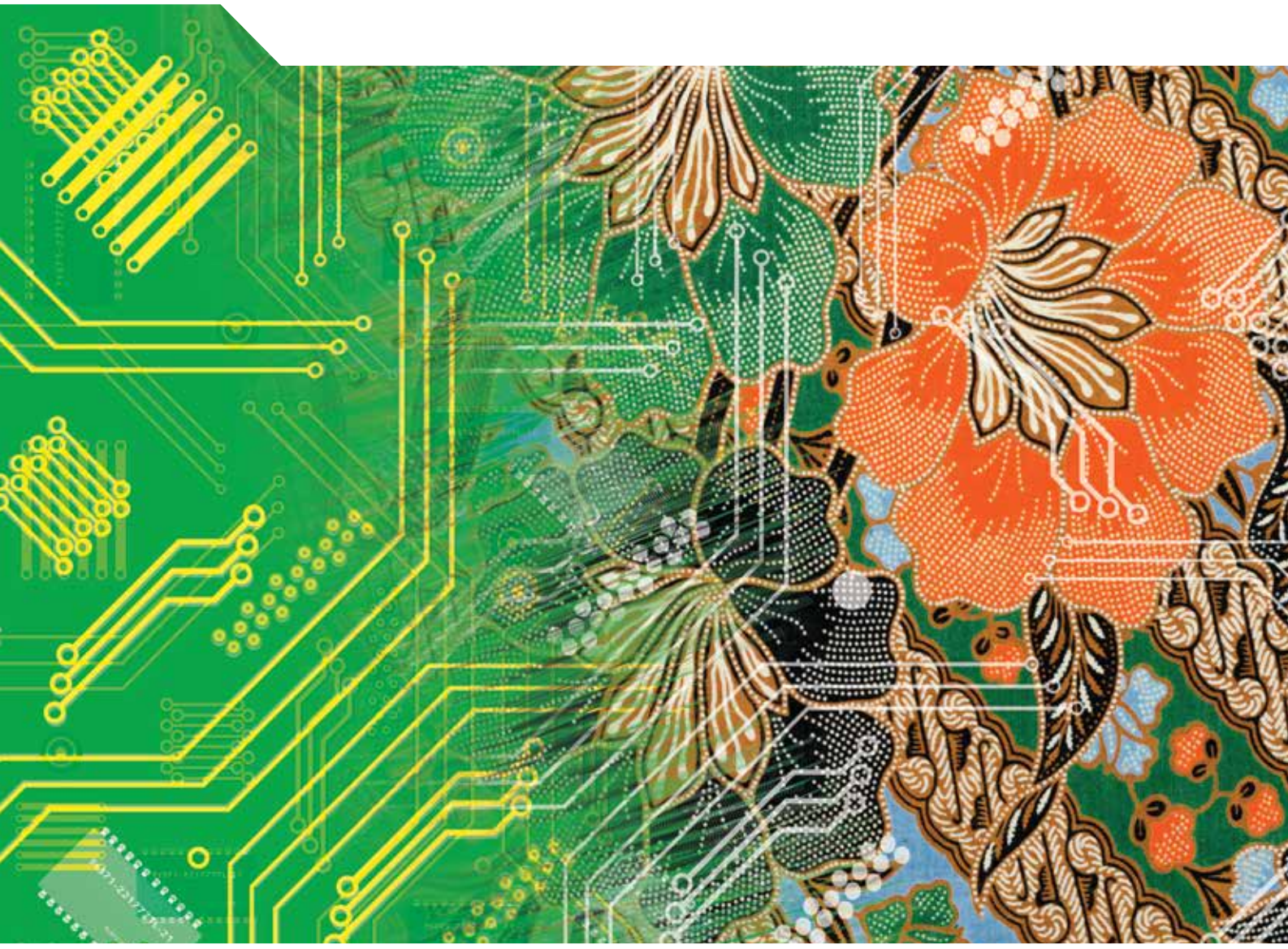
National Intellectual Property Systems, Innovation and Economic Development

WITH PERSPECTIVES ON COLOMBIA AND INDONESIA



OECD

National Intellectual Property Systems, Innovation and Economic Development

WITH PERSPECTIVES ON COLOMBIA AND INDONESIA



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Foreword

Innovation plays a pivotal role in economic development: this is a key lesson of the past decades. The build-up of innovation capacities has been central to successful growth experiences. Emerging and developing countries have recognised that innovation is not just about high-technology products, but that innovation capacity has to be built into the early stages of the development process to gain the learning capacities that will allow "catch-up" to occur. The adoption of foreign technology requires adaptation to the local context, which in turn implies incremental innovation. These countries also need innovation capacity to address developmental challenges specific to their local contexts, such as providing access to drinking water or eradicating neglected diseases.

Intellectual property (IP) rights are important for building up these innovation capacities. IP creates exclusive rights for holders, which can result in substantial monetary rewards if the invention meets with market success. They are aimed at providing incentives to invent in fields relating to technology (patents), business (trademarks) and the arts (copyright). IP can serve innovation not only by providing direct incentives for inventions, but also by a number of indirect mechanisms: facilitating access to knowledge and inventions (e.g. by providing opportunities for licensing and disclosing information on inventions in patent documents), stimulating innovation by resolving information asymmetries (e.g. trademarks allow firms to signal the quality of their product), facilitating international competitiveness and trade (e.g. by strengthening knowledge transfer from international to local firms), and enhancing opportunities for access to finance (e.g. using IP as collateral for credit). IP is even more pivotal in the knowledge economy where intangible assets are critical.

National innovation performance depends on a variety of factors and innovation policy choices have substantial impacts. A policy area of potentially significant impact on innovation is the national IP system. The IP system allows a market-based economy to produce innovation while providing solid ground for other types of government intervention to be more effective. IP policy is in many cases a complement to other innovation policy instruments: It can be used to foster the commercialisation of public research, to give guarantees to inventors responding to public procurement (demand-side policies), to back access to soft loans or other public funding and so on. A solid IP system is also critical to accessing international markets.

This publication addresses the role of national systems of IP in the socio-economic development of emerging countries, notably through their impact on innovation. It presents a framework that identifies the key mechanisms that enable IP systems to support emerging countries' innovation and development objectives. This allows country studies to be conducted to identify strengths and weaknesses in the IP system from the perspective of contributions to national innovation performance. It then enables the formulation of concrete policy recommendations, thereby serving the overall objective of strengthening national innovation and growth. The report also discusses two IP country studies conducted for Colombia and Indonesia. These are based on analyses of the national intellectual property systems, drawing on country missions that gathered detailed information and feedback from more than 100 stakeholders on IP-related priorities and bottlenecks. Concrete policy recommendations are provided for both countries.

This publication forms part of two large OECD initiatives. The first is an initiative to explore the ways in which development challenges shape innovation performance, in particular how development contexts shape conditions for successful national IP policies. The second contribution is a focus on assessing country innovation policies by providing insights into a specific tool for innovation policy: intellectual property rights. Moreover, the publication contributes to the OECD-World Bank Innovation Policy Platform project, a web-based, interactive space that provides access to open-data, learning resources and opportunities for collective learning on innovation policy. More specifically, the framework developed for this publication has provided the basis for the Intellectual Property Rights module of the platform.

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The country mission to Colombia, which forms the basis of the country review presented in Chapter 2, was organised and conducted by Caroline Paunov with the support of the National Ministry of Planning of Colombia (DNP) and, in particular, Oscar Salazar and Javier Villarreal. The review also benefitted from a one-day workshop organised by Catalina Atehortúa García from TECNNOVA. A background report on Colombia's economic, innovation and social context is based on a comprehensive report prepared by Catalina Martinez Gutierrez. The work also benefitted from background research conducted by Andrés Barreneche. Comments provided by Gernot Hutschenreiter and Andrew Wyckoff are gratefully acknowledged.

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Acronyms and abbreviations

ACAC	Colombian Association for the Progress of Science (*Asociación Colombiana para el Avance de la Ciencia*)
BATAN	National Nuclear Energy Agency of Indonesia (*Badan Tenaga Nuklir Nasional*)
BPPT	Agency for the Assessment and Application of Technology (*Badan Pengkajian dan Penerapan Teknologi*)
BRIICS	Brazil, Russia, India, Indonesia, China, South Africa
CBD	Convention for Biological Diversity
CIPI	Intersectoral Commission for Intellectual Property of Colombia (*Comisión Intersectorial de Propiedad Intelectual*)
CMO	Copyright Management Organization
CONPES	National Economic and Social Policy Council of Colombia (*Consejo Nacional de Política Económica y Social*)
DGIPR	Directorate General of Intellectual Property Rights of Indonesia
DNP	National Planning Department of Colombia (*Departamento Nacional de Planeación*)
EPO	European Patent Office
EU	European Union
FDI	Foreign Direct Investment
FNC	Colombian Coffee Federation (*Federación Nacional de Cafeteros de Colombia*)
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
GI	Geographical Indication
IADB	Inter-American Development Bank
ICA	Colombian Agricultural Institute (*Instituto Colombiano Agropecuario*)
ICT	Information and Communication Technology
IP	Intellectual Property
IPR	Intellectual Property Rights
JPO	Japan Patent Office
LIPI	Indonesian Institute of Sciences (*Lembaga Ilmu Pengetahuan Indonesia*)

MCIT	Ministry of Trade, Industry and Tourism of Colombia (*Ministerio de Comercio, Industria y Turismo*)
MSME	Micro, Small and Medium-Sized Enterprise
PCT	Patent Cooperation Treaty
PPH	Patent Prosecution Highway
PRI	Public Research Institute
PVP	Plant Variety Protection
R&D	Research and Development
R&I	Research and Innovation
RISTEK	Indonesian Ministry of Science and Technology (*Kementerian Riset dan Teknologi*)
SENA	National Learning Service (*Servicio Nacional de Aprendizaje*)
SIC	Superintendency of Industry and Trade (*Superintendencia de Industria y Comercio*)
TFP	Total Factor Productivity
TKDL	Traditional Knowledge Digital Library
TRIPS	Trade-Related Intellectual Property Rights Agreement
TTO	Technology Transfer Office
USPTO	United States Patent and Trademark Office
WIPO	World Intellectual Property Organisation
WTO	World Trade Organisation

Executive summary

Innovation plays a pivotal role in economic development: this is one important lesson of the past decades. The build-up of innovation capacities has been central to successful growth experiences. Intellectual property (IP) rights are important for building up those innovation capacities, and are even more pivotal in the knowledge economy where intangible assets are critical.

IP creates exclusive rights for holders, which can result in substantial monetary rewards if the creation meets with market success. IP can serve innovation not only by providing direct incentives for inventions, but also by a number of indirect mechanisms: facilitating access to knowledge and inventions, stimulating innovation by resolving information asymmetries, facilitating international trade, and enhancing opportunities for access to finance.

Main findings

How can policy optimise the contributions of national intellectual property (IP) systems to innovation in a development context? Maximising the contributions of national IP systems to innovation requires policies that take into consideration the challenges that national innovators face. If unaddressed, these challenges will reduce or even eliminate the positive impacts of IP systems on innovation. While procedural and legal aspects are critical, it is the interrelationships between the national IP system; the set of institutions, rules and bodies involved in the design, implementation and enforcement of IP in a national economy; and complementary innovation policies that shape conditions for success, particularly in a development context. Analysing national IP systems, therefore, requires a focus on different potential and actual users, their fields of activities and market conditions for IP. The following considerations are important:

- The focus of national IP policies has to go beyond consideration of patents alone. From the perspective of national innovation utility models, trademarks and design rights are more relevant than patents for most resident inventors in middle-income countries.
- Adequate legal, administrative and judicial conditions are crucial to guaranteeing IP rights to potential users of the IP system. The resources allocated to the IP system by governments must, however, keep to reasonable levels, as the IP system partly competes with the innovation system for some of these resources (e.g. engineers) and should seek international co-operation.
- In a development context, potential innovators face multiple challenges that shape the impacts IP systems can have on innovation. These include substantial heterogeneities in productive sectors. In other words, a few "islands of excellence", such as leading innovative firms, universities and/or sectors, co-exist with an often-substantial informal sector and a large number of firms with low innovation capacities. In order to support innovation, it is important that all groups have opportunities to effectively benefit from the national IP system.

- Complementary policies adapted to specific development contexts are critical for wider benefits from the IP system. Such policies include, for instance, providing capacity-building training or funding of joint firm-university research projects. Adapting national IP systems also requires consideration of the specific characteristics and needs of informal and traditional sectors.
- A high-level co-ordination body with a clear "IP for innovation" agenda can facilitate the design and implementation of IP policies in support of innovation.

Recommendations

National IP systems in Colombia and Indonesia face several common challenges including the following:

- IP policy has rightly focused on ensuring that IP operations and procedures provide efficient, high-quality registration procedures, as well as on raising awareness among potential users about IP. However, IP is not an end in itself and more effort is required for its commercialisation. Particular challenges here concern the commercialisation of public sector IP and the provision of support services to help identify suitable IP strategies for firms and universities alike.
- The national IP system can help to strengthen the country's innovation system; however, it must be accompanied by a range of complementary policies. These include policies to encourage interaction among actors in the innovation system, address the weak skills base, and contend with shortcomings in the business framework, such as the limited opportunities for innovators to obtain external financing.

Recommendations for Colombia

Efforts aimed at improving the quality of IP examinations while reducing delays in processing should continue, so as to reinforce substantial recent achievements. In addition, provision of regional IP services, particularly in regions where industrial capacities are strong, can encourage wider use of the IP system.

Colombia's private and public universities have begun to define IP support policies. However, the fact that public sector officials cannot operate spin-offs impedes the ability of public universities to engage fully in commercialisation activities.

Focusing IP awareness and capacity-building initiatives on national actors with the strongest potential for obtaining revenue-generating IP can bring the highest payoffs for Colombia's innovation system.

Support for specialised services, which conduct technology screening, is important as it enables Colombia's innovators to take advantage of information on technologies contained in patent application files.

The success of Colombia's IP co-ordination body in co-ordinating enforcement issues should be capitalised upon, empowering it to implement an "IP for innovation" agenda. Moreover, the proposal to create an autonomous industrial property institute that deals exclusively with industrial property is an attractive option.

Recommendations for Indonesia

Efforts aimed at standardising and automating procedures to increase the processing efficiency of IP applications should be a priority, as lengthy delays weaken incentives. Policy steps also have to be taken to avoid the potential exclusion of smaller entities, as well as businesses in remote geographic areas.

Policies should encourage the use of IP by national actors, including the launch of IP awareness and capacity-building initiatives. Incentive schemes should give researchers a stake in the returns from their inventions, by rewarding most those who commercialise inventions with high industrial applicability. This requires resolving legal uncertainties regarding the licensing of IP generated from public funding sources.

Embracing "new" types of IP, such as traditional knowledge, genetic resources, folklore and geographical indications (GIs), will be attractive for Indonesia, but these need to be used to generate value if they are to serve the innovation system. Indonesia's IP policy should take further complementary steps to support commercialisation.

To achieve these objectives, the country's IP policy has to undertake a more coherent approach involving the various actors of Indonesia's innovation governance system.

Overall assessment and recommendations

1. Analysing the national intellectual property systems of developing and emerging countries

Why does innovation matter in development contexts?

Innovation matters even in countries with less developed industrial conditions. Incremental innovations in activities beyond "knowledge-intensive" sectors can offer substantial opportunities for success. Examples include the successful exports of fish from Uganda, wine from Argentina and Chile, and medicinal plants from India. An exclusive focus on high-technology industries ("high-tech myopia") can be costly if the potential for innovation in other sectors is ignored. Many opportunities for innovation have arisen in lower-technology sectors with high export opportunities, such as the production of palm oil and derivative products in Malaysia. Innovation in agriculture is particularly relevant for addressing socio-economic challenges and fostering growth. Evidence shows that agricultural R&D has a greater impact on poverty reduction than most other public investments. Moreover, local innovation and innovation in the informal sector are also increasingly relevant to inclusive development agendas. Thus, informal and inclusive innovation is essential for innovation policy in emerging countries, along with research targeting social challenges.

Different types of innovation play different roles at various stages. Middle-income economies often have an industrial base and core framework conditions for innovative firms, and so have addressed the initial challenges for adopting novel technologies. High-technology R&D-based innovation matters at later stages of development, as a factor of competitiveness and of learning, facilitating the "catch-up" process. Stages in country development do not, however, imply a linear progression, as different priorities and objectives often apply to different actors in countries at the same time. Certain areas can be more advanced; in fact, in many emerging countries "islands of excellence" – very innovative world-leading businesses, sectors, regions and research institutions or universities – co-exist with a large group of low-productivity firms and a substantial informal economy. Policies in support of innovation are, therefore, critical in contexts of development and, in consequence, national intellectual property (IP) systems – given their potentially significant impact on innovation – are a priority for investigating questions of development.

The key factors for IP systems involve more than legal and administrative conditions

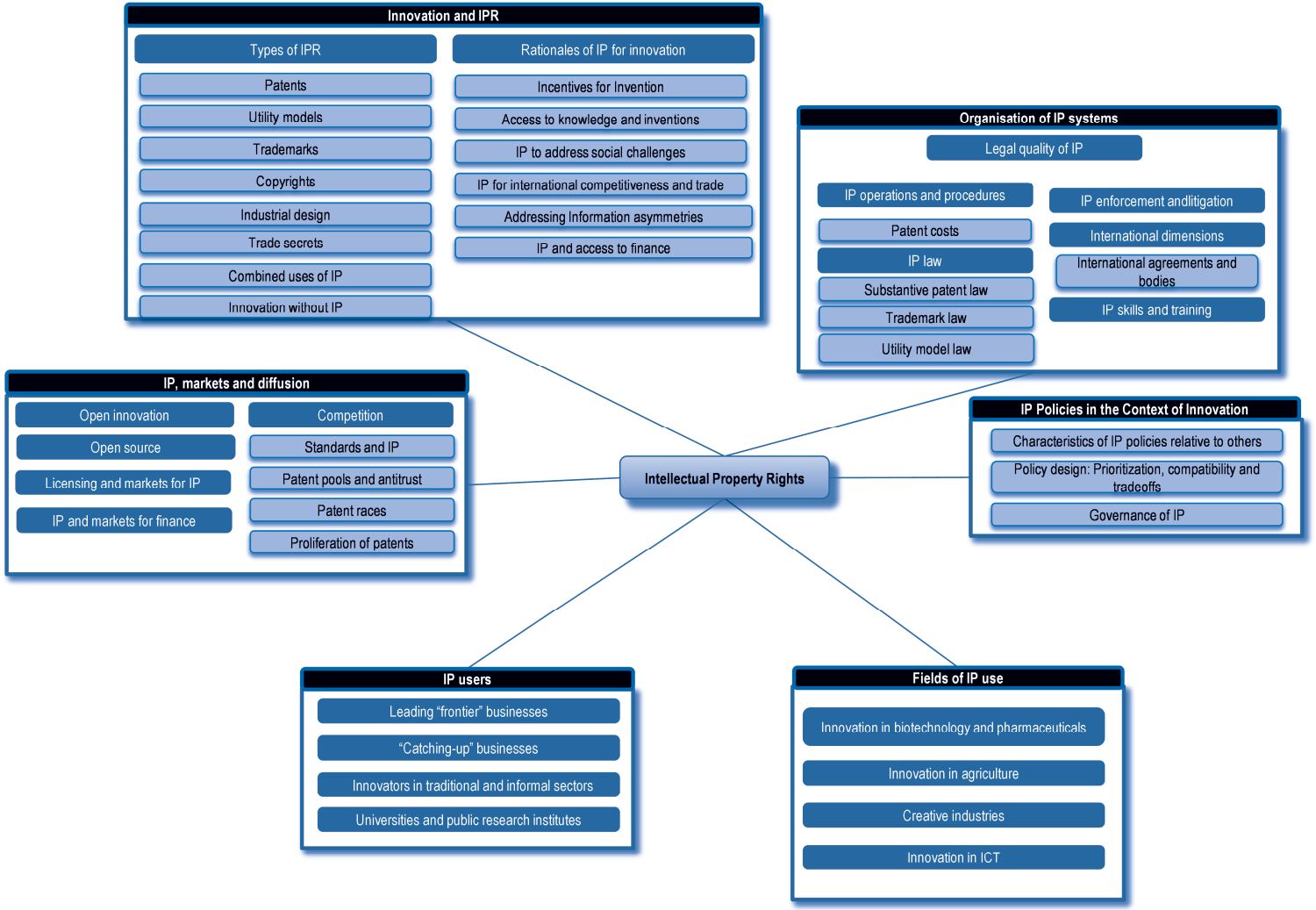
How can policy optimise the contributions of national intellectual property systems to innovation in a development context? A well-functioning IP system must navigate among multiple constraints and objectives at the legal and economic level, and find compromises among multiple actors. Maximising the contributions of a national IP system to innovation requires policies that take into consideration the challenges that innovators face. If unaddressed, these challenges will reduce or even eliminate the positive impacts of IP systems on innovation. Existing studies of national IP systems often emphasise strongly procedural and legal aspects without fully embracing the innovation context. It is, however, the interrelationships between the national IP system; the set of institutions, rules and bodies involved in the design, implementation and enforcement of IP in a national economy; and complementary innovation policies that shape conditions for success, particularly in a development context. Analysing national IP systems of developing and emerging countries, therefore, requires a focus on different potential and actual users, their fields of activities and market conditions for IP. Figure 1 presents a "conceptual map" illustrating the extent of the IP system that needs analysis. The nodes indicate the various issues (concepts, mechanisms, actors or policy measures) to be addressed, while the boxes indicate nodes that belong to the same group. The analytical structure is implemented in the Intellectual Property Rights module of the OECD-World Bank Innovation Policy Platform.

