constraints being faced by South Africa, such as limitations in the number of skilled R&D professionals.

With respect to the IP system, Dr. Kaplan's paper expresses concern for the limited economic research currently available on South Africa's IP system, a situation that is not different from that in most developing countries. This makes it difficult to draw strong conclusions on its role and impact in economic development. Nevertheless, some basic information does exist that makes it possible to draw some preliminary conclusions. With regard to the use of the patent system, the number of applications both in South Africa and abroad has been stagnant while the share of South African applicants in total patent applications has been declining. Compared with other countries, South Africa's innovation surveys indicate that the percentage of companies that have been granted a patent is fairly low, the use of patent databases as a source of technological information is very limited, and the use of the patent system by public research organizations (with some exceptions) has also been low. While hardly any studies have examined the possible impact of the IP system on, for example (a) innovation by domestic companies; (b) foreign direct investment (FDI) in South Africa; and (c) the country's participation in technology markets, the author indicates that these all represent fertile areas of research. For example, he highlights the recent establishment of a number of specialist technology suppliers, particularly in the field of engineering. The precise factors underpinning their growth (and the possible role played by the IP system) require investigation.

The author also points out some of the debates taking place in the policy arena with respect to intellectual property, including, for example, whether South Africa should transit from a patent registration system to one with substantive examination of patent applications; how to enhance the disclosure function of patents via the effective diffu-

sion of technological information contained in patent documents; how to properly balance the incentives for innovation with other public interest objectives such as public health; and issues relating to indigenous knowledge and genetic resources. In general, the author highlights the importance of economic research being enhanced so that future policy initiatives in South Africa rest on firm empirical foundations.

In **Chapter 2**, Rachel Wynberg, Judith Silveston and Cyril Lombard provide an interesting study on the role of patents in value addition in the South African natural products sector. The sector under consideration is one that has attracted much attention from policy-makers and academics in the context of discussions on the protection of genetic resources and associated traditional knowledge. It is a sector, however, on which there has been very limited systematic economic research, particularly with respect to its interface with the IP system. Anecdotal evidence of the existence of patents relating to the natural products themselves and to the processes required for their extraction and development have created much concern among various stakeholders in the field.

Focusing on three specific products, namely, devil's claw, *Hoodia* and *Rooibos*, the chapter seeks to understand whether patents have helped or hindered the development of the natural products industry and whether the low levels of value adding in Southern Africa can be attributed to patents and/or to other factors. The paper provides an analysis of the value chains for each of the products and examines the patent landscape in order to understand the extent to which the former has determined the latter and whether there are business opportunities that have remained unexploited.

While the paper identifies the existence of certain patents that could restrict the capacity of local producers to use certain technologies (e.g. extraction techniques for devil's claw and for *Hoodia*), substitute technologies that are not patented in South Africa are generally available but are not being used by the local industry. The difficulties that Southern African firms in the natural products' sector are facing in moving up the value chain and capturing greater value added seem to stem primarily from a number of other factors ranging from restricted market access, buyer dominance, a lack of strategic alignment amongst producers and insufficient technical and financial capacity to meet quality control standards, which would deserve further investigation.

The paper also points to the importance that patents have played in some instances (particularly in the case of *Hoodia*) in the development of the industry and in stimulating research and industrial activity. It identifies a number of business opportunities available to local firms due to the limited territorial coverage or scope of many of the existing patents. According to the authors, very low awareness and understanding of the IP system is often a problem, as the very existence of patent documents in a given area tends to put off investors and enterprises even if their territorial coverage, scope or status should not constrain their use by South African firms. Moreover, the authors conclude that little attention has been paid so far to the possibility of licensing-in technology as a strategy to start upgrading local technological capacity in this sector. Finally, the paper stresses the important role of prior traditional knowledge in the cases examined, with-

out which there probably would have been no industry at all. This aspect, which has often been overlooked in the past, has increasingly received recognition, including through the establishment of benefit-sharing agreements and attempts to enhance interaction between traditional knowledge holders and the local industry.