Main considerations for assessing national IP systems from the perspective of innovation

The following considerations are critical for an analysis of national IP systems in middle-income countries:

- National IP systems can have substantial impacts on innovation. By creating exclusive rights for their holders they can provide incentives to invent in fields relating to technology (patents), business (trademarks) and the arts (copyright). The innovation performance of users in the productive sector also depends on their access to knowledge. Therefore, IP policy has to strike the right balance between providing incentives for innovators and facilitating access.
- Such policy focus has to go beyond consideration of patents alone. From the perspective of national innovation utility models, trademarks and design rights are more relevant than patents for most resident inventors in middle-income countries.
- These incentives, however, require that national IP systems have legal, administrative and judicial conditions in place to guarantee those rights to potential users of the IP system. Experiences of different IP offices provide principles to strengthen legal and procedural dimensions of IP including, notably, enforcement. Competition authorities also play a critical role in taming possible abuses of the system.
- The resources allocated to the IP system by government must be kept to reasonable levels, as the IP system partly competes with the innovation system for some of these resources (e.g. engineers who work as researchers in industry or as patent examiners). To ensure quality of the system while reducing cost, countries should seek to enhance international co-operation (e.g. common search and examination in patent offices of several countries).

Figure 1. Conceptual mapping for analysing IP for innovation



- In a development context, potential innovators face multiple challenges. These include substantial heterogeneities in productive sectors, in other words, a few "islands of excellence" – leading innovative firms, universities and/or sectors – co-exist with an often substantial informal sector and a large number of firms with low innovation capacities. Moreover, institutional weaknesses, scarcity in knowledge assets and multiple market failures characterize the context for innovation. These factors also shape the impacts that IP systems can have on innovation.
- Complementary policies adapted to specific development contexts are, therefore, critical to maximizing the contributions of IP systems. Such policies may include, for instance, providing capacity-building training or funding of joint firm-university research projects. Adapting national IP systems requires taking into account the specific characteristics and needs of informal and traditional sectors, catching-up and frontier businesses, and universities and public research institutes (PRIs). In order to support innovation, it is important that all groups have opportunities to effectively benefit from the national IP system.
- This means that priorities cannot be set in such a way that only legal and administrative conditions or complementary IP policies are implemented. Both are critical. Policy can initially target specific users and/or types of IP, focusing on those with the highest potential payoffs from IP. This, however, should not lead to the exclusion of groups from the IP system. Policy must avoid bias in IP system outcomes towards larger businesses, which would diminish the contributions of other types of actors to innovation.
- A high-level co-ordination body with a clear "IP for innovation" agenda can facilitate the design and implementation of IP policies in support of innovation. It should comprise both the various public institutions of the national IP system and its users, including private firms and businesses from different groups. Buy-in at the highest policy level is critical, as is the requirement for participating institutions to implement the decisions taken.

Analysing national IP systems of Colombia and Indonesia

Applying these principles to the study of national IP systems in two very different socio-economic and innovation contexts, Colombia and Indonesia, indicates a series of common challenges. This includes the following:

- IP policy rightly focused on ensuring that IP operations and procedures provided efficient, high-quality registration procedures, as well as on raising awareness among potential users about IP. However, IP is not an end in itself and more effort is required for its commercialisation. Particular challenges here concern the commercialisation of public sector IP and the provision of support services to help identify suitable IP strategies for firms and universities alike.
- The national IP system can help to strengthen the country's innovation system; however, it must be accompanied by a range of complementary policies. These include policies to encourage interaction among actors in the innovation system, address the weak skills base, and contend with shortcomings in the business framework, such as the limited opportunities for innovators to obtain external financing.

2. Study of Colombia's national intellectual property system

Colombia's context for IP and innovation

Since 2006, policy makers in Colombia have developed an intellectual property (IP) strategy oriented towards supporting innovation and national competitiveness. This has resulted in various reforms that have helped to improve the legal and administrative conditions of the IP system, and thus have created opportunities for the IP system to play a more prominent role in support of innovation. In light of these developments and with the current re-orientation of Colombia's innovation policy, this report provides recommendations to help support Colombia's IP policy for innovation at this critical stage.

In Colombia, recent years have seen the end of two consecutive decades of slow economic growth and an emerging middle-income market. Since 2000, average GDP growth has been 4.27% per year. Nevertheless, the country still faces many structural challenges. It remains one of the most unequal countries in the world and has suffered from ongoing internal conflict for more than 60 years. Productivity remains low because of poor quality of education, weak infrastructure, persistent informality and low governance levels. These factors also hinder innovation system performance. However, the current mineral sector boom provides new opportunities in this regard, as 10% of royalties will be dedicated to building up the innovation system, providing resources to strengthen skills, business-framework conditions, interactions and linkages. Meanwhile, large commodity-related foreign direct investment (FDI) inflows and exchange-rate appreciation are increasingly generating worries of Dutch disease.

The socio-economic context of Colombia and the characteristics of its innovation system are crucial to the capacity of IP to support innovation in the country. Colombia's good economic performance in the last decade, its strong macroeconomic discipline, its well-integrated trade environment and its increased national security, provide the right context for strengthening its innovation system, including its IP system, to enhance its contributions to innovation. Regarding its trade relations, Colombia has also substantially reduced tariffs and barriers to FDI and signed various free trade agreements including with the European Union (EU) and the United States. This has raised opportunities for accessing and tapping into knowledge from abroad. The incentives of foreign companies to engage in knowledge transfers will also depend on whether they perceive Colombia's IP system as one that provides them with sufficient legal security to protect their IP.

A small number of well-known universities produce qualified scientists and conduct research in an expanding higher education sector, while in the private sector a small cadre of innovation-oriented companies have grown to appreciate the benefits of innovation. A key implication for IP policies, particularly those based on patents, is that a focus on leading research institutions offers the greatest opportunities for success. This will also require engaging private actors to foster commercialisation and engage in efforts to develop licensing and markets for IP, as research institutions do not have the capacity for commercialisation. Given the weaknesses of private sector activities in innovation, foreign markets for IP might be particularly attractive outlets.

Colombia has a low-technology base and its share of high-technology product exports is low. Many private sector actors in low-technology manufacturing and services have been only modestly engaged in innovation activities and only slightly engaged in technology-based innovations. With such a low-skills base, patents will not be attainable for many actors in the innovation system.

Its biodiversity offers potential opportunities for inclusive economic development, in particular with increasing demand on international markets for natural products and developments in biotechnology. A focus on ownership and the access rights of genetic resources can be important in this specific context, as they determine how benefits are shared and enable their use for commercial purposes.

Colombia has low levels of industrial innovation, which need to be addressed. However, some sectors outside those traditionally considered as innovation-intensive can provide opportunities for developing innovation capacities. This includes extractive industries, which require innovation-based services adapted to local conditions. In fact, Colombia's most active patenting company is the state-owned firm, Ecopetrol. IP policy that is relevant for different actors in these sectors can be useful as a way to raise the contributions of IP to innovation, especially in conjunction with corresponding innovation policies. A focus on IP for industrial innovations in manufacturing alone might not be as useful.

Inequality is an important challenge for Colombia. Given that the informal sector employs about half of the labour force, the question of how to integrate groups commonly excluded from innovation cannot be easily dismissed. While IP policies are certainly not the primary solution, their importance demands that attention be paid to ways in which IP can support innovators in informal and traditional sectors, and provide a contribution to addressing this social challenge.

Several types of market failure constrain the performance of innovators in Colombia. These include limited access to capital for innovation and high barriers to business entry. While IP can provide powerful incentives, returns such as royalties will only arise for inventors who have successfully commercialised their inventions. This means that IP will only be used by those who are least affected by market failure, including access to capital and other barriers to entry, unless complementary policies can address these issues. Small entities such as universities and small businesses will face difficulties in obtaining returns from their inventions on domestic markets.

Colombia's national IP system

Organisation of the Colombian IP system

Colombia has comprehensive legal provisions in place that regulate IP. As a member of the World Trade Organization, the country has implemented obligations specified in the Agreement on Trade-Related Intellectual Property Rights (TRIPS). As a member of the Andean Community, Colombia has IP regulations that impose even higher standards in some cases than those stipulated by the TRIPS Agreement. Negotiations with the European Union and the United States have introduced some modifications regarding IP legislation. Colombia is also a signatory of major international IP treaties.

The starting point for a more co-ordinated policy approach to IP is the Colombian National Economic and Social Policy Council's (CONPES) document 3533 of 2008, which formulates an action plan regarding IP from the perspective of national competitiveness and innovation (CONPES, 2008). A central issue addressed is the decentralised nature of IP policy and the need for a co-ordinating body to introduce greater coherence regarding how IP is handled in Colombia.

This led to the creation of the Intersectoral Commission for Intellectual Property (CIPI) in 2010, an institution that functions as a co-ordinating body bringing together various institutions involved in IP policy making. Different governmental stakeholders have stated that CIPI has helped them to co-ordinate effectively with others and to identify a consensus on questions of IP in international negotiations. CIPI has provided an increasingly useful forum for discussion of IP-related topics. CIPI is, however, not formally connected to bodies in charge of promoting national competitiveness and innovation, such as the Commission on Competitiveness.

Table 1 provides an overview of all of the institutions involved in Colombia's IP system and their tasks.

Table 1. Colombia's IP system: An overview

Tasks/type of IP	Copyright	Plant variety protection	Industrial property
Co-ordination agency	Intersectoral Commission for Intellectual Property (CIPI)		
	Ministry of Trade, Industry and Tourism (MCIT) & National Planning Department (DNP)		
Policy design	Colombian Copyright Office, Ministry for Internal Affairs and Justice	Ministry of Agriculture and Rural Development	Ministry of Trade, Industry and Tourism (MCIT)
Administration of IP	Colombian Copyright Office	Colombian Agricultural Institute (ICA)	Superintendency of Industry and Commerce (SIC)
Foreign policy design	Ministry of Foreign Relations; Ministry of Trade, Industry and Tourism (MCIT)		
Enforcement	Colombian Copyright Office	Colombian Agricultural Institute (ICA)	Superintendency of Industry and Commerce (SIC)
	Attorney General, Customs Authority, National Police and others		
Entities in charge of supporting the IP system	Ministries of Culture; Agriculture and Rural Development; Trade, Industry and Tourism; Information and Communication Technologies; Education and others		
	Colciencias, SENA, collecting societies, Artesanías de Colombia and others		

Source: OECD based on CONPES (2008) incorporating institutional changes implemented since 2008.

IP operations and procedures

There are three institutions in charge of granting IP in Colombia: the SIC is in charge of industrial property, the ICA takes care of Plant Variety Protection (PVP) and Colombia's Copyright Office handles copyright and related rights. Each of these institutions falls under the authority of a different institution. The SIC is an autonomous institution, but is not self-financing (also the case for the other two IP offices); its activities are based on fees it collects for IP applications.

Reforms undertaken to improve IP operations and procedures include the following:

- The SIC is in the process of digitising all national documents to permit quicker searches of national and international documents. The Colombian Copyright Office is working to provide all information online by early 2014.
- The fees charged were judged to be too high by some universities and small businesses. In response to such complaints, the SIC has recently revised its fee policy. Substantial discounts for patent, trademarks and other types of IP are provided for small businesses, universities, individuals with limited income and non-for-profit organisations. Trademark fees were also reduced by more than 33%

after an international comparison indicated that fees were high by international standards.

- The SIC has recently engaged in efforts aimed at raising the legal quality of its examination process. Measures to improve quality include the drafting of examination manuals to standardise examination criteria and capacity-building for examiners. Another recent modification has been to increase acceptance rates for patents from a previous high-refusal regime.
- A further challenge for the SIC concerns ways to process IP applications more quickly. In addition to efforts aimed at fostering automation, the SIC has out-sourced some of its studies on patentability, a step that has helped reduce processing times. Additional resources and staff hired to deal with backlogs have also helped to substantially reduce the times needed for processing IP. Moreover, the commitment taken by the SIC to compensate applicants if processes take longer than legally stipulated is a useful measure to raise users' confidence in the IP system.
- Finally, the SIC co-operates with IP offices in other countries to improve examination procedures. An example of such co-operation is the PROSUR initiative, which aims to improve services to local and international users of the IP system, initially through sharing patent examination results.

The possibility to apply for IP protection online can lower some application costs, particularly for actors not based in Bogotá. Online application for trademarks and copyright registration has been very useful in this respect. There are also plans to allow online patent applications. However, this does not fully compensate for regional IP services.

All stakeholders in the IP system agree that substantial shortcomings in the judicial system weaken IP enforcement. The underlying causes are insufficient training of lawyers on IP matters and overload of the judicial system. In response, all IP offices have been given jurisdictional roles allowing them to act as courts of first instance with regard to IP litigation.

Finally, lack of awareness on IP issues is widespread among institutions in charge of the legal and administrative aspects of the IP system and users. Various efforts are underway to address those shortcomings.

IP, markets and diffusion

Licensing and markets for IP are weakly developed in Colombia, as the innovation capacities of the private sector are not strong. However, a few institutions have been instrumental in improving the state of development. Competition is a major issue in Colombia as some leading actors exercise significant monopoly powers. In such contexts, IP will not incentivise innovations. The main challenge, however, is an institutional one, as the SIC is at once an IP-granting institution and the competition authority, leading to a potential conflict of interest.

Users of Colombia's IP system

Colombian residents are relatively weak users of the IP system in general and of the patent system in particular. Colombia ranked 58th internationally out of 105 IP offices (in 2011) in terms of the number of patent applications, and the country's performance is equally weak if applications are ranked by population or GDP. The list of top 10

Colombian patent applicants during 2007-11 reflects the concentration of leading research capacities in the selected universities with four listed in the ranking. While its nationals make greater use of utility models and trademarks compared to patents, the absolute application numbers are equally low.

Innovators in traditional and informal sectors

Colombia's experience with GI is relatively recent. A major challenge for making GI work has often been the lack of effective producer associations with the ability to support GI effectively. The major exception is "Café de Colombia", managed by the Federación Nacional de Cafeteros, which has succeeded in creating a commercially successful IP strategy.

Colombia is a country with considerable biodiversity and substantial cultural diversity over its large territory. At present, no database has been created to document Colombia's traditional knowledge, a step that might further help promote its economic use to the benefit of the different groups that own such knowledge. Colombia also lacks a sufficiently articulated domestic industry capable of exploiting the country's biodiversity.

"Catching up" firms and leading "frontier" businesses

It is worth noting that in 2012 about two-thirds (65.6%) of applications for utility models in Colombia were filed under the provision of discounts (i.e. they were filed by small entities including small firms and universities). Numbers are, however, still low. The experience with discount rates in Colombia has also shown that the application of discounts as a means to substantially increase application rates has limitations. Financial constraints are not the only constraining factors. In fact, most small and medium businesses in Colombia consider IP to be irrelevant for their activities and accessible only for large firms. Often firms are unaware as to what type of knowledge they should seek to protect and how they should go about doing so. This is a common perception noted by various governmental institutions that have engaged in awareness-raising campaigns aimed at modifying these views.

Few Colombian companies have sought international IP applications via the PCT procedure or applied for patents in Europe, Japan or the United States. However, several leading and frequently large businesses in Colombia now support internal processes to promote the importance of IP. In many cases, global competitors raised awareness among national companies of the relevance of IP to their operations. A key challenge has been lack of recognition of the importance of innovation. The tendency is to see investments in research as a cost rather than as a long-term investment in competitiveness. Such a long-term strategic perspective is necessary, however, to ensure the success of a patent and innovation-based business strategy.

Some voices in the private sector have raised concerns about certain public IP support programmes aimed at improving companies' IP performance (e.g. by offering deductions in fees). Some of these required applicants to provide detailed technical information in their submissions, but provided no guarantees that the information would be treated confidentially. Since the selection process involved peer reviews, some applicants believed that their competitors could review the technical information. The high rejection rate for applications further reduced the perceived benefits for industrial applicants. Another concern raised by private businesses is that project approval is very slow, which is a challenge as technical project proposals might become obsolete. Discussions are

currently underway to change the programme requirements so as to render it more appealing to private sector applicants.

Public research institutions and universities

There is wide agreement among observers that lack of incentives precludes researchers from filing IP applications. Currently, researchers in universities and public research institutes receive much larger returns for publications than for IP titles and their commercialisation. However, all universities are free to negotiate shares of IP royalties with their researchers. While researchers were initially not overly interested in obtaining IP, this attitude is now changing in some leading institutions.

Moreover, the commercialisation of IP from public universities faces a major challenge: researchers, as public sector officials, cannot claim sources of income other than their salary and, therefore, cannot engage in spin-offs. Some officials from public universities expressed a concern that these constraints might lead the best researchers to depart for the private sector, thus weakening the quality of research at public universities. The question of spin-offs also needs to be addressed by private universities in that the law on non-profit organisations, which applies to Colombia's private universities, stipulates that they cannot create for-profit activities. Notwithstanding those challenges, a few spin-offs have been created.

Institutional support is critical for commercialisation and the creation of technology transfer offices (TTOs) is on the agenda of many of Colombia's leading research institutions. The question of how to create a sustainable business plan for TTOs still remains to be addressed, however. Overall, university bodies in charge of IP are still young and rely on limited resources. In this context, the "Network for the Management of Intellectual Property" (Redes de Manejo de la Propiedad Intelectual para el Fortalecimiento de la Capacidad de Investigación) project has helped to exploit economies of scale at a sector level. The project has created four networks composed of research institutions in the sectors of health, agriculture, industry and energy, as well as defence.

One fundamental challenge to commercialisation is the limited nature of partnerships with the private sector. A more structural constraint for further co-operation is the weak innovation capacity of the private sector in Colombia. Only a few firms have the capacity to effectively engage with universities. The private sector also identified challenges for co-operating with universities to commercialise university IP.

Recommendations for Colombia

Main lines of policy action

The national IP system in Colombia can help to strengthen the country's innovation system; however, it must be accompanied by a range of complementary policies. These include policies to encourage interaction among actors in the innovation system, address the weak skills base, and contend with shortcomings in the business framework, such as the limited opportunities for innovators to obtain external financing and the substantial transportation costs to reach markets given inadequate infrastructure.

Substantial delays in processing IP litigation and a lack of relevant knowledge on the part of judges have acted as constraints on the effectiveness of the IP system. To help remedy this weakness, IP offices were granted judicial powers in 2012, but this approach

must be complemented by corresponding resource decisions and continued efforts aimed at improving efficiency if it is to be effective. Efforts aimed at improving the quality of IP examinations while reducing delays in processing should continue, so as to reinforce recent achievements by the SIC. In addition, provision of regional IP services, particularly in regions where industrial capacities are strong, can encourage use of the IP system outside of Bogotá. Furthermore, provision of online information on IP application procedures and effective use of IP by businesses can support these efforts, but should be complemented by capacity-building efforts, otherwise uptake is unlikely to increase substantially.

Colombia's private and public universities have begun to define IP policies to support commercialisation efforts. However, the fact that public sector officials cannot operate spin-offs impedes the ability of public universities to engage fully in commercialisation activities. This restriction is of particular relevance, as researchers do not receive substantial rewards as part of their salaries for obtaining or commercialising IP. Similarly public programmes aimed at supporting the use of IP have to be streamlined to allow them to play their intended role.

Focusing IP awareness and capacity-building initiatives on national actors with the strongest potential for obtaining revenue-generating IP can bring the highest payoffs for Colombia's innovation system. Moreover, geographical indication (GI) and trademarks have formed the basis of the successful "Juan Valdez" brand. Replicating its success for other products requires complementary policies aimed at building effective collective associations. Engaging in such efforts for a selected set of products is preferable to expanding the number of GIs with the limited support of such associations.

Moreover, support for specialised services such as TECNNOVA, which conducts technology screening, is important as it enables Colombia's innovators to take advantage of information on technologies contained in patent application files, and thus promotes the "catching-up" process.

Finally, the success of Colombia's IP co-ordination body, CIPI, in co-ordinating enforcement issues should be capitalised upon with the creation of an institutional setting that would empower CIPI to implement an "IP for innovation" agenda. Regarding the institutional context for Colombia's IP policy, the proposal to create an autonomous industrial property institute that deals exclusively with industrial property is an attractive option. Such a body could work to ensure that IP questions are given sufficient focus and that the roles of competition and IP granting authority are clearly separated, as would be the case if implemented by separate institutions.

Specific recommendations for Colombia

Connecting IP policies to innovation policies

1. IP can be a powerful support for innovation systems, but it is critical for Colombia to implement complementary innovation policies to strengthen its innovation performance.
2. Colombia's Intersectoral Commission for Intellectual Property (CIPI) could play a significant role in pushing the "IP for innovation" agenda forward. Success will require an explicit focus on innovation, involvement of the private sector, high-level policy buy-in and the implementation of decisions by the relevant public entities.

3. Colombia should consider creating an autonomous industrial property institute to deal exclusively with industrial property.

Legal and administrative conditions of IP systems

4. Colombia's IP offices will need adequate resources and staffing to carry out their new jurisdictional powers and must seek efficiency improvements where possible.
5. Efforts aimed at reducing backlogs need to continue.

Adapting IP systems to users

6. Simplified IP application procedures and fee discounts can have more substantial effects if combined with innovation support policies.
7. It is important to create regional IP services to incentivise the wider use of IP and to help enhance the role IP can play in plans aimed at fostering regional S&T and innovation capacities.
8. IP policy should address regulatory constraints faced by researchers in public universities and support services provided by external institutions such as TECNNOVA to help universities reach out to the private sector.
9. IP awareness and capacity-building initiatives should focus on national actors with the strongest potential for obtaining revenue-generating IP, as these can bring the highest pay-offs for the innovation system.
10. Colombia should support "technology screening" services that help firms and universities to take advantage of information on technologies contained in national and international IP application documents in support of research with higher potential economic payoffs.
11. Colombia should continue efforts to support GIs by investing in building associations for selected high-potential GIs, rather than expanding the number of GIs.
12. In order to create opportunities for economic development based on its biodiversity, Colombia should not only focus on ownership rights and access conditions, but should also seek to support the development of a sufficiently articulated domestic industry capable of exploiting those opportunities.
13. It is useful to consider how policy can support the use of IP in sectors where Colombia has comparative strengths, including extractive industries.
14. Colombia's IP policy should not only focus on patents, but also, depending on the business activity, on trademarks, design and utility models. Colombia should address the weak use of utility models.
15. Opportunities for filing and exploiting IP abroad for some leading inventions should be supported further, as this can encourage funding (foreign income and capital) to support innovation in Colombia.
16. Simplifying and shortening application procedures and accommodating concerns over sharing critical information about inventions in information requirements could heighten the impact of support schemes aimed at encouraging the use of IP.

3. Study of Indonesia's national intellectual property system

Indonesia's context for IP and innovation

Indonesia is the fourth most populated country in the world with 237 million inhabitants. Its GDP places it among the top 20 countries in the world. In 2001-12, a timeframe which includes the Global Financial Crisis, the country's average annual growth rate was 4.3%, compared to a much lower average of less than 1% for OECD countries during the same 11-year period. Moreover, its growing domestic market and solid base in one of the world's most dynamic regions offers many opportunities for further growth. This, however, requires addressing a series of challenges, including huge infrastructure gaps, substantial pockets of poverty, and a weakly articulated and poorly performing innovation system.

The socio-economic context of Indonesia and the characteristics of its innovation system are crucial to the capacity of IP to support innovation in the country. Southeast Asia is one of the world's most dynamic regions, exceeded only by East Asia. Europe, Latin America and North America have lagged behind. Indonesia's recent growth experience follows this dynamic, regional trend, while its huge, growing domestic market offers significant opportunities for future national growth. This performance will continue to attract foreign companies to the Indonesian market and, thus, provide opportunities to draw on their technological expertise (e.g. by seeking licensing arrangements). However, incentives for foreign companies to engage in transfers will depend on their perception of the local IP system and the level of legal certainty it offers them.

While innovation has played little role to date in Indonesia's growth, there has been an improved contribution of total factor productivity (TFP) to output growth. In addition, there are indigenous pockets of concentrated S&T and R&D expertise, especially in the public sector where most expenditure on research occurs. A small number of well-known universities produce qualified scientists and conduct research in an expanding higher education sector, while in the private sector a small cadre of innovation-oriented companies have grown to appreciate the benefits of innovation. A key implication for IP support policies, particularly those based on patents, is that a focus on leading public research institutions offers greater opportunities for success in Indonesia. This will also require engaging with private actors for commercialisation. Given the weaknesses of established private sector activities in innovation, commercialisation of the most advanced technical inventions produced by public research institutions should go hand-in-hand with entrepreneurship policy (e.g. science parks), and might sometimes target foreign markets.

Indonesia is very slowly moving away from a low technology base with a low share of high-technology product exports and an increasing reliance on imports of these goods. Many private sector actors in low-technology manufacturing and services have, to date, only been modestly engaged in innovation activities and very few are involved in technology-based innovations. This means that patents will not be attainable for many actors in Indonesia's innovation system, as they lack the needed research capacity. However, this is less the case for utility models, design rights and trademarks.

Poverty and inequality are key challenges for Indonesia. Given that the informal sector in Indonesia employed 68% of the population in 2009, the question of how to integrate the contributions of this sector, which is commonly excluded from innovation, cannot be easily dismissed. While IP policies are not a solution to poverty and inequality,

addressing these challenges can be facilitated by mobilising IP, which offers potential opportunities for innovators in informal and traditional sectors.

Several forms of market failure affect innovation performance in Indonesia: weak infrastructure, bureaucratic inefficiencies and limited access to capital for innovation. While IP can provide powerful incentives, in practice, incentives are provided to inventors who have successfully commercialised products. This translates into IP systems that only provide incentives to those less affected by product and factor market failures, such as large companies, unless complementary policies are used to address market failures. It is important, therefore, to focus on how IP support policies can ensure benefits for "catching-up" firms. This requires a focus on commercialisation.

Indonesia has multiple traditional industries and a rich repository of traditional knowledge, some of which (e.g. bhatik, handmade furniture and traditional medicines) can offer opportunities for developing innovative markets with additional opportunities on international markets. Developing these industries can also provide opportunities for a more inclusive development strategy in Indonesia. IP policy needs to focus on the requirements of these sectors, as well as on potential challenges they might face in their development.

Indonesia's national IP system

Organisation of the Indonesian IP system

Indonesia has introduced a variety of patent regulations designed to protect IP and stimulate innovation. Significant changes to Indonesia's IP legislation were made in 1991 and again after 1995, when Indonesia became a member of the Trade-Related Intellectual Property Rights (TRIPS) Agreement upon its accession to the World Trade Organization (WTO). A few legislative processes for drafting and approving the regulations for implementation are still pending, including for licensing, which remains an area of legal uncertainty. Indonesia is also a signatory of major international IP treaties.

At least 10 ministries are responsible for various aspects of IP policy making in their respective fields. The co-ordination mechanisms bridging between ministries and bodies involved in IP policy for innovation are, similarly to those for innovation policy, rather weak. The only formal instance of inter-ministerial co-ordination is the Task Force for IP Enforcement which focuses on a narrow dimension of relevant IP policies related to enforcement and raising awareness about IP.

IP operations and procedures

The institution in charge of granting and promoting the use of industrial property rights and copyright in Indonesia is the Indonesian Directorate General of Intellectual Property Rights. DGIPR is not self-funded, and the resources it generates are transferred to the Ministry of Finance, which returns some of the revenue to the DGIPR for its operations. It faces several challenges:

- It needs to gain public trust in its integrity, principally by emphasising that no surcharges or illegal charges are permitted during the registration process.
- DGIPR also lacks a comprehensive database to support examination processes and regional coverage is challenge in Indonesia.

- The current patent publication system and access to service of DGIPR are not very user friendly and actually impede access to IP information.
- Application fees for different types of IP are set by Presidential decree. Special rates for SMEs are applied for industrial designs, layout and integrated circuits. These applicants pay about half the rate paid by other applicants.
- Regarding the speed of registration several users of the system have indicated registration processes are overly long.

Indonesia has engaged in many types of international co-operation in support of its IP system. In addition to WIPO, the DGIPR has received external support from India, Japan and Switzerland.

Enforcement of IP is more generally considered a challenge. However, two relatively recent reforms can help strengthen the quality of enforcement:

- DGIPR is now involved in the fact-finding phase of the patent infringement process.
- In April 2012, the Ministry of Law and Human Rights established the Arbitration and Mediation Agency for IP rights.
- Indonesia has also significantly improved its legal framework to combat counterfeiting and IP violations.

IP, markets and diffusion

One of the crucial factors for strengthening licensing opportunities and markets for IP is a framework to enhance public-private partnerships. In addition to limited linkages in Indonesia's innovation system, IP laws do not promote such collaboration. Currently, the country has only a handful of agencies that promote commercialisation processes, such as the Indonesian Agricultural Research and Development Institute for Agricultural Technology Transfer. Interestingly, an open-source software movement supported by the public administration has been growing over the last decade.

Users of Indonesia's IP system

Indonesian residents are relatively weak users of the patent system, compared to more developed countries and regional competitors. In comparison, trademarks and design are used more, possibly (for the latter) reflecting greater dynamism among services industries. Utility models, however, are only used moderately compared to neighbouring countries such as the Philippines and Thailand.

Innovators in traditional and informal sectors

While traditional "bhatik" textiles and traditional furniture have export potential, only a few furniture manufacturers or bhatik factories have developed successful branding strategies. Traditional producers are often not aware of business opportunities based on product differentiation and branding. Moreover, the widespread perception of limited enforcement of trademarks, trade secrets and industrial design rights weakens incentives. Also, industry associations are not actively involved to support firms that are generally small, have limited resources, and lack sufficient skills to develop and implement these strategies on their own.

Indonesia is richly endowed with natural resources and enormous diversity and a joint database on traditional knowledge is now being developed across several ministries and organisations, including RISTEK, LIPI, the Ministry of Agriculture (genetic resources) and the Ministry of Education (traditional knowledge and traditional cultural expressions). Little has been done to date to stimulate the use of such knowledge and folklore for economic purposes. Copyright management organisations (CMOs), for example, can facilitate folklore and artistic creations by providing access to copyright materials at competitive prices and offering adequate rewards to those owning the copyright, both of which constitute incentives for innovative businesses. Indonesia has two related organisations, one for music and one for books, both of which were created in 2002.

"Catching-up" businesses and leading "frontier" businesses

Special measures have been taken to meet the needs of SMEs, raise their IP awareness, diffuse knowledge about the variety of IP instruments, lower the cost and time for application, and encourage firms to develop IP strategies. Nevertheless, IP awareness among SMEs is low despite awareness-raising campaigns by the Ministry of SMEs and the DGIPR.

With regard to leading "frontier" businesses, to date, only a few national companies have filed patents through the PCT.

Research institutions and universities

Although some research institutions have rules specifying the percentage of royalty income that researchers can receive, they cannot implement them because of a lack of implementation regulations concerning licenses and royalties. All income generated from publicly funded projects has to be returned to the Ministry of Finance. This system has undermined incentives, as it denies researchers any potential monetary returns from commercialisation of their inventions. Many bodies involved in supporting IP recognise the importance of progress on this issue.

Some public schemes provide incentives to researchers to file for IP and patents, in particular. Certain well-intentioned simple support schemes for researchers to file patent applications have led some researchers to file low-quality patents in order to receive support without incurring overly high costs. This is a consequence of a system where filing the application itself is rewarded regardless of the granting, because researchers have neither the incentives nor the opportunity to seek commercialisation. The returns for the innovation system of these grant schemes are, consequently, relatively low.

Additional challenges include relatively high fees for patents and patent maintenance, which research institutions often do not make available to researchers from their short-term budgets. Short-term budgetary allocations are also hindering potential commercialisation, as funding for projects is likewise limited to short time periods, and does not extend over the full product development life cycle. In addition, constraints on research budgets act as major disincentives to researchers.

For certain institutions, quality of research is not sufficiently high to obtain IP. This is not an issue IP policy can address, and efforts must aim at supporting research infrastructures and increasing the number of highly skilled researchers. In some cases, however, research lacks sufficient novelty because researchers do not take sufficient account of the existing state of the art.

In Indonesia, universities and public institutions could benefit far more from the innovation system if they enabled researchers to commercialise their inventions. This issue has occupied public authorities for more than a decade. Law 18/2002 states that public research institutions should establish TTOs in accordance with their capacities and abilities. Some leading governmental research institutes and universities, including the National Nuclear Energy Agency of Indonesia (BATAN), the Agency for the Assessment and Application of Technology (BPPT), the Bogor Agricultural Institute (IPB), LIPI and the Ministry of Agriculture, have set up TTOs, which have also played a role in supporting the successful IP track records.

The organisational structures in most research organisations in Indonesia do not yet meet up to the standards set by leading institutions and stipulated by Law 18/2002. The evidence suggests that only a few institutions had a TTO. Not all of these were fully institutionalised within the organisational structure, and a substantial share, especially from the public sector, were ad hoc in nature. The majority of IP centres supported socialisation (i.e. awareness) and registration activities. Only a few were engaged in commercialisation activities. IP centres had not developed independent sources of funding and relied on tight and varying budgets received from their institutions. The available resources were often insufficient in terms of available workspace and ICT infrastructure and staff. Practices regarding ownership of IP varied across institutions, both within and across private and public institutions.

Recommendations for Indonesia

Main lines of policy action

Indonesia's IP system has to be complemented by other innovation policies to boost the country's innovation policy; however, reform of current IP policies could strengthen the innovation system.

Regarding operation of the IP system, efforts aimed at automating procedures to increase the processing efficiency of IP applications should be a priority, as lengthy delays weaken incentives. The new Arbitration and Mediation Agency created in 2012 is a positive step towards reducing enforcement costs and needs to receive the necessary political support to ensure its success. Policy steps also have to be taken to avoid the potential exclusion of smaller entities, as well as businesses in remote geographic areas, because of barriers of access to the IP system. Such steps can involve differential pricing strategies and the provision of online and regional services.

Policies should also encourage the use of IP by national actors, including the launch of IP awareness and capacity-building initiatives. However, policies should focus on those actors with the greatest potential for earning revenue-generating IP, as this will ultimately generate the highest payoffs to the country's innovation system. Incentive schemes should give researchers a stake in the returns from their inventions, by rewarding most those who commercialise inventions with high industrial applicability. This requires resolving legal uncertainties regarding the licensing of IP generated from public funding sources. Since obtaining IP alone does not generate value unless it leads to innovation, Indonesia's IP policy should take further complementary steps to support their commercialisation.

It is worth emphasising that a different mix of IP compared to that of OECD countries would serve Indonesia best. Trademarks, design rights and utility models will better serve a larger group of innovators, since only a small number have the capacity to seek patents.

Embracing "new" types of IP, such as traditional knowledge, genetic resources, folklore and geographical indications (GIs), will be attractive for Indonesia, but these need to be used to generate value if they are to serve the innovation system. IP in agriculture is another priority and should be explored and developed much further. In addition, some leading research institutions should examine the opportunities of IP abroad, as foreign markets can provide higher returns for Indonesian inventions, especially as domestic markets for IP are weak.

To achieve these objectives, the country's IP policy has to undertake a more coherent approach involving the various actors of Indonesia's innovation governance system, particularly if the system is to support innovation performance. Indonesia can also further optimise its innovation and IP policies by sharing IP best practices with other countries.

Specific recommendations for Indonesia

Connecting IP policies to innovation policies

1. IP can be a powerful support to Indonesia's innovation system, but implementation of complementary policies is crucial to strengthen innovation performance.
2. Indonesia's IP policy should emphasize effective co-operation with the actors in Indonesia's innovation governance system with an explicit focus on innovation and high-level policy support.
3. Additional efforts aimed at increasing exchanges on IP policy with experienced policy makers and country experts can help enhance policy impacts.

Legal and administrative conditions of IP systems

4. Indonesia can increase the efficiency of IP application processing by prioritising automation. The quality of the examination process should also be improved.
5. The new Arbitration and Mediation Agency created in 2012 must receive the necessary policy support to operate effectively and support the IP system.

Adapting IP systems to users

6. Expanding the provision of online and local IP services would help attract new users from regions other than Jakarta.
7. Focusing IP awareness and capacity-building initiatives on national actors with the strongest potential for obtaining revenue-generating IP can bring the highest payoffs for Indonesia's innovation system.
8. Indonesia has to adopt a scheme whereby public sector researchers receive a share of returns from their inventions. Resolving the current legal uncertainty about licensing of IP generated from public funding sources should be made a priority.
9. Indonesia's IP incentive policy has to shift away from a "quantity" approach towards a "quality" approach, as the current focus on quantity generates effects that are counterproductive to strengthening the IP and innovation systems.
10. Indonesia's IP policy should take further complementary steps to support the commercialisation of inventions by public research institutes. It should provide support for shared TTOs and replicate successful commercialisation experiences in other national institutions.

11. Indonesian IP policies aimed at helping small companies should be complemented by policies supporting these firms' capacity to innovate.
12. IP policy should further support technology-screening services that help firms and universities take advantage of information on technologies contained in national and international IP application documents.
13. IP related to traditional knowledge, genetic resources, folklore and GI is particularly relevant for Indonesia. Policy should encourage communities to generate economic value based on their assets, as these uses will bring the biggest payoffs.
14. Depending on the activity, trademarks, design and utility models can involve a larger group of innovators. Therefore, Indonesia should address the weak use of utility models by residents. Unregistered design rights can also be a way to support SMEs in fast-moving industries such as fashion. Moreover, exploring opportunities for IP in agriculture should be a priority.
15. Opportunities to file and exploit IP abroad for some leading inventions should be supported further, since this can raise resources (foreign income and capital) to support innovation in Indonesia.

Chapter 1

Analysing the national intellectual property systems of developing and emerging countries

This chapter defines a framework to provide guidance on conducting country analyses for national intellectual property (IP) systems in middle-income countries with the aim of defining policy recommendations to promote innovation. It concludes that national IP systems can support innovation in these countries by creating exclusive rights for different groups of users. IP systems have to have legal and administrative conditions to guarantee those rights. Moreover, economic development contexts are characterised by multiple market failures where leading innovative firms and universities co-exist with a substantial informal sector and a large number of firms with low innovation capacities. If different users are to benefit from the national IP system, complementary support policies are needed as well as a focus on types of IP beyond patents. Successful reforms of national IP systems will also depend on a high level of co-ordination to implement an effective IP for innovation agenda.

1.1. Aim of the framework

Purpose

The purpose of the framework presented in this chapter is to facilitate analyses of national intellectual property (IP) systems for countries, at different stages of development, with a view to identifying policy priorities that support innovation. The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) and various free trade agreements (FTAs) have led to the strengthening of IP systems in most countries. The starting point for the framework, then, is how existing IP systems can best be mobilised for innovation.

In order to achieve this objective the framework has set four objectives:

1. **Map the full set of actors, conditions, policies and interrelationships that matter for IP systems and their contributions to innovation.**

   Intellectual property is a potentially very powerful tool for innovation policy for countries at different stages of development. However, the complexities of the topic, including its legal components, frequently result in superficial treatment of IP in country-based analyses of innovation policy. Existing studies of IP systems often emphasise strongly procedural and legal aspects without fully embracing the innovation context. It is, however, the interrelationships of the IP system with complementary innovation policies that will shape conditions for success, particularly in a development context. For instance, discount rates for IP applications from universities alone will not guarantee that those inventions will result in innovations. More needs to happen, in particular, private businesses with the capacity to exploit such knowledge play a critical role, and innovation policy can help to foster their capacities so as to foster the commercialisation of IP generated by universities. Assessing the contributions of national IP systems to innovation, therefore, requires a focus on the full set of actors of IP and innovation systems and the conditions they face that affect their innovation performance.

2. **Incorporate the development dimension into discussions of IP.**

   Policy impact depends on making development challenges a key focus of analysis. Intellectual property has been studied extensively, but often without consideration of how different development contexts explicitly shape conditions for innovation. Such abstraction hinders the design of adequate policy recommendations on IP for innovation. This is because several contextual features, such as university-industry networks and limited markets for access to finance for innovators, are often particularly pronounced in development contexts, and shape how IP systems support innovation. For instance, as discussed above, intellectual property is only one of several critical components needed in support of the commercialisation of inventions generated by public research. Therefore, other factors – such as limited capacities of the private sector to commercialise those inventions – if left unaddressed, lead to limited or, in extreme cases, no impacts of IP systems.

   It should be noted that the framework is by no means a "one-size-fits-all" theory for developing and emerging countries. Instead, it emphasises some critical components of emerging innovation systems that, if existent in the country of analysis, require specific adjustments of IP policies for them to support innovation.

3. **Focus on national IP and complementary policies.**

   The purpose of the framework is to help identify options for national IP policies and complementary policies to support impacts for innovation. This is not to disregard the international dimensions of IP policy, which the framework does make reference to. There are, however, multiple fields of action for national policies which can make a substantial difference to the success or failure of an IP system to support innovation. As such, the framework makes these policies its explicit focus.

4. **Describe policy principles emphasising priorities, trade-offs and compatibilities of policies.**

   The framework also defines a set of policy principles for IP policies and complementary measures. The purpose is not to draw policy conclusions for all emerging and developing countries. Rather, it provides principles to be applied to specific country contexts so as to allow for country-specific policy conclusions. In addition, it discusses which priorities should be set when it comes to implementing policy recommendations. Since a flat catalogue of policy recommendations can challenge their implementation, it also discusses trade-offs and the compatibility of IP policies with the wider set of innovation policies.

Thematic coverage

The framework takes innovation as its focal point in analysing IP systems. It, therefore, focuses essentially on how IP systems affect domestic industry. That is, the focus is on users of the IP system in the production sector, not on end consumers. The purpose is to review the policy arsenal at the disposal of developing countries with regard to IP. The framework aims to be comprehensive in its coverage of themes since incomplete coverage does not allow for an adequate evaluation. However, given its focus on supporting domestic industry, the framework addresses issues of access only to the extent that they directly relate to innovation. The framework focuses only on the impacts of technology transfer on these users. In consequence, other important IP issues such as access to drugs and green technology are not within the scope of the framework.

Moreover, the framework emphasises topics that are not commonly the focus of IP policy. The objective of this framework is to better reconcile IP policies from the perspective of innovation; therefore, it has adopted a strong emphasis on complementary factors. This emphasis reflects the observed disconnect between IP and innovation policies that undermines potential impacts IP systems could have, but consequently fall short of. While it also covers questions of enforcement and operations, these are treated with less detail given their detailed discussion elsewhere, and the widespread understanding of required policy changes to address those challenges.

The topics discussed by the framework cover a wide area. They have been extensively discussed and have benefited from varied policy experiences across many countries. In order to provide a concise treatment of the main themes, the document does not provide detailed accounts of those discussions and experiences. The relevant IP policy experiences of Colombia and Indonesia are discussed in detail in subsequent sections. Additional details on specific themes are provided as part of the OECD-World Bank Innovation Policy Platform's Intellectual Property Rights module.