The case of the *Rooibos* sector is also the focus of **Chapter 3**, albeit from a different perspective. Cerkia Bramley, Estelle Biénabe and Johann Kirsten track the evolution of the IP strategies used by firms in that sector in response to changing consumer demands, threats of misappropriation and risk of loss of reputation. The focus is on the shift from individual to collective quality signaling strategies, which is at the core of recent moves by the *Rooibos* industry to apply for the protection of *Rooibos* as a geographical indication. The paper provides insights into the marketing strategies of the various actors in the industry at various levels of the value chain and explores the ways in which different companies have been seeking protection for the name “*Rooibos*”.

According to the authors, the dispute that took place following the registration of *Rooibos* as a trademark in the US market in 1994, which ended in 2005, is what initially led to increasing awareness in the industry of the possible threats of misappropriation, particularly in key export markets. In addition, the risk of quality degradation as new actors enter an industry lacking quality control standards, and the possible loss of reputation for traditional *Rooibos* producers has set the scene for increasing collective action by *Rooibos* producers and exploration of ways to maintain the collective reputation. The authors indicate that the rationale for aspiring to GI protection in the case of *Rooibos* is anchored on the need for regulating product reputation rather than on a territorial quality strategy and focuses essentially on reserving the name “*Rooibos*” for the domestic industry, thus defining a minimum quality standard. While some territorial development strategies do exist associated with *Rooibos*, they have so far not been linked to the GI initiative. The emphasis is primarily on export markets, where the threat of misappropriation and the lowering of quality standards has been observed, which, in turn requires analysis of the different legal instruments available in the principal markets of concern to the producers. In addition, the key actors seem to be concerned exclusively with the mainstream herbal tea market and much less on the use of *Rooibos* in other sectors such as the cosmetic industry.

While the *Rooibos* producers consider the most suitable legal mechanisms for its protection in South Africa and various export markets, it is considered a pilot case for South Africa, which could set an important precedent for other South African products that may also consider using collective labeling strategies. Practical case studies from developing country industries such as this one provide interesting insights on the evolution and development of different IP strategies to address specific market developments. In the case of *Rooibos* the search for a collective labeling strategy and a suitable IP strategy has gone hand in hand with greater interaction and coordination among various actors in the supply chain in order to address the challenges they face.

The evolution in IP strategy is also the focus of **Chapter 4** by Helena Barnard and Tracy Bromfield. The context, however, is quite different as the chapter provides an analysis of the way IP management functions have developed at Sasol, South Africa's largest firm and the highest R&D spender, from its establishment in 1950 to 2005, by which time it was firmly established as a multinational corporation (MNC) with research facilities in a number of locations worldwide. As the authors explain, having a coherent IP strategy is one of the characteristics of MNCs, especially in chemical and related industries. Apart from the direct financial benefits that firms can realize through, for example, the licensing of patents, patents and scientific publications also act as signals of technical competence and legitimacy in the field. For developing country MNCs – coming from economically less successful regions – such “currency” is especially important to gain access to the relevant international knowledge networks.

In the case of Sasol, the authors show how the development of an IP strategy has lagged behind the development of the firm's scientific and technological capacity. While in its early days Sasol relied on the use of foreign technology and later relied on secrecy as its main strategy for appropriating the results of its own research, the company gradually started experimenting with the patent system in a subsequent phase. The paper shows a clear evolution toward a more coherent patenting strategy combined with an active use of publications, to enhance the international technological credibility of the company. This appeared to be particularly important during the years in which the country was under economic sanctions. The study also highlights the way Sasol benefited from interactions with foreign partners in the development of its technological base, while the same did not seem to occur until much later with its IP strategy, which developed through internal trial and error. One reason for this may be that stronger IP management capacity at Sasol did not particularly serve the purposes of its foreign partners. Indeed, the alignment of motives that seemed to have spurred the mutually beneficial interactions between Sasol and its foreign partners around technological and scientific capability creation did not seem to spill over to developing competence in IP management until a proper joint venture was established in which both partners could clearly benefit from Sasol upgrading and fine-tuning its IP management capacity. The paper also points out the complementary roles of patenting and publishing in scientific journals and the dilemmas faced by companies when deciding whether to patent or keep a new technology secret.