Country coverage

The aim for this framework is that it may be applied to different country contexts. It provides a better basis for analysing development contexts than more generic frameworks. There is obviously no clear line of separation between developed, emerging

and developing countries and, indeed, substantial differences exist between these countries. At the same time, many of the conclusions will be valid in developed country contexts to the extent that they share some of the challenges (e.g. weaknesses of industry-university networks), although most will not apply to the same extent. These conditions are discussed below. It is the purpose of specific country studies to identify the most relevant shortcomings and draw relevant policy implications. Obviously some contexts are very different: while these cannot be described by income only, as an approximation it is probably adequate to say that the types of contexts that form the object of this study describe the range of middle-income countries, but less so that of low-income countries.

1.2. National IP systems and innovation in a development context

Overview of the national IP systems

This section provides an overview of national IP systems and the impacts of the development context. National IP systems can be defined as the set of institutions, rules and bodies involved in the design, implementation and enforcement of IP in a national economy. Figure 1.1 illustrates the IP system in a conceptual map. The nodes indicate the various issues (concepts, mechanisms or actors) to be addressed, while the boxes indicate issues that belong to the same theme. The structure provides the basis for the Intellectual Property Rights module of the OECD-World Bank Innovation Policy Platform.

Box 1.1. The relevance of different types of IP for innovation

Patents are often discussed in the context of innovation. However, as shown in Annex Table A.1, other types of IP are equally closely related to innovation activities, including non-traditional innovations in sectors other then manufacturing. Trademarks, for instance, can be useful for non-technological innovations in the service sector by providing brand names to clearly distinguish such products for consumers. The filing of new trademarks partially reflects the introduction of new products and can help improve conditions for appropriating returns on innovation, whenever other means are not effective, or extend or expand protection provided by other types of IP (Mendonca et al., 2004, Millot, 2009). Utility models, trademarks and design are more relevant than patents for residents in various middle-income countries. One imperfect indication of this is the fact that the national-to-foreign application ratio is lowest for patents compared to other types of IP for various developing and emerging countries (Table 1.1).[1]

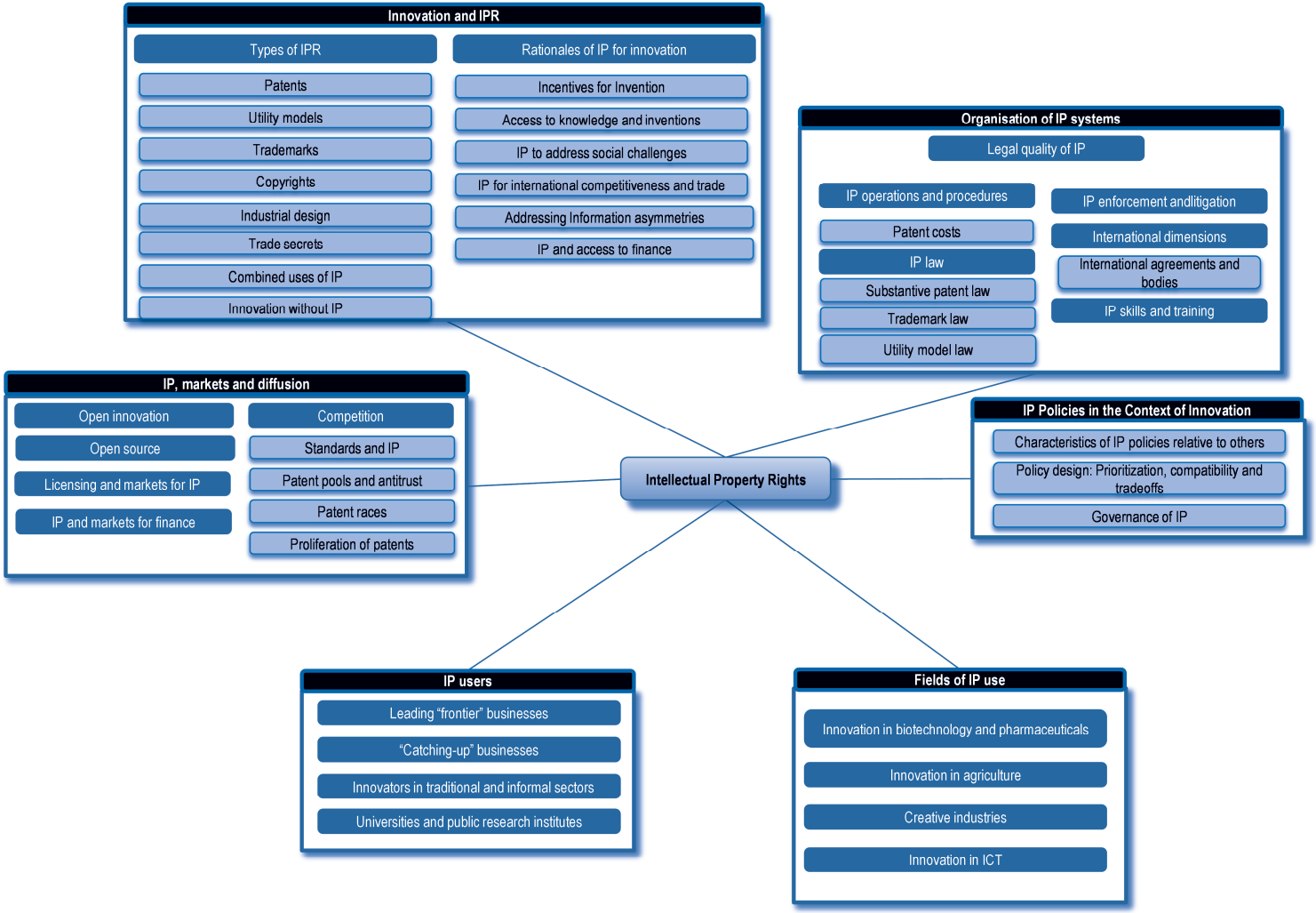
Table 1.1. IP applications by IP office, broken down by resident and non-resident (%), 2011 or latest available year

	Patent		Utility model		Trademark		Design	
Office	Resident	Non-Resident	Resident	Non-Resident	Resident	Non-Resident	Resident	Non-Resident
Indonesia (2009 for design data)	9%	91%	81%	19%	95%	5%	79%	21%
Malaysia	17%	83%	56%	44%	45%	55%	40%	60%
Philippines	6%	94%	94%	6%	57%	43%	48%	52%
Thailand	24%	76%	92%	8%	60%	40%	77%	23%
Brazil (2010 for all)	12%	88%	97%	3%	82%	18%	70%	30%
Chile	12%	88%	76%	24%	68%	32%	11%	89%
Colombia	9%	91%	92%	8%	58%	42%	38%	62%
Ecuador (2010 for all)	1%	99%	41%	59%	54%	46%	32%	68%
Mexico	8%	92%	89%	11%	71%	29%	46%	54%
China	79%	21%	99%	1%	92%	8%	97%	3%
France	87%	13%	42%	58%	92%	8%	95%	5%
Germany	79%	21%	80%	20%	88%	12%	89%	11%
Japan	84%	16%	79%	21%	78%	22%	87%	13%
United States	49%	51%			84%	16%	57%	43%

Source: WIPO Statistics Database.

1. Note that the ratio is also affected by differential payoffs to IP and is, therefore, an imperfect indicator.

Figure 1.1. Conceptual mapping for analysing IP for innovation



It is critical to start with an assessment of innovation and IP where the key dimensions are the different types of IP (Box 1.1) and the ways in which they relate to innovation, as well as the rationales for using IP to promote innovation (Annex A).

The following elements describe the relevant dimensions of the IP system for analysis:

- Various aspects concern the *organisation of IP systems*. Key issues here are: the legal provisions set for IP ownership (as established by substantive patent law for patents); the operations and procedures of the IP system; the conditions for enforcement of IP rights; international agreements regarding IP that countries have agreed on; and IP skills and training on both the public administration and user side. These are critical for the "legal quality" of the IP system, which determines whether IP ownership rights are indeed guaranteed.
- *IP, markets and diffusion* describe a range of framework conditions that critically shape IP impacts. This includes: the state of competition; conditions for licensing and markets for IP; whether IP can be used to obtain credit on markets for finance; and the roles played by open innovation and open source.
- A key element is also how IP systems and innovation support innovation activities and access to knowledge for different types of *IP users in the production sector*, including (in emerging and developing countries): traditional and informal actors; "catching-up" firms; leading "frontier" firms; and universities and public research institutions.
- The ways in which IP can serve innovation differ across users, and also vary substantially across *fields or sectors of activities* (including ICT, agriculture and creative industries, as well as biotechnology and pharmaceuticals).
- There is a wider question of how IP policies relate to innovation policies. Critical issues include: how national IP systems are governed; the characteristics of IP policies compared to others; policy design questions (i.e. prioritisation, compatibilities and trade-offs); and relevant governance dimensions for IP policies.

The design of IP policies depends on the use of relevant qualitative and quantitative measures of the IP system and its characteristics (see Annex 1.A1).

The development context and its impacts on national IP systems

The development context is associated with a set of substantial contextual weaknesses. These constitute key factors explaining low innovation performance, but they also condition the ability of IP policies to achieve innovation objectives. Table 1.2 summarises these well-known factors and their impacts and implications for IP policy. This is not to say that these factors inevitably all occur to the same extent in all countries, or that they are in any way specific to developing countries. In addition, several of these factors are often correlated, which further intensifies negative impacts. The main implication is that IP policies have to explicitly incorporate those weaknesses. Complementary policy approaches have to be developed if they are to have impacts on innovation.

Table 1.2. Innovation system challenges, their impacts on IP systems and policy implications

Innovation system challenges	Impacts on IP systems	Policy implications
• **The productive sector is characterised by inequality** with few leading sectors ("islands of excellence" co-exist with low-productivity firms and a large informal sector). ○ **Lack of competition** is a challenge. ○ **Polarising policy pressures** can be substantial. ○ **Growth/economic performance is often skewed towards a few sectors** with agricultural and services, and in some cases, natural resource-based industries, playing a particularly important role.	• Actors place very different demands and needs on the IP system (e.g. some seek international IP, while others have more to benefit from access to the information contained in IP applications). • Potential policy pressures might influence IP policies in a way that does not serve all actors. • Incumbents with strong monopoly powers might not substantially increase innovation efforts with IP, and rather use IP ownership to fight potential incumbents. • Specific types of IP will be most important for leading sectors.	• IP policies have to consider a variety of actors and ensure their involvement and participation in policy consultations. • Accountability and transparency of IP policy systems can help to reduce the dominance of powerful players over policy decisions. • Competition policy has to ensure that all firms, including leaders, have incentives to innovate and do not make use of IP to fight incumbents. • IP policies should explicitly focus on those types of IP that serve leading sectors best.
• **Private sector capabilities are weak with major capacities in research institutions**. ○ Opportunities for national **university-firm network** co-operation are weak. ○ **Private sector capacity** to absorb S&T from universities, research institutes and abroad is limited, given lack of access to skills and resources.	• Increased university IP will have only a limited impact on the commercialisation of inventions generated by universities and PRIs, as the business sector does not have the capacity to exploit them. • Patents will remain out of reach for many businesses, as they lack the inventive capacity and the resources for needed investments. • The potential benefits to be had from IP differ substantially (e.g. lack of access to finance constrains opportunities for businesses to commercialise inventions, even if they possess the corresponding IP titles).	• Universities and PRIs with research capacities can provide substantial contributions to successful IP strategies. As such, they should be a target group for these policies. • IP policies for universities and PRIs need to be complemented by a strategy to establish active links with businesses and develop their capacities for successful commercialisation. • Lack of access leads to limited returns from IP. It is necessary for complementary policies to compensate for such lack of access to resources (e.g. by supporting access to finance for innovation).
• **There are institutional weaknesses and missing institutional settings.** ○ National markets to provide finance for innovation development are weakly developed, as are markets for trading technology. ○ Complementary IP institutions, such as TTOs, may be inexistent or less well equipped. ○ Competition authorities might be less well prepared to regulate markets. ○ IP office capacities might suffer from limited human capital, resources and productivity. ○ Governance co-ordination challenges are potentially substantial, not only for IP policy, but also for innovation policy. ○ There are potential challenges regarding trust in institutions and corruption.	• Ensuring the "legal quality" of IP systems is challenging. • Enforcement is often weak, reducing the value of IP ownership rights. • Complementary policies in addition to core IP system policies are weaker with more limited funding and constraints on governance. • IP systems will have only weak impacts on financing for innovation unless institutional barriers are overcome to enable such market developments.	• Institutional reforms at various levels remain critical for the legal and administrative framework of IP to operate. Trust is critical and would, if absent, lead to the failure of administrative and legal conditions. • Public policy efforts on finance are necessary for IP systems to positively impact innovation financing. • Seeking economies of scale in the provision of services, for example, by co-operating internationally to automate and improve the efficiency of IP application procedures or setting up regional TTOs to address weaknesses is critical.

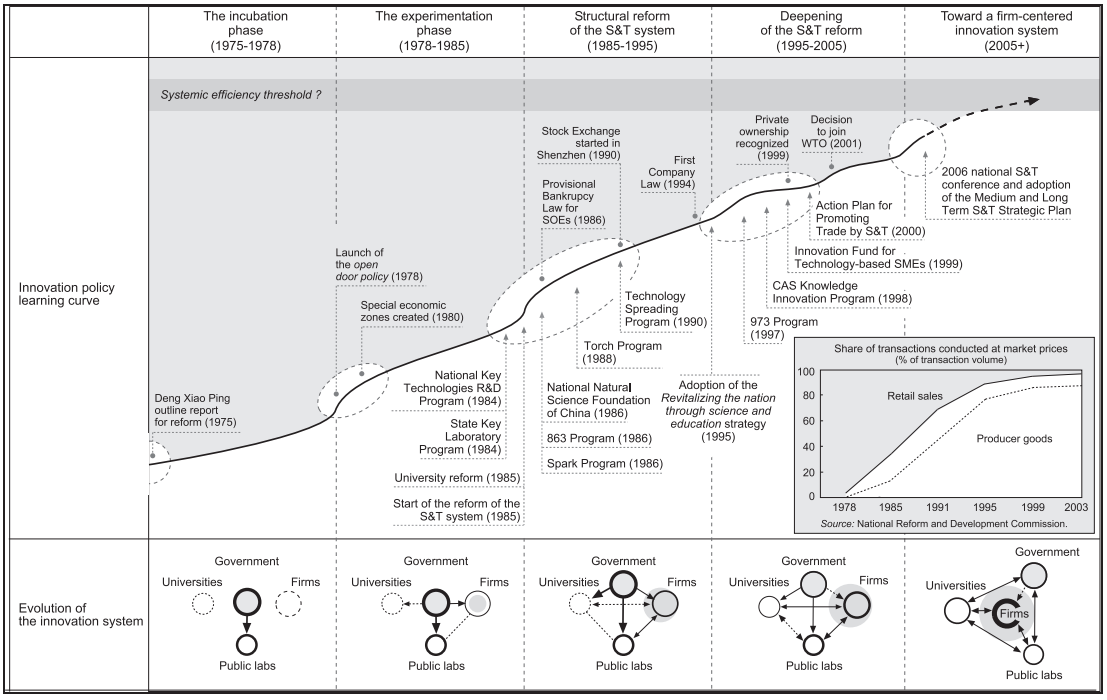
Table 1.2. Innovation system challenges, their impacts on IP systems and policy implications (*continued*)

Innovation system challenges	Impacts on IP systems	Policy implications
• **Knowledge is scarce.** ○ **The skills base for innovation is weak**. Skills are more concentrated, and research capacities, IP knowledge, managerial capacities and absorptive capacities from abroad are low. ○ **Foreign knowledge is critical,** but limited absorptive capacities challenge opportunities for local industry to benefit ○ **Levels of S&T activities are low.**	• Patents are not a realistic target for many actors because they lack the needed research capacities. • Tapping into knowledge provided by IP will be extremely relevant, but limited absorptive capacities can lower potential spillovers.	• Building up knowledge and research capacities must be a constant objective so as to increase the number of potential users of IP. It should include, in particular, patents and opportunities for tapping into foreign knowledge. • With limited skilled resources to support the innovation system the IP system should avoid absorbing a large share of engineers as examiners.
• **Market failures are prevalent.** ○ **Markets for finance** are weakly developed including for innovators. ○ **Infrastructure challenges** are substantial and constrain business activities, particularly for smaller businesses. Transportation costs limit market size.	• While IP can provide powerful incentives, the reality is that incentives will only arise for inventors who have successfully commercialised their products. This translates into IP systems that will, in the absence of addressing those challenges, only provide innovation to those less affected by market failures.	• IP policies alone are not sufficient to facilitate innovation, particularly for actors confronted with market failures. Policy complementarities should play a critical role in addressing and providing them with opportunities. • Regional IP offices can play an important role in providing access to users in remote locations.

Without discussing all dimensions, a few points are worth emphasising. First, inequalities and "islands of excellence" characterise these economies. A majority of the world's poor now live in middle-income countries where the inequalities in income and opportunities are strikingly skewed. The realities in many emerging and developing countries are such that a small fraction of the population has access to wider resources and opportunities, while other large groups lack access to the most basic resources. This has implications for innovation performance in that it implies substantial heterogeneities and often large informal sectors. Many emerging and developing economies have economic structures characterised by "islands of excellence" – very innovative, world-leading businesses, sectors, research institutions or universities – which co-exist with a group of weak performing firms or institutions and a substantial informal economy (OECD, 2013a). Due to the diversity of contexts for innovation faced by different groups within countries, conditions for innovators cannot be looked at from an aggregate perspective alone.

Second, the private sector often plays a marginal role in innovation with public research institutes and universities taking on a more central role: A frequently observed feature of developing country innovation systems is the small role of the private sector, which often has only weak innovation capabilities. In these cases only few companies have the human capital, scale and adequate market conditions to be effective innovators. This is particularly the case when it comes to investments in R&D. In low and middle-income countries, for which data are available, public research is critical for the majority of basic R&D, that is, close to 90% in Mexico and 75% in South Africa (WIPO, 2011). The private sector plays a more prominent albeit still not central role, as is the case in middle-income economies, which have evolved more towards more private firm-centred systems of innovation found in the most advanced economies. Figure 1.2 illustrates how China's development of a firm-based model went hand-in-hand with an innovation policy learning curve. The development process involved moving towards a more firm-centric model.

Figure 1.2. China's innovation policy: Institutional reform and learning curve



Source: OECD (2008), *OECD Reviews of Innovation Policy: China 2008*, OECD Publishing, doi: 10.1787/9789264039827-en.

Principles for country policy assessments: IP systems and innovation in a development context

Box 1.2 provides conclusions for country policy assessments based on the discussion in this chapter.

Box 1.2. IP and its relation with innovation

IP is a means to support innovation, but not an end in itself.

There are different types of IP. They differ in terms of the nature of the intangible asset they protect, their sectors of activity and the different actors they involve. All have a close connection to innovation.

The number of granted IP rights is an indication of successful inventive capacities, but not of successful innovation performance. An additional step has to be undertaken – the commercialisation of IP.

Comprehensive analyses of national IP systems for innovation must focus on:

- the organisation of IP systems, i.e. the set of critical legal and administrative conditions
- IP, markets and diffusion, i.e. critical market conditions for impacts of IP such as the state of competition and licensing opportunities
- IP users in different sectors of economy i.e. conditions of potential and actual IP use for different actors and activities
- IP policy questions.

IP policy has to be contextualised for an IP system to support innovation

The following challenges to development processes affect the potential impacts of IP and need to be considered as part of assessments of IP systems:

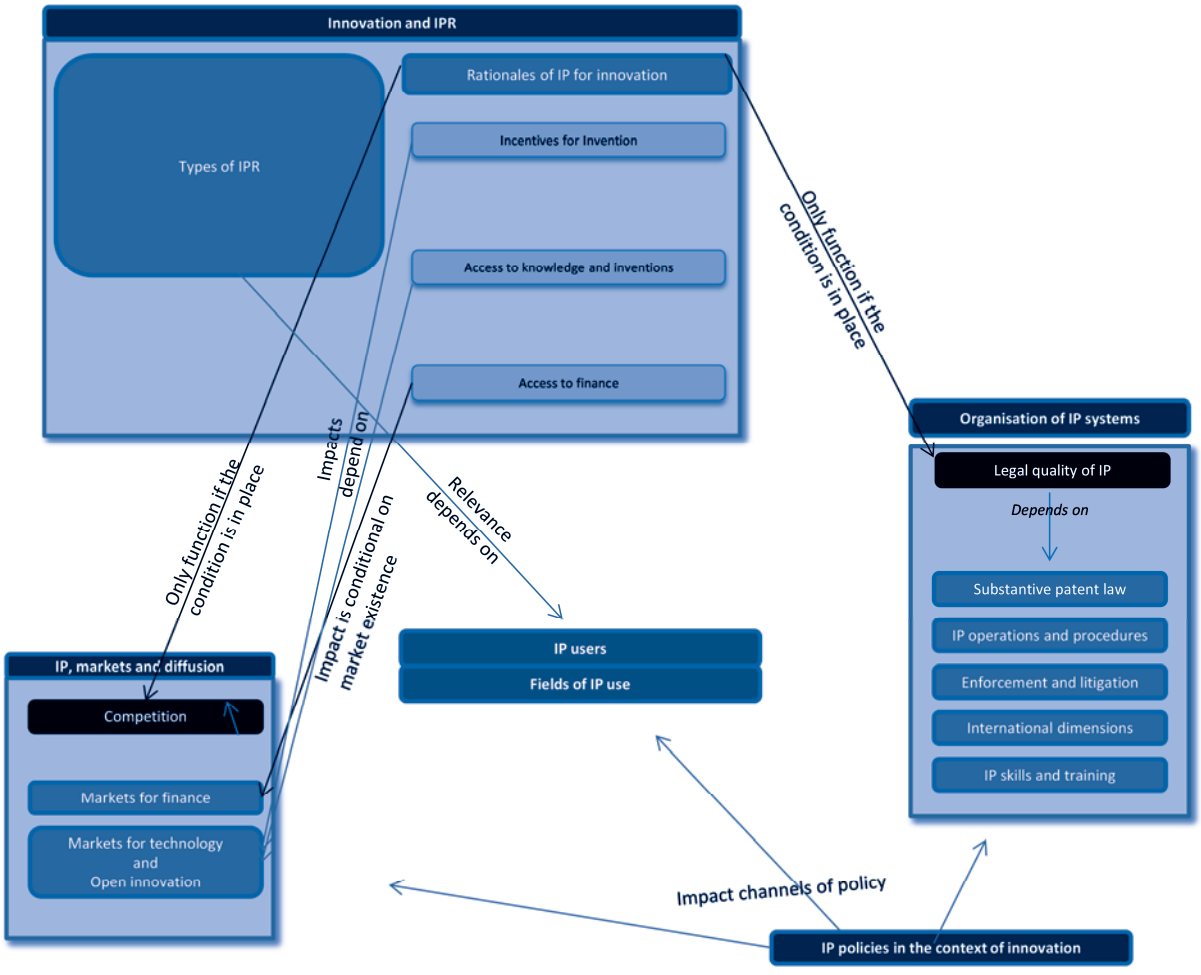
- large inequalities in the productive sector
- weak private sector capabilities with major capacities in research institutions
- institutional weaknesses and missing institutional settings
- scarce knowledge assets
- widespread market failures.