The paper is perhaps one of the first thorough case studies of IP management within a developing country firm, and provides interesting lessons for other large companies with significant R&D capacity that are taking a similar road. It provides an interesting analysis of learning processes and makes a clear distinction between processes leading to the development of intellectual property and learning processes relating to the management of intellectual property, each requiring a different set of skills.

In **Chapter 5**, McLean Sibanda presents an analysis of patenting and technology transfer activity at South African publicly funded research institutions. The institutions form the largest concentration of skills and personnel in the area of science and technology

in South Africa and, therefore, a strong potential for the development of patentable inventions. In 2002, the South African Research and Development Strategy identified disparate practices in respect of ownership, management and commercialization of intellectual property emanating from publicly financed research at these institutions (DST, 2002) and highlighted the need for harmonization of IP practices and upgrading IP management practices in such institutions. The paper sets out to analyze the evolution in the way IP management evolved in the period from 2001 to 2007.

Although South African publicly financed institutions are generally characterized by low (and stagnant) patenting activity coupled with low conversion of these patents to licenses and/or products, the author notes that a majority of the main higher-education institutions and at least two of the science councils have made significant progress toward laying a sound foundation for IP management and technology transfer. The author indicates that patenting from South African institutions has concentrated primarily on areas of technology linked to biomedical/biotechnology and ICT. Moreover, patent citation analysis provides evidence of a number of patents having received several citations, some of which have been licensed to commercial partners, indicating their relevance and importance within the sectors concerned.

With respect to the commercialization of patents, the institutions have had variable success and only a few have been able to earn revenues from the licensing of patented inventions. While revenue generation may only be a secondary objective for patenting and licensing, the limited revenues received are an indication of the difficulties faced by the institutions in licensing patented technologies to industry. This may raise concerns, given the high costs often incurred in patenting, particularly in foreign markets. The authors also found evidence that spin-off formation was not a significant activity or preferred mode of commercialization of IP by most of the institutions, which generally preferred licensing to established firms.

Finally, the author concludes that institutional arrangements for managing and commercializing intellectual property seem to be at an early stage in South Africa, with a shortage of skilled professionals posing a challenge to the protection and commercialization of research results. According to the author, the lack of harmonized IP policies with clear benefit-sharing arrangements for inventors may have contributed to the low rate of patenting by the institutions. The author notes, however, that various initiatives by the South African government (including legislative proposals) have been developed to support IP management and commercialization and may be important in ensuring that South African publicly funded research institutions are able to upgrade their IP management capacity and better meet the challenges of the knowledge economy.

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We are also very grateful to all the other researchers who devoted time and effort to this pioneering endeavor, undertaking original research and analyzing the data collected in order to provide new insights on the economics of intellectual property in South Africa. Our gratitude also goes to Professor Ashish Arora, Professor at the Carnegie-Mellon University, Pittsburgh, US, and Professor Luigi Orsenigo, Professor at Bocconi University, Milan, Italy, for their participation in the Roundtable and for their useful insights and suggestions to the national researchers. We also thank the external referees who provided valuable comments to the researchers at various stages of the process in order to enhance the quality of the papers and ensure high standards. Last but not least, our gratitude is extended to the Government of South Africa for supporting this endeavour, participating actively in the workshop that launched this project and assisting the researchers at various stages of their work.

It is hoped that the publication will be useful to further inform debates on intellectual property and economic development both in South Africa as well as internationally. It is also hoped that it will contribute to generating interest among researchers in South Africa and beyond on the impact of intellectual property on economic development and will encourage them to undertake much-needed empirical work in this area.

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