These challenges require complementary policies, particularly in order to commercialise IP and ensure the effective use of IP for innovation.

1.3. The legal and administrative conditions of IP systems

IP systems can support innovation performance in multiple ways; these mechanisms are described in Annex A. However, those mechanisms will only have impacts if the legal and administrative conditions are such that inventors effectively receive ownership of their IP. This in turn depends on factors ensuring "legal quality" (see Figure 1.3). However, it also depends on the state of competition and the extent to which IP can be traded on markets or provide access to finance.

Figure 1.3. Binding constraints on IP impacts for innovation



Organisation of the IP system

Legal quality

The legal and administrative conditions of the IP system have to provide "legal quality" if IP is to encourage innovation. In the case of patents, utility models, registered industrial design and plant variety, the following conditions characterise "legal quality":

- The *certainty* of legal provisions and the IP examination process needs to be guaranteed. In the case of patents, legal certainty is about clear legal provisions regarding subject matter, duration, scope and breadth, inventive step and disclosure requirements. It also requires objective, high-quality and timely IP examination procedures and enforcement. That is, the IP examination process has to be applied within a reasonable time period, using standardised criteria, and must decide on IP titles efficiently and in such a way that a low proportion of IP titles are rejected in court.
- *Stability* over time is crucial to avoid frequent changes that raise perceived uncertainties and put in question *ex post* rewards for *ex ante* investments, thereby weakening the incentives provided by the system.
- *Clarity* is vital to ensure that the IP system has effective disclosure of inventions.

- *Reasonable inventive step* (i.e. the distance of the invention to be patented from the state of the art in the given field, and novelty in the case of utility models) needs to be adopted to draw a balance between encouraging substantial inventions and excluding many relevant incremental innovations from the system.

In the case of trademarks and geographical indications, certainty of the IP examination process and stability are the key components of "legal quality". For unregistered industrial design rights, copyright and trade secrets, certainty over legal provisions and stability are the critical elements.

Finally, "legal quality" has to be attained at a reasonable trade-off against the requisite costs needed to achieve such an IP system.

Substantive patent law and laws regarding other types of IP

IP are legal rights. For these rights to operate effectively, a corresponding comprehensive and clear legal framework should be implemented. The critical dimensions for the working of the patent system are the following:

- *Subject matter* can impact how patents support or hinder inventions. Boundaries of the patent system apply, for example, to the question of genetic resources and business methods. Uncertainties regarding what is patentable can increase enforcement costs and therefore can reduce the incentives to patent.
- *Duration* of protection matters to the extent that it limits monopoly rights by making the invention available to the general public after a lapse of time. The legal provision operates in combination with patent renewal fees. The current provision is for 20 years. There are, however, provisions for patent term extensions in the United States and elsewhere, and supplementary protection certificates in the European Union.
- *Scope and breadth* are claims that define the scope of protection and thus its boundaries and conditions for infringement. The central issue regarding scope is that it defines the degree of potential monopoly power it provides to the patent owner.
- *Inventive step* is critical for providing incentives for inventions. The lower the threshold, the less patents will incorporate substantial inventions, and the higher will be the rate of destruction of previously held patents. Lower rates increase the number of patent applications, which has a downside in the uncertainty created by backlogs, and raise challenges related to patent thickets. While the threshold needs to be set above the state of the art if it is to offer incentives for innovation, determining the exact level at which to set the inventive step is difficult. If set too high, which would avoid the costs described, the step would exclude numerous de facto inventions from the patent systems. This could decrease incentives for inventions and reduce their potential for commercialisation. Taken together, it could result in negative effects on the system.
- *Disclosure* requirements ensure that information about inventions are shared to the benefit of society.

Regarding substantive patent law and IP law, the national IP policy of each WTO member country must comply with the TRIPS agreement. Signed in 1994, the TRIPS agreement applies to all developing WTO member countries since 2005, excluding only the least developed economies (Box 1.3).

Box 1.3. Overview of the TRIPS agreement regarding patents, trademarks, geographical indications and copyright

The TRIPS Agreement is to date the most comprehensive multilateral agreement on intellectual property. Signed in 1994, it applies to all developing WTO member countries since 2005, excluding only the least developed economies. It is a minimum standards agreement; members can provide more extensive protection of intellectual property if they so wish. The areas of intellectual property that it covers include: (i) patents; (ii) copyright; (iii) trademarks including service marks; (iv) geographical indications; and (v) industrial designs. The TRIPS agreement also allows for limited exceptions to IP rights, such as fair use, compulsory licensing and government use without authorisation of the rights holder, but requires that certain obligations are fulfilled. The specifications for different forms of IP are as follows:

Patents

The agreement requires that members make patents available for any inventions, whether products or processes, in all fields of technology, provided that they are new, involve an inventive step and are capable of industrial application. It also requires patents to be made available and patent rights to be enjoyable without discrimination as to the place of invention and regardless of whether products are imported or locally produced.

Members may exclude from patentability: (i) inventions, the prevention within their territory of the commercial exploitation of which is necessary to protect public order or morality, including to protect human, animal or plant life or health, or to avoid serious prejudice to the environment; (ii) diagnostic, therapeutic and surgical methods for the treatment of humans or animals; and (iii) plants and animals other than micro-organisms, and essentially biological processes for the production of plants or animals other than non-biological and microbiological processes.

The term of protection available does not end before the expiration of a period of 20 years counted from the filing date.

Copyright

The agreement requires compliance with the basic standards of the Berne Convention for the Protection of Literary and Artistic Works. It confirms that copyright protection shall extend to expressions, computer programs and databases, provided that the arrangement of contents constitutes intellectual creation. It does not extend to ideas, procedures, methods of operation or mathematical concepts as such.

The general term of protection, which must be granted automatically, constitutes the life of the author plus 50 years from their death. If not based on the life of a natural person, the term of protection is no less than 50 years from the end of the year of production.

Trademarks

The basic rule for trademarks is that any sign, or any combination of signs, capable of distinguishing the goods and services of one undertaking from those of other undertakings, must be eligible for registration as a trademark, provided that it is visually perceptible. The TRIPS agreement requires service marks to be protected in the same way as marks distinguishing goods.

Members may make registration of trademarks dependent on use, but at least three years must have passed after the filing date before failure to realise intent to use is allowed as grounds for refusing an application. Initial registration and each renewal of registration of a trademark lasts for a term of no less than seven years. Registration of a trademark is renewable indefinitely.

Industrial designs

Members have to provide for the protection of independently created industrial designs that are new or original if they do not significantly differ from known designs or combinations of known design features.

The duration of protection available amounts to at least 10 years. The wording “amount to” allows the term to be divided, for example, into two periods of five years.

Source: WTO, *Overview: The TRIPS Agreement*, accessed at www.wto.org/english/tratop_e/trips_e/intel2_e.htm.

IP operations and procedures

Registered IP only works if national IP systems provide for objective, high-quality and timely IP examination procedures and enforcement. The pricing strategies involved also have to be carefully considered since they can impact on IP examination procedures and their duration by affecting access to the IP system and the nature of applications deposited at IP offices.

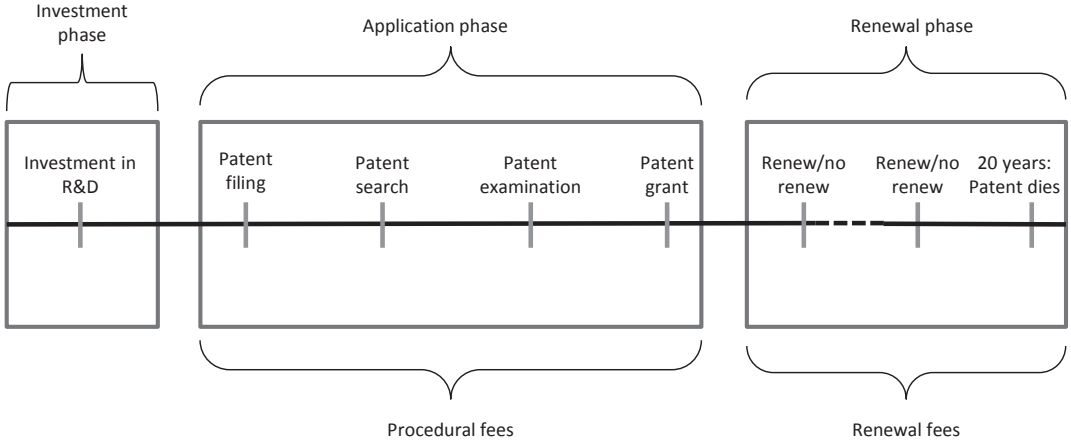
Patents, utility models, plant variety protection and registered design rights

The four steps in the patent application process (Figure 1.4) are as follows:[1]

- The entity seeking patent protection files a patent application at a patent office. The application must disclose in sufficient detail the invention for which protection is sought for the average skilled person to be able to understand and make use of it.
- The patent office appoints an examiner who takes charge of the application and conducts a novelty search. The patent document is made public with a search report 18 months after filing date.
- At the examination stage, a decision is taken regarding "non-obviousness" and "inventive step", where granting of a patent means no reason for refusal as all criteria for patentability are met. Applicants normally need to request examination within a given timeframe after receiving the search report.
- Once granted, a patent can be maintained for a maximum duration of usually 20 years from the filing date, subject to the payment of renewal fees. It can be challenged by competitors in courts and possibly amended or revoked.

Similar processes arise for utility model applications, but with substantial differences regarding notably the examination stage, as well as the duration of the application process and the granted IP rights. The registration of industrial design rights and plant variety protection follow a similar routine, but again with differing processes for registration and duration of protection.

Figure 1.4. The patent life-cycle



Source: EPO (2010), Study for the EPO on the Economic Dimensions of the Fee Structure in the European Patent System Final Report, European Patent Office, London.

Trademarks

The steps in the trademark process are as follows (Millot, 2009):

- An application for registration of a trademark can be filed with trademark offices. The application must contain a clear reproduction of the distinctive sign filed for registration, including any colours, forms or three-dimensional features. It must also contain a list of goods or services to which the sign would apply.
- The offices then examine the application to ascertain that the sign is not identical or similar to trademarks already granted to another trademark owner and also whether the application complies with trademark regulations.
- The trademark is then published "for opposition" so that third parties may oppose its registration within a period of a few months.
- In the absence of oppositions, the mark in question will be registered.

It is also possible to register a trademark with the WIPO system of international registration of marks, which is governed by the Madrid Agreement Concerning the International Registration of Marks and the Madrid Protocol.

Costs of IP operations and procedures

There are several types of costs associated with registering IP. For patents, costs include administrative fees such as filing, search, examination, country designation and grant/publication fees; process costs associated with drafting of rather complex applications, monitoring, which can be in-house or outsourced; translation costs where applications are made abroad; and maintenance costs including renewal fees. For registered industrial design, PVP and utility models – all of which are awarded based on novelty requirements – several of these fees also arise since the novelty requirement also imposes an examination process. The application process is, however, much lighter for utility models. The case of trademarks differs since the award is based on "uniqueness".

Those costs have impacts on would-be users of the IP system. Fees also finance the processing costs and, thus, the functioning of the IP-granting system. In the context of OECD countries, the major costs are process and enforcement costs, as well as translation costs for patents targeting more than one market. A main policy concern is that certain would-be inventors – namely small entities – face substantial costs and may be discouraged from using the system. Filing and search fees have less of an impact on applicants from advanced countries compared to processing and maintenance costs (EPO, 2010). In the case of developing and emerging countries, however, filing and search fees can be a barrier for some applicants as financial constraints are commonly higher. It is also worth noting that the geographical distance to the IP office can impose an additional cost on inventors if IP cannot be applied for online. The fee system should not exclude inventors whose contributions can be substantial. For that reason, discount fees have been introduced where those costs might represent a barrier, such as for small firms and universities. This is also the case for Colombia and Indonesia, as discussed in Chapters 2 and 3. At the same time, institutions in charge of innovation, which provide IP support policies that substantially reduce the costs involved in seeking patents, need to consider whether some of these policies support patent applications that add to backlogs, but do not necessarily "add value". This can notably be the case if the "quantity" rather than "quality" of IP applications is rewarded, where "quality" can be

defined as the probability that the invention will be granted an IP title and, moreover, that it will be successfully commercialised. Such policies might also increase the performance costs of the IP system.

A major challenge regarding procedures is delays in processing IP applications. The surge in patent applications in many jurisdictions has led to substantial delays in decisions on IP applications. Delays create uncertainty that can be detrimental to contributions towards innovation. Inventors may not proceed with efforts aimed at commercialising their inventions and competitors may be deterred from engaging in related research until patent decisions are made. Moreover if inventors expect long delays in decisions, this will reduce their incentives to engage in investments in the first place. This applies particularly to industries where inventions quickly become obsolete due to rapid technological change. If IP systems are to offer incentives for inventions as well as support innovation, they should ensure a reasonable duration for processing patents. Furthermore, it is critical that the quality of the examination process is not compromised. Raising fees is an option, but one that can only be used to a limited extent, as the IP system should not exclude groups of inventors by imposing unaffordable high fees.

A common approach adopted by many IP offices is to reduce procedural fees to avoid excluding certain kinds of innovators, while at the same time increasing renewal fees. IP offices can thus finance examination costs for unsuccessful applications by cross-subsidising low procedural fees that enable their access (EPO, 2010). Possible opportunities for improved pricing for specific types of procedural fees, include filing, search and examination fees, and can create a more efficient system. Some applicants strategically seek to delay the patent granting process in order to distort investment decisions by competitors. Delays impose a negative externality by contributing to uncertainties. Hence, mandatory fees for further processing request applicants, who fail to comply with set time limits, could be increased to reduce delays and avoid such abuse.[2]

The patent system has to preserve "legal quality", which renders simple approaches towards speeding up procedures more complex. Patent examiners have to maintain quality of the examination process to ensure that only a low share of IP titles are rejected in courts. Otherwise the value of IP titles would be diluted because owners of patents, if challenged, could never be sure that their rights would be upheld in courts. Moreover if many patents were wrongly granted, this would mean that competition would be blocked where it should not be. This could increase incentives to those seeking additional IP only to block competitors, even in cases where applications should have a low probability of actually receiving patents. This distortion of the process could lead to an even higher rate of patent applications, which increases backlogs. In developing and emerging countries the challenges are similarly important, particularly as the resources available to IP offices are limited. While providing IP offices with more resources can be an effective solution, developing and emerging countries should carefully consider any additional investment. This is particularly the case for increasing the share of highly skilled staff, such as engineers, whose resources are scarce in the overall economy and thus are needed as key contributors to the innovation system.

Satisfying the "legal quality" requirements for IP operations and procedures at reasonable cost is challenging and requires investment in opportunities for raising productivity. Improvements can be made by taking advantage of ICT systems to automate processes and speed up the retrieval of relevant information for the examination process. Many developing and emerging countries including Colombia and Indonesia (as discussed in Chapters 2 and 3) are currently engaged in such efforts, often in co-operation

with WIPO and IP offices in other countries. Some IP offices have experimented with outsourcing some examination procedures. They have to ensure competitive criteria for selection, including pricing and quality of the service provided by the external parties. Some IP offices share examination results obtained for patents that were deposited previously in the other IP offices. Moreover, innovations in processing IP in other offices can prove helpful adding to the pay-offs from co-operation.

Enforcement

The legislative context is a pre-condition for obtaining rewards from IP ownership. If IP cannot be enforced because of a weak legal system, then potential inventors will not perceive much value in obtaining IP ownership, and the system will fail to provide incentives. In the case of all unregistered IP (i.e. copyright, trade secrets and, in some cases, industrial design), enforcement is the main cost component ensuring whether or not inventors are rewarded. IP rights are private rights and, thus, the main responsibility for taking measures to protect and enforce IP should lie with rights holders. However, opportunities for enforcement depend on: (i) a functioning court system and (ii) effective police and law enforcement bodies. A functioning court system for IP law offers dispute resolution where IP law is interpreted in a consistent and predicable way. Moreover, because litigation cases can be very costly and take considerable time, alternative procedures are valuable, such as mediation services which can help reach agreements over IP conflicts. This approach is beneficial because high enforcement costs can substantially reduce the resources available for innovation. What is more, enforcement might be perceived as too costly for some firms to derive actual value from their IP and, in consequence, these firms might not use the IP system. Where this is the case, policies that provide support by covering IP registration fees will be insufficient to incentive the use of the IP system by firms. Another key element is effective implementation of court decisions. Adequate training of agents in charge of enforcement is similarly critical.

International dimensions

IP provides national rights; that is they provide territorial rights which apply only to the country for which they have been granted. This also applies to PCT applications (described in Box 1.4) although a single PCT application can seek patent protection in multiple countries to facilitate cost savings for those inventors who aim for an international IP strategy. Several international and regional agreements have introduced more harmonised IP rights and modifications in national legislations, including the TRIPS agreement, which have led to international standards regarding IP. This also includes major international IP agreements (Box 1.4). Regional country unions, such as the Andean Community, also have provisions for IP as have bilateral free trade agreements. As innovation activities are increasingly globalised, such international dimensions might effectively form a natural extension of national IP systems. Developing and emerging countries that participate in the global economy can benefit from engaging in discussions over the design of IP internationally. Moreover, internationalisation can also benefit national IP systems, for example, by sharing examination results to reduce processing costs across IP offices.

Box 1.4. Major international IP agreements

Major international agreements, which are administered by WIPO, include the following (see Box 1.3 for an overview of the TRIPS agreement):

Paris Convention (initially adopted in 1883/in force since 1884) contains substantive provisions regarding all types of industrial property including patents, trademarks, industrial designs, geographical indications, trade secrets and utility models, and also provisions against unfair competitive practices. It has a total of 175 contracting parties (July 2013).

Madrid System for the International Registration of Trademarks (Madrid System) (initially adopted in 1891 and in force since 1892**)** functions under the Madrid Agreement of 1891 and the Madrid Protocol of 1989. The Madrid Protocol has 91 contracting parties, 56 of which are also contracting parties of the Madrid Agreement (July 2013).

Hague Agreement Concerning the International Deposit of Industrial Designs (Hague Agreement) (initially adopted in 1925 and in force since 1928) provides a single application mechanism for registering a design in the contracting parties to the Agreement. It has 60 contracting parties (July 2013).

Patent Cooperation Treaty (PCT) (initially adopted in 1970 and in force since 1978) provides the possibility of seeking patent rights in a large number of countries by filing a single international application (PCT application) with a single patent office (receiving office), and then entering the national stage in the desired countries at a later date. It has 148 contracting parties (July 2013).

Berne Convention for the Protection of Literary and Artistic Works (Berne Convention) (initially adopted in 1886 – last amended in 1979 – and in force since 1984) contains a series of provisions determining the minimum protection to be granted, as well as special provisions available to developing countries that want to make use of them. It has 166 Contracting Parties (July 2013).

Trademark Law Treaty (TLT) (adopted in 1994) aims to simplify and harmonise the administrative procedures of national applications and the protection of marks. Individual countries and intergovernmental organisations that have regional offices for the registration of trademarks may become party to the Treaty. It has a total of 53 contracting parties (July 2013)

Patent Law Treaty (PLT) (adopted in 2000/in force since 2005) contains provisions to harmonise and streamline formal procedures in respect of national and regional patent applications and patents. It provides maximum sets of requirements that the patent office of a contracting party may apply. It has 34 contracting parties (July 2013).

IP skills and training

The quality of IP systems depends on highly qualified and trained IP staff from the public sector and on well-informed and experienced end users from the private sector. Among the many required actors are policy makers who design innovation policy with knowledge about how IP can best serve their policy objectives, examiners with the appropriate skills to ensure the examination quality of the IP system, and qualified lawyers and judges to ensure enforcement. On the end user side of the IP equation are informed universities and businesses with a sufficient understanding of IP to serve their interests. Lack of awareness on either side will reduce the efficiency of the IP system. This is not to say that all end users in the innovation system need to have an intimate knowledge of IP. Rather, those with the highest potential should be most aware about the forms of IP most relevant to their businesses. If firms are not sufficiently informed, they might not know how to use IP or use it inadequately with low returns to the firm. In either case, uninformed end users neither support innovation nor create a dynamic whereby local businesses take more advantage of IP. National IP offices and other national institutions offer a variety of training modules. Support is also offered from abroad (e.g. WIPO, IP offices from other countries, etc.).

IP, markets and diffusion

Competition

Competition authorities in developing and emerging countries have to be prepared to address abuse of IP systems that work to the detriment of promoting innovation. It is important to stress the following points:

- IP rewards inventors by guaranteeing exclusive monopoly rights over their inventions. This is the essential incentive mechanism well-functioning IP systems provide. However, IP systems do not operate well in monopolistic contexts since competition critically impacts firms' innovation activities (e.g. Ederington and McCalman, 2008; Fernandes and Paunov, 2013; Thoenig and Verdier, 2003). Market concentration in emerging markets poses challenges for innovation that, while independent from IP per se, need to be addressed. If they are not, businesses may not actively seek inventions and, therefore, refrain from using IP at all.
- IP can create a challenge for innovation activities if used by incumbents to block competitors or, alternatively, to enter collusive licensing agreements to create greater rents on the basis of their IP. Some types of practices such as cross-licensing threaten competition and have been used for collusion, creating barriers to entry. Abusive behaviour by powerful incumbents, in particular, needs to be addressed by competition authorities to avoid weaker market participants being driven out by anti-competitive uses of IP. The role of competition authorities in the case of IP is not to deny monopoly rights, nor the returns that markets provide for them (as this forms part of the very rationale for IP-provided incentives), but to ensure that IP is not used as a tool to exclude competitors.
- Challenges to competitive markets can be particularly important in sectors where network effects are strong because emerging standards can fundamentally affect the value of some IP, namely that which acts as gatekeepers for firms to operate in certain markets (Foray, 2004).

Competition questions will become even more challenging as markets for IP develop further, notably with regard to cross-licensing agreements and patent pools. If competition authorities are not well prepared, the potentially positive effects of markets for technology can foster monopolistic market structures to the detriment of innovation and development.

Licensing and markets for IP, open innovation and open-source models

The contributions of IP towards innovation also depend on the extent to which open innovation initiatives and markets for IP are developed in their economies. If national actors follow an open-innovation approach by seeking inventions externally, this creates a larger market for inventions. This approach can increase incentives to obtain IP because it will also enhance its attractiveness to inventors who do not have the resources to commercialise their inventions. These markets create an opportunity to derive value from it. Otherwise IP will only provide value to owners with the adequate manufacturing capacity, while providing limited value to university researchers and many smaller start-up businesses. Box 1.5 summarises the benefits of developing markets for IP. Moreover, licensing agreements are also critical for businesses to access technologies as a way to tap into knowledge to stimulate learning and raise their innovation capacities.

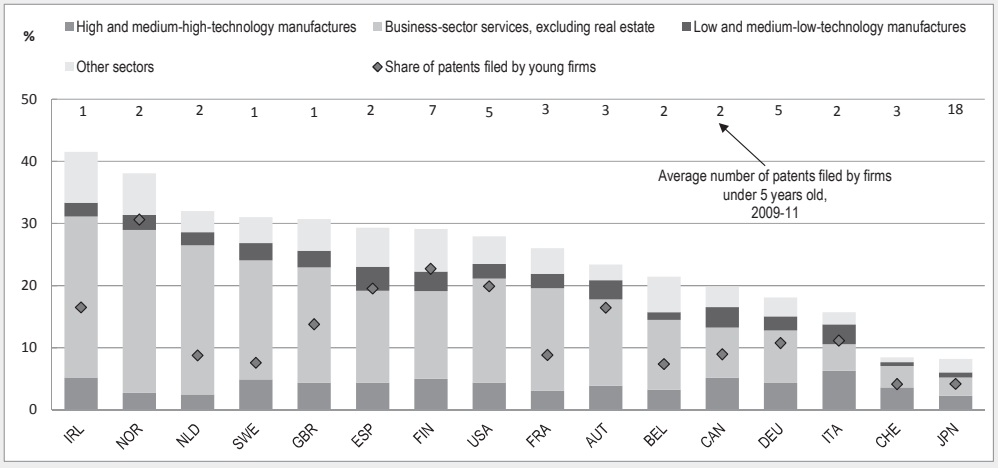
Box 1.5. Benefits of developing markets for IP

Developing markets for IP will benefit emerging economies for the following reasons:

- Inventions are born out of a combination of existing ideas, data and insights, which are initially separate and need to be brought together for new ideas to emerge. Hence, easier conditions for explicit knowledge flows will foster innovation, and will allow for a better exploitation of complementarities across innovative entities, hence boosting the collective efficiency of the involved innovators. For instance, new drug treatments are increasingly the result of joint work of biotech companies specialised in the identification and analysis of genetic pathways and of pharmaceutical companies specialised in the effects of drugs on human health. Complex products like aeroplanes involve complex structured supply chains comprising numerous businesses, each contributing its own innovations.
- Knowledge flows make possible a broader, more diverse and better use of existing competences and knowledge, beyond the uses or applications foreseen by the sole proprietor. A skilled biotech expert can apply ingenuity to solving a problem raised by a chemist. Likewise, a new material invented for aircraft can find use in bicycle production. The circulation of explicit knowledge on markets for technology is essential to productivity growth, as inventing and manufacturing goods are two distinct activities that rely on different competencies and facilities. Knowledge flows allow companies to specialise in what they do best. They allow inventions to be implemented by actors other than inventors, who are not necessarily good at manufacturing and marketing products. They facilitate the emergence of companies that specialise in research in disciplines such as biotech, chemicals and ICT. While young firms are not necessarily equivalent to small technology-based business, the data shown in Figure 1.5 give at least an approximate indication of the potential importance of these businesses.

Figure 1.5. Patenting activity of young firms, 2009-11

Share of young patenting firms and share of patents filed by young patenting firms, EPO and USPTO



Sources: OECD (2013), OECD Science, Technology and Industry Scoreboard, OECD calculations based on the Worldwide Patent Statistical Database, EPO, April 2011; and ORBIS© Database, Bureau van Dijk Electronic Publishing, December 2010; matched using algorithms in the Imalinker system developed for the OECD by IDENER, Seville, 2011. See notes provided in OECD (2011a).

- By making inventions available to a broader range of potential manufacturers, knowledge transfers allow for the implementation of inventions on a larger scale, in greater quantities and variety. If, for example, a young firm invents a specialised electronic device, it can be implemented in many products manufactured and marketed by global companies. With the emergence of global value chains, multinational firms can better exploit the comparative advantage of developing and emerging countries, either for inventing or manufacturing.

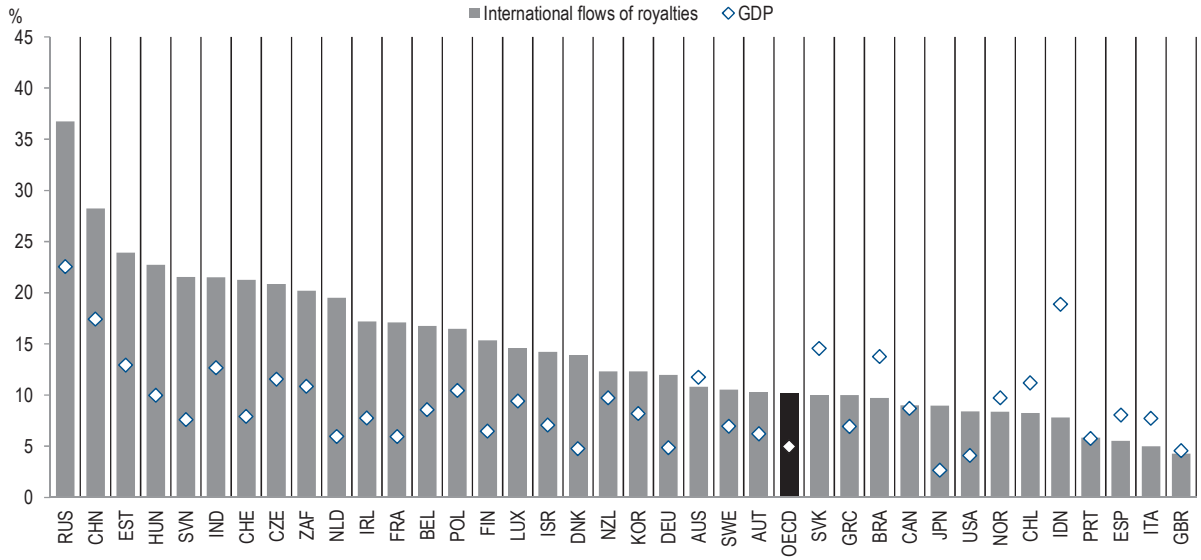
Source: Based on OECD (2010), "Knowledge Networks and Markets: A Typology of Markets in Explicit Knowledge", internal working document, OECD, Paris.

Independent of the development of such national markets, the role of markets for technology and IP is increasing, as knowledge becomes an increasingly important source of competitiveness. The concept of the "knowledge society" has been widely used to indicate an increased role for the intangible aspects of products. In consequence, IP has become an even more important asset. On a global scale, innovation processes are increasingly based on explicit knowledge created outside the boundaries of the company. Thus co-operation has become an important way of tapping into outside knowledge in order to generate new ideas and bring them quickly to markets. In almost all countries for which data are available, transactions involving royalties and license fees grew faster than GDP over the last decade (Figure 1.6). Companies that enter into such transactions are motivated by new business opportunities, being able to share risks, taking advantage of complementary resources and realising synergies. In addition, companies can achieve higher flexibilities in responding to fast-moving markets, while reducing the costs required for inventions. For firms in emerging and developing countries, opportunities to enter into licensing agreements at affordable terms constitute a critical way of accessing knowledge.

In addition to these transactions, ICT offers companies the ability to facilitate innovation processes that move beyond traditional in-house innovation production models. ICT has probably affected the trade-offs of developing in-house production versus outside production of technology. At the same time, ICT acts as an enabler of an alternative model of open innovation, the open-source model, which applies IP in a rather different way. Such models potentially offer a powerful means of encouraging joint modes of invention that might also involve end users. In conclusion, the value and contribution of IP will evolve with global and national trends and, thus, it is essential that developing and emerging countries monitor developments to use IP to best support their innovation systems.

Figure 1.6. International technology flows of royalties and licensing fees, 2000-11

Average growth rate, based on current USD, percentages



Note: average of receipts and payments.

Source: OECD (2013), *OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth*, OECD Publishing. doi: 10.1787/sti_scoreboard-2013-en.

Markets for finance

IP can potentially support access to finance for innovators if IP titles can serve as collateral. However, this depends on whether financial markets provide corresponding opportunities. Often commercial banks do not have the necessary competencies to value technology, and they are oriented towards funding projects with lower risk profile. Fostering different financial models to provide opportunities for risky innovation projects is, thus, a precondition for IP to play such a role. Moreover, a critical factor in this regard is IP valuation (i.e. assessing economic value of different types of IP), a rather complex activity as much depends on the final product and its future success on markets. This will require training of professionals who are equipped with the requisite knowledge and experience to handle the valuation of IP assets. This is not exclusively a challenge faced by developing and emerging countries; it also is a challenge for many OECD countries.

Principles for country policy assessments

Box 1.6. Principles for country policy assessments: Legal and administrative conditions for IP systems

Binding constraints for IP to foster innovation.

Binding conditions for IP relate to the organisation of the IP system, where legal quality needs to be ensured, as well as to markets where competition is particularly critical. Other factors that shape impacts are markets for finance and technology, as well as open innovation initiatives.

Legal quality is needed to provide adequate legal and administrative conditions for IP.

For IP to offer incentives for inventors, national IP systems have to provide legal quality. Ensuring legal certainty requires adequate IP legislation and application procedures at IP offices. Two steps are required: (i) evaluating whether the existing legislative framework provides legal certainty and (ii) checking whether services provided by IP offices ensure quality in the examination procedures.

Legal provisions are a first condition for legal quality.

Legal provisions are the primary ingredient to provide legal certainty, as they offer clarity as to the ownership rights the inventor can expect to receive. With the TRIPS agreement, WTO member countries have agreed to a common approach along several dimensions. The scope for national policy requires clarity on subject matter for certain issues, such as the question of genetic resources, and use of some types of IP, such as utility models. The major decisions, however, involve how IP procedures are applied in practice, such as how to apply the disclosure requirement and the threshold on the inventive step for patents. Both can be critical for the operations of the IP system.

Innovation systems in developing and emerging countries can benefit from *effectively using information contained in IP applications to avoid costly duplication and orient research to more competitive uses.* As disclosing information is not necessarily in the interest of inventors, adequate legal provisions regarding disclosure and their practical implementation are important. IP offices should also provide users with online access to patent databases. These efforts need to be complemented by training particularly for smaller businesses to ensure information contained in IP applications is effectively used.

Operations and procedures in IP systems need to be in place for legal quality.

Emerging and developing countries have to ensure that operations and procedures in IP systems support legal quality. To reach this objective the following points are important:

- IP offices should invest in co-operating with patent institutes from foreign countries with similar IP characteristics with respect to examination, seeking efficient types of outsourcing of processes and supporting automation processes. This can allow productivity gains to improve performance without raising costs or compromising quality. This will also allow saving on scarce skilled human capital that is needed in the economy, particularly in the form of innovators. …/…

Box 1.6. Principles for country policy assessments: Legal and administrative conditions for IP systems *(continued)*

- Fees charged for processing applications should not create access barriers for inventors. Cross-subsidising low procedural fees and reduced fees for certain categories of applicants, usually "small entities" such as universities and small firms, by raising renewal fees is a reasonable approach. In addition, renewal fees reduce the monopoly rights over patents by shortening the duration of such rights for those patents for which renewal is not sought.
- Certain fee structures can contribute towards reducing workloads and avoid some abuses of the IP system by applicants who ultimately reduce its effectiveness. IP offices should consider raising fees for further processing, as such additional processing may often be used for ulterior strategic purposes and can slow down the system's performance.
- Support policies aimed at increasing IP applications should not lead to an increase in low-quality applications with limited contributions to invention, as these add to the workload of IP systems and impede efforts to reduce processing times and preserve quality. Ensuring this often requires setting up more complex IP support policies than simple fee coverage including, for example, additional financial returns for inventors if IP titles are granted and further rewards if those inventions are turned into innovations.

IP offices must have the right incentives to ensure the system works optimally. For self-funded institutions, incentives might lead to fee structures that do not serve innovation, such as charging fees that are unaffordable for some potential applicants. On the positive side, reliance on own funding generated can support a service culture that seeks to serve applicants better than would otherwise be the case. Periodic evaluations of policies of IP offices to ascertain how well they serve innovation systems can be useful as a control mechanism, with the adoption of measures to address potential problems.

Enforcement is critical for legal quality.

Enforcement including effective litigation is critical because it affects legal certainty. Efficient enforcement should be fair to the inventor so that the IP system works to the advantage of innovation. Since litigation is very costly, arbitration mechanisms that can help avoid costly litigation are beneficial. Supporting courts with the required skills is often critical and its absence effectively weakens the system's capacities.

Skills are a further requirement.

IP systems need qualified IP-trained staff at key institutions to provide high quality services to support innovation. This includes appropriate skills and training of those working in institutions implementing IP policies, processing IP applications and ensuring enforcement.

Inventors will only use the system if they are aware and sufficiently trained. While general awareness campaigns are useful, middle-income economies should also seek to offer services that help firms identify how IP best suits their own purposes (e.g. tailored training for those with highest potential gains). Chambers of Commerce could also play a role in identifying firms and research institutions with the biggest potential for innovation based on the nature of their products or their internal resources, as well as identifying businesses with an interest in exploring IP strategies.

Competition policy has to contribute towards an environment that is conducive to innovation.

IP systems have to strike the right balance between granted monopoly rights and competition, given the latter's substantial contributions to innovation. Strong competition policy is essential to ensure that the IP system operates in a competitive environment. This requires adequate legal provisions and measures to ensure that competition authorities take action to restrain abuse where collusive behaviour prevents competitive markets from operating freely. The separation of the competition authority and IP office is critical to avoid conflicts of interest.

Developing opportunities for inventors to receive financing could raise the contributions of IP towards innovation. These types of financial markets are weakly developed in developing and emerging countries, so government support for credit schemes, where IP can serve as collateral, are worthy of consideration.

Monitoring and assessing how IP policies can best support innovation is important.

The value and contributions of IP evolve with changing global and national trends. Countries have to critically assess and monitor these developments so as to inform their IP policies with the best approaches for supporting innovation performance. Support for economic analysis units in IP offices is one possible approach to help ensure IP policy is informed by such changing trends.

Table 1.3. Categorisation of types of innovators and most relevant IP policy principles

Groups of innovators and policy aims and objectives	Type/source of invention/ innovation and dissemination	Main agents involved	Example of activities and innovations	IP policy principles
Innovators in traditional and informal sectors *Overall aim* To support these activities to reach subsequent "catching-up" stages and to help include marginalised groups *Policy objectives* To support grassroots innovation including by mobilising traditional knowledge to support welfare To address challenges of traditional and informal sectors, which often employ a large share of the labour force To support incipient and "promising" but undeveloped economic activities	Incremental innovations based on intelligently applying existing innovations and traditional knowledge and, in some cases, based on using external scientific expertise to optimise impacts and increase economic returns	Informal businesses engaged in various types of economic activities Groups both in rural and urban areas not engaged in formal economic activities Public institutions, research universities and networks contributing work relevant for grassroots innovation, the informal sector and traditional industries	Innovative product developments in traditional industries such as handicrafts including types of furniture and textiles, and food-based activities such as coffee Developing products based on insights from traditional medicines such as *Ayurveda* Innovation activities of the Honey Bee Network	Support enhanced commercial use of trademarks, design geographical indications (GI) for traditional industries, and copyright for artistic creations and related innovation activities Organise collective action efficiently to build economic value by supporting effective collecting societies for copyright or industry associations for GI and trademarks to protect handicrafts or food products Enable access for certain groups Build awareness-raising activities for actors to use IP in support of their economic activities
"Catching-up" businesses *Overall aim* To support businesses in building initial innovation capacities to advance towards the "frontier" and overcome "middle-income traps" *Policy objectives* To establish capacities to adapt technologies and innovations To build up innovation capacities and establish niche competencies To ensure widespread dissemination of innovation among businesses	Incremental innovation based on innovations and technologies developed by others including abroad Dissemination of innovative technologies across businesses especially those generating more substantial generic benefits	Universe of private businesses of all types including small and medium-size establishments Public institutions and industry organisations to address co-ordination challenges for building up new activities Universities and research institutes allowing adaptation and support for building up capacities of businesses	Development of new plant varieties for agriculture Efforts at developing new methods for mineral extraction in the Chilean copper industry to satisfy local needs	Support innovation activities by facilitating use of trademarks, design and utility models Ensure fees are kept low for small and medium-sized firms including fees for applications, processing, renewals and enforcement costs Facilitate licensing agreements to enable access to knowledge and raise opportunities for financing based on IP Build awareness-raising activities for actors to use IP in support of their economic activities.

Table 1.3. Categorisation of types of innovators and most relevant IP policy principles *(continued)*

Groups of innovators and policy aims and objectives	Type/source of invention/ innovation and dissemination	Main agents involved	Example of activities and innovations	IP policy principles
Leading "frontier" businesses *Overall aim* To support leading businesses to successfully compete internationally, reaping revenue from foreign markets *Policy objectives* To ensure their position on the value ladder in global value chains To keep competitiveness in industries where the country is "at the frontier"	Innovation is identical to developed countries exposed to developments in global market, and involves incremental and radical innovation	Involves private sectors with support from public agents and intermediaries; large firms can be important Involves mainly private sector in interaction with leading public research institutions and universities; global partnerships are often equally of relevance for world-leading innovations	India's software industry Brazilian company Embraer or Colombian company Ecopetrol	Provide support for obtaining IP abroad and strategic positioning with respect to international competitors, so as to tap into larger markets and foreign markets for technology Strategically use patent information to define fields for internationally competitive research for identifying such IP Critically assess the value-added of additional innovation support policies, such as R&D tax credits Ensure adequate incentives for researchers and their institutions
Research institutions and universities *Overall aim* To support contributions towards innovation for socio-economic objectives *Policy objective* To produce inventions for innovation systems in emerging countries Develop capacities of research institutions to support private sector innovation activities To develop research capacities for addressing social challenges To strengthen capacities for developing a sufficiently advanced skills base	Wide range from major inventions and scientific research conducted in global partnerships, as well as support for social and grassroots innovation including those that help introduce technical innovations to disadvantaged communities	Public and private universities and research institutions connected to global networks in their capacity to address socio-economic challenges Public and private universities and research institutions engaged with the private sector jointly collaborating on research to: help incipient industries and/or activities; support catching up; and help maintain frontier innovation capacities	Innovations developed by universities to address soil degradation Brazil's Escola de Minas, in particular its leadership in the steel sector	Ensure adequate incentives for researchers and their institutions Ensure support for organisational context to help obtain IP, for example, efficient TTOs at regional level to exploit economies of scale Ensure opportunities for commercialisation activities including markets for technology, linkages with industry and regulations for researchers Build awareness-raising activities for actors to use IP in support of their research

1.4. Adapting IP systems to users in a development context

Innovation is important at all stages of development, and different types of innovation play different roles. Incremental innovation is often associated with the adoption of foreign technology, while social innovation can improve the effectiveness of business and public services. High-technology R&D-based innovation matters more at later stages of development, when it acts as both a factor of competitiveness and of learning (facilitating completion of the "catch-up "process). Annex A describes those multiple contributions in more detail. In order to support those opportunities for innovation in a context of substantial heterogeneities, it is critical to adapt national IP systems to the needs of the different actors in the production sector. This is an important step to reduce the IP commercialisation gap with developed countries, which unlike the gap with developed countries, in terms of IP titles, shows no signs of narrowing (Ghafele and Gibert, 2012).

Users of IP

Four "stylised" groups of innovators can be identified: (i) innovators in traditional and informal sectors, (ii) "catching-up" businesses, (iii) leading "frontier" businesses; and (iv) research institutions and universities (Table 1.3). The first three groups are essentially, but not entirely, progressive stages of development in innovation capacities. Different processes occur within the same country for different sectors and activities and frequently also within the same sectors and activities. No one type of actor matters exclusively in a different country context; rather it is essential to consider in each country each of these groups as they all have a role to play for innovation. Focusing on the different types of actors has to, therefore, form the core of analysis on IP and its contributions towards innovation for development. The group of distinct IP issues are discussed in Table 1.3. The IP policy issues questions, raised for specific groups, will also affect some of the other innovators.

Innovators in traditional and informal sectors

From a social and economic perspective, support for local and inclusive innovation is important because those sectors often employ a substantial share of the labour force in developing and emerging countries. However, IP for innovators in traditional and informal sectors is less relevant than it is for the other three groups of users because activities in this group are much more incremental and often involve very small local markets. They might, therefore, not be of sufficient quality for IP and patents, in particular, might be out of reach. This said, low use of other types of IP might be due to limited awareness or concern over enforcement rather than limited potential returns. Evidence on the relative importance of these factors to date is still scarce (WIPO, 2013a).

Several IP-related opportunities arise for IP policy. These include GI for traditional activities and other IP rights that closely affect agricultural products, handicrafts and *traditional knowledge.* Types of IP such as GI offer the opportunity to include specific regions that might otherwise remain marginal in standard innovation processes. The introduction of GI can result in economic benefits to local communities, such as higher prices for local agricultural products compared to those from other regions. Examples include locally grown coffee beans that are recognised as "community-owned". GI can thus generate resources in support of regional development and offer opportunities to integrate this group of innovators into innovation systems.

Traditional knowledge can provide opportunities for innovation but pose challenges for the current IP system, as knowledge belongs to communities not individuals. In the area of healthcare, for example, traditional medicines, such as *Ayurveda*, which is native to the Indian subcontinent, can act as inputs for local groups to patent and develop innovations. Research institutions and companies can provide needed research capabilities to effectively turn products with economic potential into IP-protected products that generate economic returns for local groups. Products must pass regulatory tests before they can be sold on foreign markets, a process that also requires support from research institutions. It is worth noting that local entrepreneurs have also deployed non-IP strategies to successfully market these types of products.

Discussions around IP for traditional knowledge are complex because they refer to collective ownership of existing knowledge rather than "new" knowledge. However, they are of particular interest to developing and emerging countries as they can potentially result in profitable assets for local groups. (The topic is also of concern to some developed countries, such as Australia and Canada.) Moreover, traditional knowledge can also be a means to support marginalised groups that are weakly positioned to compete in innovation systems. Similarly, claiming national or group ownership over traditional knowledge can help these groups to engage in innovation activities. However, this will be the case *only if* traditional knowledge is applied to specific economic activities, such as the development of novel entertainment products. In sectors such as furniture or textiles, developing and emerging economies have traditional advantages and could extend their markets to developed country markets. The exploitation of traditional knowledge in such cases might provide a competitive advantage.

Support for discussions on IP regarding traditional knowledge is therefore crucial, as is creating a record of such knowledge. Currently a portal of online databases and registries of traditional knowledge and genetic resources is available on the WIPO website.[3] The portal aims to act as the clearing-house mechanism of the Convention for Biological Diversity (CBD). In addition to the Traditional Knowledge Digital Library project from India (described in Box 1.7), three other databases are available from China, India and Korea. These sources not only facilitate prior art searches by patent offices, but also help potential innovators to make commercial use of such knowledge to the benefit of the communities owning that knowledge.

Box 1.7. India: Traditional knowledge and digital library project

The Traditional Knowledge Digital Library project (TKDL) is an initiative of several Indian Government agencies, proposing to document the disclosed traditional medicinal knowledge available in the public domain by sifting and collating information on TK for the existing disclosed literature covering *Ayurveda*. The TKDL compiles the information in digitised format in five international languages: English, German, French, Japanese and Spanish. To create the TKDL of Ayurveda, an inter-disciplinary team of Ayurveda experts, patent examiners, information technology experts, scientists and technical officers have worked together for one-and-half years. TKDL seeks to give recognition and legitimacy to existing traditional knowledge and protect it from being misappropriated.

Source: WIPO, Booklet No. 2, Intellectual Property and Traditional Knowledge.

However, as is the case for other types of IP, ownership rights do not alone generate economic value to the economy or to specific groups. Substantial investment is needed. In the case of GI, action needs to be undertaken on behalf of the collective to obtain added value. Producers need to maintain product quality and develop effective marketing

strategies to ensure brand recognition. Adequate positioning in international distribution chains is also important. If producer associations are weak or even nonexistent, GIs will encounter major problems on the road to success. Complementary policies will be essential to support associations in their functions, rather than only supporting GI registrations. If a large number of products are registered using GI, such investments will be costly and difficult to maintain. A more reasonable strategy is to focus on a few selected products with the highest potential. Taking this approach also helps to avoid the risk of diluting impact by registering too many GIs.

In general, collective action is more important for innovators in informal and traditional sectors because many firms are small, have limited resources and lack sufficient skills. Developing a successful strategy through the use of trademarks, for example, will not be feasible unless these are provided externally by a regional or sector-based business association. This underlines the importance of complementary policies and supporting associations to use IP for the economic benefit of these groups. (The account of Colombia's Juan Valdez described in Chapter 2 provides an example of a successfully deployed GI.) Collective management is also relevant for the entertainment industry, which can provide opportunities for generating income for groups in traditional and informal sectors. Copyright is the main type of IP here. In this case, effective collective management organisations are critical for supporting the local creative industry. They provide one-stop access to a wider body of creations, simplifying negotiations for potential users (who would otherwise have to negotiate individually). These organisations also have greater resources to represent and raise awareness of the rights and interests of their users than their individual members.

A key issue for individuals in informal and traditional sectors is the access costs generated by IP protection. IP protection imposes particularly high costs on the lowest income groups, which may be excluded from consuming products based on these inventions. This is particularly relevant for pharmaceuticals. IP constitutes a barrier if it restrains access by these groups to necessary technologies. Given the often very traditional modes of production, this is probably less of a challenge for most producers. However, it is important to ensure that IP does not become a barrier, in particular during the process of upgrading production technologies as a part of business growth.

"Catching-up" businesses

"Catching-up" businesses are formal businesses, including small and medium-size firms, engaged in incremental innovations based on technologies developed by others, including from abroad. These firms are often in the early stage of building internal innovation capacities, reflected in a workforce that lacks advanced skills. These businesses face the following opportunities and challenges regarding IP:

- Awareness of relevant IP for business strategies is low. Many firms lack awareness about the creation and protection of their IP, such as negotiating and drafting license agreements and patent applications.
- Several types of IP including patents, trademarks, design rights and utility models, can be attractive for "catching-up" firms in different sectors. Utility models can also help support "catching-up" phases of development (Box 1.8). Being more affordable and easily accessible, IP can provide legal protection of firms' activities from potential infringement accusations by subsequently granted patents.

- Ensuring payoffs for IP requires evaluating the impact of processing and enforcement costs including potentially substantial litigation costs. For small companies, enforcement costs are a key challenge as the costs are not proportional to firm size. For example, attorney fees, management costs and the time required to deal with litigation issues can be substantial. What is more, large players often have the means, which small firms lack, to avoid costly litigation by using cross-licensing strategies by holding a portfolio of patents. Large firms can also reach agreements more easily because of repeated interaction with competitors (Lanjouw and Schankerman, 2004). Moreover, the fact that smaller companies are less prepared to withstand litigation increases their risks of facing further litigation. These costs lower their potential returns on IP and thus reduce the potential incentives IP provides for small firms to engage in innovation. Firms lacking confidence in their capacity to enforce rights will refrain from filing IP applications.
- The development of markets, where IP can be traded or used to obtain finance, can empower inventors. By providing them with a title over their inventions, IP, with the exception of trade secrets, signals the value of inventions to financial markets without exposing the innovators to the risk of revealing the nature of their inventions to others. Such access to finance or opportunities to trade IP can in turn facilitate the commercialisation of inventions. For instance, it will be critical for IP titles from universities since these lack manufacturing capacities needed for commercialising inventions. The process is challenging even in many developed countries, however. Licensing is also a key instrument for accessing knowledge for "catching-up" and can be fostered by reasonable licensing norms that balance profits for licensees (including those based abroad) with returns for licensors.

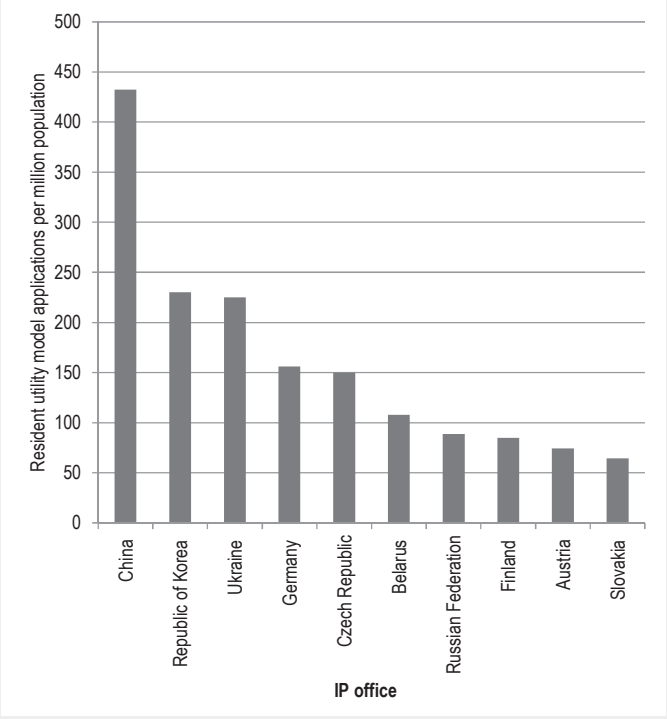
Box 1.8. Utility models and their contributions

Utility models (or "petty patents") provide seeming opportunities for protecting incremental innovations and, thus, potentially for a wider group of innovators. This is particularly relevant in developing and emerging countries where for a large share of firms the distance to the global frontier is large, creating a substantial threshold for obtaining patents. At the same time it might not be attractive to lower the incentive step for patents because in that case the system would provide weaker incentives for more substantial inventions. Moreover, such a step would extend stronger protection provided by patents to inventions of lower value. In this context, protection of minor innovations could be a way to support businesses as they build up capacities, and support wider adoption of patents in the future (Kim et al., 2012, Suthersanen, 2006). Both China and Korea have actively embraced utility models as part of their development process (Figure 1.7). Inventors in a range of middle-income countries, but also some of the leading innovating countries such as Germany and Finland, also use the utility model intensively. In other words, effective systems of utility model protection could address the transformative difficulties that developing countries experience as they move from imitation to innovation, amid a strong regime of patent protection and enforcement. A study of Japan's system of utility model protection, for instance, showed that it contributed positively and significantly to Japan's post-war productivity increases (Maskus and McDaniel, 1999). Such contributions can be particularly substantial where a gap exists between the global frontier and the innovation capacities of a large share of national innovators.

…/…

Box 1.8. Utility models and their contributions *(continued)*

Figure 1.7. IP offices with highest resident utility model applications per million populations for selected IP offices, 2011



Source: WIPO Statistics Database.

However, utility models are not universally adopted in development contexts. The evidence shows that while adoption occurred in some Asian countries (e.g. Korea and Thailand) in the past, many developing and emerging countries firms do not use utility models even if they are made available. One explanation for weak usage is that the system is not quick and simple in practice, diminishing the incentives for firms (WIPO, 2013). Indeed, the application procedure should be low-cost and simple to promote usage, as adequate conditions are critical for the system to operate effectively.

Moreover, a critical challenge, which applies not so much in a development context but more for advanced economies, is where to set the "novelty" requirement. If set too low, there is a risk that the model will create barriers to competition but not support innovation. It might also allow for "evergreening" of prior patents that arguably might provide little rewards when it comes to innovation. Such risks formed the basis for debates on reforms on the utility model system in Australia (IP Australia, 2013). Thus, the threshold for inventiveness has to be set at reasonable levels and depends critically on how it compares to patents.

Leading "frontier" businesses

Many developing and emerging economies boast innovative world-class businesses or "islands of excellence". These businesses often undertake a substantial share of a nation's private sector R&D and have sufficient research capabilities to obtain national IP and, moreover, international IP. When tapping into larger international markets, "frontier" businesses can obtain larger returns on their inventions than would be the case within national markets. They also constitute possible partners for international collaborations in research activities. In certain sectors, such as pharmaceuticals, businesses have to exploit

patent application information from their global competitors more strategically in order to design research agendas for international competitiveness.

Tapping into knowledge from abroad can be more accessible for these businesses and IP can thus provide opportunities, given licensing opportunities. In this context, considering IP as a challenge is probably too simplified an approach. Often locating suitable partners can prove more difficult, than setting up licensing agreements.

Certain challenges do need to be addressed to foster the innovation performance of "frontier" firms. If these firms operate as monopolies without competitive pressures, they may lack incentives to innovate. In this case, IP will not act as an incentive mechanism. Moreover, it is worth exploring the extent to which other support policies are needed and are *complementary* to the rewards provided by IP, from which large firms can reap the largest benefit, particularly compared to smaller entities.

Research institutions and universities

The role of universities and public research institutes (PRIs) in innovation systems is complex, and has been and continues to be the subject of much discussion. Importantly, multiple channels exist by which public research can contribute to innovation, including via advice, consultancy and extension services, dissemination of research findings via publications. In addition, universities have a critical role to play in providing the skills needed for innovation. They have received substantial policy attention with regard to their role as innovators. However, with the exception of a few leading institutions in selected sectors (e.g. pharmaceutical, biomedical and software) and in some countries (notably the United States), universities and public research institutes have so far made minor direct contributions to innovation, and licensing revenues or income from spin-off activities have been modest (OECD, 2013b; WIPO, 2011).

In emerging and developing countries this potential contribution has received particular attention since the business sector is often weak, while research capacities are concentrated in universities and PRIs. The potential benefits for innovation might thus be particularly attractive. University spin-offs can help to create an emerging innovative business sector. However, potential costs also have to be considered, particularly when considering the other key roles that universities and PRIs play in emerging and developing countries (Table 1.4). With weak business framework conditions the extension services provided to industry, for instance, might be equally relevant. In particular, the role of universities and PRIs in ensuring the wide dissemination of knowledge is critical and might be compromised if preserving novelty does not allow the immediate dissemination of findings.

Another key issue is the impacts on research activities themselves. In order to address these concerns several recommendations have been made regarding reservation rights, such as research exemptions notably for research tools, to ensure inventions with a primary function to facilitate research remain accessible, as well as safeguards to ensure dissemination of technologies with humanitarian and social impacts (So et al., 2008). Furthermore, *provisional patents* and *grace periods* are legal devices that maintain an inventor's right to patent an invention in the future, while not having to fulfil all necessary conditions immediately in terms of exact description and non-publicity before filing. These devices are well suited to inventions at a very early stage, when all properties have yet to be worked out and the inventor might wish to publish preliminary results in a scientific publication.

Table 1.4. Impact of IP-based technology transfer policies on universities/public research institutes and firms

	Potential benefits	Potential costs (or investment)
Universities and PRIs	**1) Increased IP ownership facilitating entrepreneurship and vertical specialization** • Reinforcing other policies aimed at academic entrepreneurship (e.g., enhancing access to finance) • Licensing and other revenues (e.g., consulting) can be invested in research **2) Cross-fertilisation between faculty and industry** • Intangible benefits to university reputation and the quality of research • Helping to identify research projects with a dual scientific and commercial purpose **3) Increased student intake and ability to place students in firms**	**1) Diversion of time away from academic research** • Distorting incentives for scientists and potentially also for the nature of public-oriented institutions • Reorganizing university processes and culture with a view to commercialization **2) IP-related establishment and maintenance costs** • Establishing and maintaining a TTO and related IP management, including investment in expertise and human resources • Spending time on IP filings and technology transfer (even if contracted out to a TTO) • Additional financial and reputational costs associated with defence of IP rights
Firms	**1) Facilitates the revelation of useful university inventions to the business sector** • Enabling firms to have access to top scientists and to collaborate with the scientific community in developing innovation within a clear contractual setting **2) Enables the creation of a market for ideas and contracting with universities** • Framework diminishes transaction costs and increases legal certainty, facilitating investment by private sector • Securing an exclusive license increases incentives for further investment • Ability to specialize is competitive advantage (vertical specialization) **3) Commercialization of new products generating profits and growth**	**1) Barriers to access of university inventions** • Precludes free access to university inventions – including the more basic research fields and research tools, except where research is the result of a sponsored contract • Lack of access if another firm has secured an exclusive license **2) IP-based transaction costs and tensions in industry-university relationships** • University scientists lack an understanding of development costs and market needs (cognitive dissonance) leading to higher probability of bargaining breakdown • IP negotiations can interfere with establishment of joint R&D and university-industry relations, where universities act as revenue maximize with strong stance on IP

Source: WIPO (2011), *World IP Report: The Changing Face of Innovation*, WIPO, Geneva.

Fostering university spin-offs or licensing activities to increase the payoff of public research for innovation has proven challenging for developing, emerging and developed economies alike. This is because a variety of factors beyond granting IP ownership need to be in place for them to serve as an instrument for innovation. IP ownership is only a first step in a process that requires additional steps before inventions can be commercialised. The fundamental questions arising are: (i) incentives for researchers to obtain IP and engage in commercialisation activities, (ii) questions regarding the ownership of IP, (iii) TTOs and related service infrastructures, and (iv) the capacities of the private and public sectors to play their respective roles.

Incentives

Researchers' incentive schemes are based on the publication track record of university science researchers rather than on IP and, even less, their commercialisation. The relative payoff given to IP over publications plays a key role. If publications result in higher returns than the returns from IP titles, then the IP incentive scheme provided will be weakened. However, as publications also support innovation systems, then it is not necessarily the case that all decisions should favour fostering IP titles. How IP is integrated into incentive schemes is an additional challenge. If researchers are rewarded

for every patent application they file, the intended effect might not necessarily benefit high-quality innovation, as researchers might decide to file low-quality patents. Rewards for "quantity" rather than "quality" might even distort the nature of the inventions undertaken, favouring less relevant inventions over more fundamental ones. Furthermore, if no further rewards are available beyond those for IP granted, researchers might not provide often needed effective support for the commercialisation of their inventions.

Moreover, if legal or administrative barriers render participation in spin-offs difficult or costly, this will further reduce the incentives for researchers to fully participate in such activities and thus any potential success. To benefit from the innovation system, researchers must apply and use their knowledge. However, additional investments are often needed in order to progress from the invention phase to the commercial product. Common approaches involve licensing-out patented technologies or creating spin-offs. The latter approach depends on suitable market conditions, such as markets for technology, and on regulations. Some national regulations, for example, do not allow researchers who are public sector employees to create start-ups. Another barrier is the lack of flexible employment contracts among researchers, for example, contracts allowing sabbaticals without compromising university career paths.

A further issue is the need to raise awareness among researchers, as commercialisation of knowledge does not form part of the core activities of many researchers. Providing information on opportunities and rewards is often critical and cannot be taken for granted (Zuniga, 2011).

Ownership

A fundamental issue is the way in which IP ownership of universities and research universities is handled. This determines incentives for researchers and universities, both in terms of applying for IP and seeking commercialisation. Among the different approaches adopted, many are influenced by the 1980 Bayh-Dole Act, which instituted a uniform patent policy across US federal agencies and removed many restrictions on licensing. The Act allowed universities to own the patents produced from research financing by federal research grants. Bayh-Dole also stipulated that researchers working on federal research grants are required to disclose their inventions to the Technology Transfer Office, which then takes a decision on whether or not to patent the innovations. Similar legislation was passed in almost all OECD countries in the 1990s and early 2000s, replacing previous systems including the "professor's privilege", whereby inventors could decide for themselves whether or not to patent an invention they owned. If research institutions do not receive returns from inventions of their professorial staff, they have only limited incentives to provide them with support, particularly to produce commercial products out of IP. At the same time, evidence on the impacts of Bayh-Dole and related legislation in developed countries shows that more efforts are required to ensure successful commercialisation strategies by universities and PRIs (Geuna and Nesta, 2006; Mowery et al., 2001).

Technology Transfer Offices (TTOs)

One way to provide such support is through the creation of TTOs. These offices help support adequate linkages between universities and the private sector to develop innovations. This is a vital first step since the success of such links often determines the extent to which university IP can contribute to innovation. The role of TTOs is important to provide researchers with necessary support in their use of IP. This includes (i) informing

and raising awareness regarding the benefits they can derive from IP; (ii) providing assistance with filing patent applications and legal advice regarding IP; and (iii) supporting the commercialisation of IP by providing partnership advice. Many research institutions have set up TTOs, but shortcomings in funding, management and incentives remains a major challenge to their provision of effective services. Reaching sufficient economies of scale is important for sustainable business models for TTOs. Since individual institutions might not have sufficient scale, the creation of regional TTOs might be of interest (Zuniga, 2011).

Private partnerships

Universities and PRIs often cannot fully exploit their inventions as they lack the necessary manufacturing facilities and marketing departments. Private sector partners can play a key role here either as licensees of their inventions or as partners of spin-offs. Linking up with partners thus represents a major opportunity for research organisations seeking to commercialise their inventions. However, challenges frequently arise at this stage, particularly with a weak private business sector. This is where adequate legal and regulatory frameworks become essential. Standard collaboration agreements can help support public-private collaborations (e.g. the Lambert toolkit) (UK IPO, 2013). While they cannot address all challenges that inevitably arise given the unpredictable nature of research, they can provide a starting point for negotiations. However, ways of identifying suitable partners often present a more significant challenge. TTOs need to play a critical role in this regard. Moreover, another key condition is the availability at universities of research capacities that can support private industry needs adequately.

IP and its potential differential impacts across users and aggregate implications

Aside from specific opportunities and challenges provided by IP to different types of users on the producer side, there is the question of differential impacts across users and aggregate implications on innovation performers. This is particularly relevant as there are substantial performance differences in emerging and developing economies (see section 1.2). Larger firms with stronger performance, as indicated by their exporter status, with access to skills, financial services and technology, are more likely to hold quality certifications or patents (Table 1.5). While this is in part related to their stronger research capacities, two other factors might further explain these results and also indicate why IP systems favour larger leading businesses:

- The first concerns the operational and procedural costs of the IP system, such as large sunk costs related to IP enforcement. These favour larger businesses. The issue is even more important in emerging countries as market failures, including lack of access to external sources of finance, are even more substantial and may reduce the ability of small entities to pay IP application, maintenance and enforcement costs. Reducing fees for small entities and implementing policies that prevent the IP system from discriminating against small entities are therefore essential. Effective arbitration mechanisms are important to reduce substantial litigation costs, which would more meaningfully be deployed for investments in innovation.
- The second concerns a more fundamental challenge to effectively using IP for payoffs: smaller businesses and universities and PRIs are disproportionately affected by those difficulties. In particular, universities and PRIs will need to engage in collaborations since they lack the manufacturing capacities to com-

mercialise their IP. Smaller businesses are often more affected by shortcomings in market failures since they cannot internalise some types of activities (e.g. distribution networks if these are weak). They are also more likely to suffer from information asymmetries, which may have a critical effect on financial market performance, and have more limited access to skills than larger businesses. Such differential effects also arise, for example, from the impacts of corruption on business activities, as larger businesses can find alternative approaches for dealing with such challenges (Paunov, 2013). Therefore, the capacity to benefit from IP would, if no corresponding complementary policies were implemented, disproportionately accrue to larger businesses.

Table 1.5. Profiles of firms holding quality certifications and patents in developing and emerging countries, 2009-11

	Quality certification	Domestic patents	Patents abroad
Firm size	+	+	+
Firm age	+	+	0
Exporter status of the firm	+	0	+
Importer status of the firm	+	+	+
Firm has its own website	+	+	+
Firm has access to financial services	+	+	+
Firm provides formal training	+	+	+
Share of skilled workers	+	+	+
Firm uses of foreign technology	+	+	+

Notes: Results are based on probit regressions and also include controls for size of locality, sector and country-year fixed effects, as well as investment in fixed assets, foreign and government ownership. The share of skilled workers is defined as the share of permanent full-time non-production workers over total full-time workers. Size is defined as the natural logarithm of employment, and access to finance indicates whether the firm has an overdraft facility or not. Results for quality certification regressions are based on 19 239 firm observations and regression on domestic patents and patents abroad are based on 9 711 and 9 714 firm observations.

Source: Paunov (forthcoming), "Democratising Intellectual Property Systems: How Corruption Reduces Opportunities" [working title], based on World Bank Enterprise Surveys.

However, this is not equivalent to saying that some users in the production sector necessarily lose out because of the IP system, whereas others benefit. As discussed above, the IP system provides opportunities for different activities including for informal and traditional activities. These opportunities, however, need to be supported by policy. The risk of employment and output losses for local industries can be reversed by the creation of competitive IP-based industries and by enabling the different actors with opportunities to benefit from IP. Complementary policy support is vital to ensure that benefits arise also for more disadvantaged users. These will be equally important from a political economy perspective as perceived benefits for large businesses could lead to opposition to IP systems in spite of wider available benefits. Clearly, competition authorities also have to play their roles in ensuring that use of IP does not lead to abuse of market power.

IP fields of use

The use of IP and its role in offering incentives for innovation varies *across different fields of activity*. For example, pharmaceuticals, chemicals, machinery, computer equipment and precision instruments represent an important share of total patents and play an important role in these industries (OECD, 2009; US Department of Commerce, 2012). For trademarks, the most intensive user sectors include audio and video equipment manufacturing, but also pharmaceutical and medicine manufacturing (US Department of Commerce, 2012).[4] Different types of IP are used for specific activities, such as PVP and GI rights, in addition to patents, utility models and design rights, which are broader in scope. Trademarks differ in this regard as they cover a wider field. With the strong concentration of leading activities in development contexts (Table 1.2), it is useful to focus on types of IP of particular relevance for those activities. Often, as in the case of Chile, agricultural products (e.g. wine and fruit) are of particular importance (WIPO, 2013).

Beyond differences in the type of IP, sector-specific characteristics impact on the use made of IP. For instance, the legal framework for patents treats all sectors equally, but their implementation in practice imposes differences (e.g. some fields require much more extensive documentation than others). There are also other grounds for differences in terms of private returns – explaining different use patterns – as well as social returns:

- One factor is the *speed of innovation cycles*. High turnover rates render IP requiring lengthy registration processes less valuable as it might, once granted, be rendered obsolete by a new invention. The use of IP in such circumstances might heighten the attractiveness of providing protection for unregistered IP (e.g. design rights for textile sectors) as a way to incentivise innovation. This approach might also require focusing on improvements in registration processes.
- Another factor is whether the sector involves *complex or simple technologies*. The former (e.g. for electronics products) will result in hundreds of patentable elements, whereas the latter case (e.g. chemicals) will involve a relatively discrete number of patentable elements. Complex technologies will effectively enhance the importance of cross-licensing agreements, which will then require the close attention of competition authorities.
- An additional factor concerns the *relationship of the IP-protected invention with the commercialised product*. In the case of pharmaceutical inventions, the patent specification corresponds to the manufactured product that will be sold on markets. In the case of engineering, the link between the patented invention and the related innovation process is more complex, as incremental changes normally occur from the development stage to product release on the market (Matthews, 2010). The link between innovation and inventions is, thus, less close for certain sectors; however, this heightens the value of IP to generate the necessary funding.
- Lastly, certain types of IP, such as patents, are also less attractive *where innovations can be kept secret.* For that reason, product innovations are more commonly protected by patents than processes. This suggests that a focus on other types of innovation policy is necessary to complement impacts.

Principles for country policy assessments

Box 1.9. Principles for country policy assessments: Adapting IP systems to users in a development context

Ensuring different groups benefit requires creating a level-playing field

National IP policies need to create opportunities for different groups of actors. This will require targeting particularly those groups that will suffer most from challenges imposed by the development context. This includes providing opportunities for informal and traditional sectors to benefit in their economic activities from IP.

Universities and Public Research Institutes (PRIs)

It is important that the role of universities as innovators does not compromise the important role they play in advancing research and also in disseminating knowledge widely. The following safeguards will thus be critical:

- ensuring research exemptions, notably for research tools
- allowing for grace periods so that inventors can publish results without compromising the novelty requirement needed to obtain patents
- balancing incentives for researchers in such a way that basic research is not compromised by continuing to provide career rewards for publications in peer-reviewed journals.

If the objective is to commercialise IP, then regulations and institutional practices have to provide researchers and their institutions with incentives both to seek IP for inventions with a higher potential of industrial application and to support the commercialisation of those inventions. This requires the following:

- Rewards should be conditional on IP applications with higher potential of subsequent industrial application. Such an evaluation could be done by the institutions' TTOs. Additional rewards can be provided for any invention that reaches the commercial stage.
- Flexibilities in regulatory frameworks that allow researchers in public universities to engage in spin-offs are another important way of supporting IP more effectively. Another alternative is providing inventors with a share of the income from future innovations.

Dealing with IP effectively will require well-funded and equipped TTOs with qualified staff. Moreover, senior management at institutions will need to support these efforts. Given scarce resources, institutions that co-operate with each other in providing services jointly might allow for economies of scale and facilitate better-functioning TTOs. *Regional TTOs can also prove to be useful.*

IP polices have to be part of a broader commercialisation policy mix for university IP to contribute to innovation. This requires *engaging in activities that result in making connections with the private sector to bring in the needed expertise and manufacturing capabilities.* Such activities could include:

- setting up joint university databases on IP available for licensing
- investing in strengthening capacities of private local companies (given their often substantial weaknesses)
- attracting international partners for joint research and/or to commercialise IP generated by universities and public research institutes.

…/…

Box 1.9. Principles for country policy assessments: Adapting IP systems to users in a development context *(continued)*

Traditional and informal sectors

Supporting the use of trademarks, design rights, copyright and GI can help local and traditional industries and thereby facilitate more inclusive innovation processes.

To avoid seeing IP as a threat, traditional producers and local groups have to be aware of the benefits they can derive from IP. *Awareness-raising campaigns* provided by IP offices to these groups and their producer associations are therefore important.

Policies need to ensure that the IP obtained is commercially exploited. This is not a task these often very small and resource-constrained businesses can easily take on. For this reason, *one critical factor is effective collective action, which might involve either producer associations to market GI and promote trademarks effectively, or collecting societies to exploit artistic creations effectively.* It is often better to focus on a few selected cases and provide wider support than to aim for many IP titles, which could receive only limited support.

Establishing databases of traditional knowledge can allow businesses to identify traditional knowledge that can form a basis for innovation. In this way traditional knowledge can act as a lever for local innovation rather than as just a repository of established knowledge.

"Catching-up" businesses

For IP policies to support "catching-up", the innovation performance policy of firms must ensure that the IP system does not exclude these firms. *Policy approaches include offering reduced fees for IP applications and, more importantly, helping to reduce enforcement costs, which represent bigger burdens to small businesses.* Offering effective arbitration and mediation services in case of conflicts over IP is also an approach to consider.

Entering into licensing agreements, especially with foreign inventors, can provide vital support for the transfer of knowledge during the "catching-up" phase. There are several key points involved:

- Such contracts have to be enforceable. If national courts do not treat foreign firms and national firms equally and licensing norms are not perceived as reasonable for both licensors and licensees, then this would likely lead foreign firms to refrain from entering into licensing agreements.
- Services to help potential licensors and licensees identify suitable partners are valuable, given that search costs can be high. IP offices and Chambers of Commerce could advertise IP-protected inventions available for licensing by using online databases. *Sector-specific databases targeted at specific users are particularly useful. Presenting licensable technologies to potential licensees can be particularly powerful as a way of reducing search costs.*
- Licensing support services that help firms to set up licensing arrangements, while the provision of standard contracts can constitute another approach to effectively reducing barriers.
- An on-going process of strengthening absorptive capacities of local businesses is necessary to enhance opportunities for " catching up".

Awareness of how IP can best serve the business objectives of firms and how it can reward innovation activities is often low and a major barrier to the effective use of IP. Compared to developed countries, innovators in emerging countries (including those with the highest potential gains) suffer more from a lack of awareness about how IP can be used best for their business. Chambers of Commerce can also play a role in identifying firms with the biggest innovation potential, based on both the nature of their products and their internal resources, as well as their motivation.

Utility models can help to reward incremental innovation efforts of "catching-up" businesses for inventions that do not meet the inventive step required for patents. The success of such a system depends on the simplicity and affordability of the application processes, and awareness among businesses of the availability of such utility model systems. …/…

Box 1.9. Principles for country policy assessments: Adapting IP systems to users in a development context *(continued)*

IP can also assist businesses in raising finance for innovation activities, and thus make a substantial contribution to their innovation performance. Since markets for finance based on IP are weakly developed, policy intervention will be needed to drive such developments. One possibility is *publicly supported credit schemes that provide financing for businesses to develop innovations based on IP-protected inventions.*

It is important to provide adequate market opportunities for inventors in emerging and developing countries, and also to prevent the most talented inventors and entrepreneurs from moving to developed countries where obtaining IP and developing innovative businesses can be easier.

Leading "frontier" firms

For leading firms with the capacity to compete internationally, *public support to facilitate obtaining IP abroad* is crucial. This will allow tapping into bigger markets and thus leads to larger payoffs for IP. Three approaches are worth considering:

- The first is providing expert support services at national IP offices for successfully filing applications to IP offices abroad, including options of use of PCT applications, as they can facilitate such processes.
- The second is raising awareness about cost-effective opportunities to target international markets that include IP among their components.
- The third is developing international filing strategies to compete with international competitor networks and, in particular, potentially patent pools and cross-licensing arrangements. This includes identifying upfront potential market opportunities in global production.

Competing internationally in sectors, such as pharmaceuticals, requires *identifying research areas with potential market opportunities and strategically exploiting information contained in patent applications filed by competitors nationally and abroad*. Support for such strategy can be based on the following conditions:

- Providing easy online access to patent information is a critical precondition.
- It is important to raise awareness among businesses of the potentially high payoffs from those strategies and help them to make better use of information provided by IP application files.
- Specialised expert services should be provided to firms, possibly with private sector funding.

The value-added proposition of providing complementary innovation support to frontier firms, such as R&D tax credits, needs to be assessed. Frontier firms are best placed to benefit from IP systems. However, if they are insulated from competition, then IP will contribute minimally to incentivising their innovation performance. Complementary IP support policies targeting these firms have to ensure that they lead effectively to more innovation efforts.

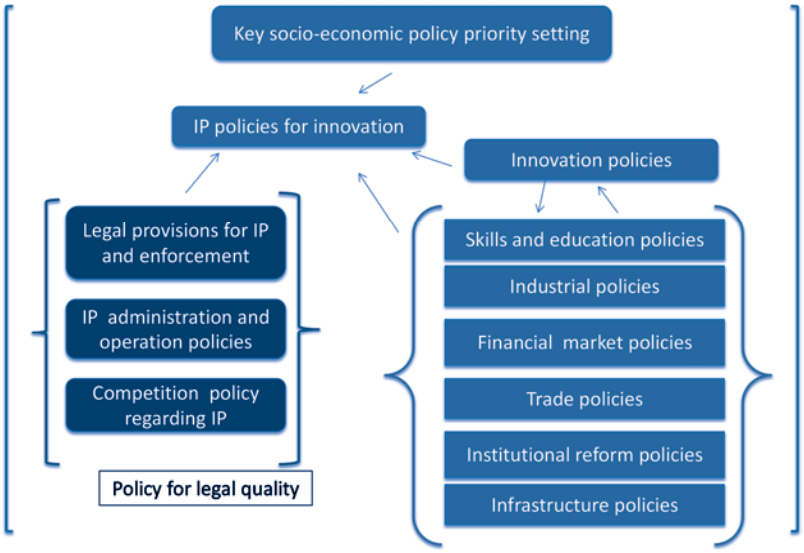
1.5. Connecting IP to innovation policies

Governance of IP systems

National IP systems are inherently complex. They require legal provisions to define the rights and conditions that determine how IP is granted and enforced. IP standards are, as described above, also defined by international, regional and bilateral agreements. Moreover, procedures are required for granting different IP types and implementing IP policies as part of innovation policy. Finally, international policy covers negotiations of free trade agreements that often have IP components, and likewise covers regional and other international negotiations on IP matters. As the IP system covers such a diverse range of legal, economic and strategic functions, its management is increasingly shared

among various institutions. In the past, it was often the case that IP offices took the leading role. This reflected a strong disconnect between IP and innovation policy. Bearing in mind the comparative advantages of different institutions, shared institutional responsibilities are not in themselves problematic. However, in order to ensure IP policy is coherent in its support of innovation, horizontal co-operation is necessary across different institutions *with an explicit focus* on innovation. Co-operation is critical at the top because different institutions in charge might be at cross purposes with one another. As a result, decisions might be contradictory and consequently weaken the contributions of IP to innovation. This is particularly important in development contexts where complementary policies are critical for impacts on innovation. Figure 1.8 illustrates the wider set of relevant policies. The examples of Colombia and Indonesia provided in Chapters 2 and 3 illustrate different types of approaches and the continued challenges that arise for operating such governance effectively. A particular challenge is ensuring wide consultations that include potential IP users, as the most powerful players usually have a stronger voice, while others are less integrated and often lack a stronger political voice.

Figure 1.8. IP policies for innovation in the wider policy context



Characteristics of IP policies relative to others

IP policies are a type of policy tool within the set of alternative and complementary innovation policies. It is important to emphasise their key characteristics to better understand where they can be most powerful. This section provides key characteristics for the case of patent systems as well as, in most cases, for other types of IP (Guellec and van Pottelsberghe, 2007):

Funding for inventors is provided by customers, not by government resources. The fact that taxpayers do not fund IP allows the system to operate at a much larger scale than most other types of innovation policies. R&D tax credits and policies aimed at generating adequate framework conditions, such as competition policy, are similar in that respect. However, an important caveat to this statement is the fact that the IP system will not be equally accessible to all users, particularly small entities. This might bias the support for innovation provided by the IP system unless, as discussed earlier, it is implemented in conjunction with complementary policies. These, however, frequently involve public funding and thus will operate at a smaller scale.

Funding for the inventor is provided ex-post for the value of the invention, rather than upfront to cover the costs of the invention. With patents, the funding that accrues to the inventor is closely related to the value of the invention. The volume of sales and willingness of customers to pay a higher price is the "patent premium". A patent gives its holder the right to market exclusively, although customers retain a strong influence and competition still prevails. Only by convincing customers and outperforming competitors can the patent holder realise gains to their title. Thus, the rewards are decided by markets. The same principle applies for all other types of IP. Inventors still face a series of risks, including market and technological risks, that might compromise their incentives to innovate – and might even challenge their survival[5] – which IP systems do not address. Moreover, lack of access to finance for viable innovation investments substantially constrains the extent to which a wider set of actors are incentivised. This factor becomes even more challenging in development contexts given the well-known shortage of access to sources of finance.

Applied research receives most support from the IP system as it rewards commercialisation. One of the criteria for patent grants is industrial applicability, thus, complementary policies will be needed to support more basic research. In addition, because successful commercialisation leads to rewards, the IP system should provide businesses with incentives to develop innovations, rather than simply developing inventions. This also holds for other types of IP. However, this will only be the case if market conditions allow for fair competition among firms, if the IP system provides for legal quality, and if conditions for the commercialisation of IP are provided (in the case of universities and public research institutes).

Companies or research institutions take economic and technical decisions, not governments. Local or state authorities might not be in the best position to take optimal decisions regarding how to go about generating inventions. If the inventor can obtain returns from IP, then incentives should be set so that inventors will optimise investments. From that perspective, such a system can enhance efficiency and reduce costly control mechanisms for other types of initiatives. However, this is based on the assumption that companies are well equipped to take those decisions and inhabit an environment allowing them to operate optimally.

Patents and other types of IP have exclusionary effects. The potential returns on patents come with a large price tag: the cost of access to innovation goes up because of the need to privatise the invention. The exclusionary effect is highest for those at the lower end. This dilemma raises issues of inequalities for end users and businesses. With highly unequal business structures, gaps in industrial performance may be pushed wider apart. The exclusionary effect can also perpetuate inequalities in opportunities and welfare. The critical factors will be measures to help ensure a level-playing field, not only in principle, but also in practice (implying that unfavourable conditions will be adjusted). This challenge also arises for most other types of IP including design right, copyright and PVP.

The prize-type incentive system provided by patents has mixed effects. On the positive side, the competitive element of patents – the inventor who files first gets the reward – can speed-up invention processes. However, this system comes at a potential cost, namely "patent wars". Competitors may over-invest in research activities to collect the entire reward, when from a social perspective all sides might benefit from a joint reward. This question can similarly arise for other types of IP that are rewarded based on "novelty" including, notably, those where substantial research investments are required. But there are situations in which this concern will be weakened, such as when inventions produced by competitors are ultimately quite different in nature, or are not equivalent, or might serve other purposes rather than becoming fully redundant.

Policy design: Prioritisation, compatibility and trade-offs

Prioritisation from the perspective of highest socio-economic payoffs

Type of policies

Achieving legal quality and ensuring that the consequent legal and administrative conditions for IP hold are preconditions for allowing IP to operate to the advantage of innovation (Figure 1.8). Therefore, the relevant policy recommendations for achieving legal quality and ensuring competition (section 1.4) have to be clear priorities. Institutional weaknesses must become key targets in development contexts, particularly when it comes to enforcement, but also in terms of operations and procedures.

However, achieving those baseline conditions might fall short of effectively supporting innovation, particularly with shortcomings in framework conditions in development contexts (as described in Table 1.2). For instance, incentivising a move towards innovation will require ensuring that finance markets for IP exist and stimulating markets for technology including, notably, suitable buyers and sellers of IP. Other complementary policies will similarly be relevant.

Thus, priorities regarding types of policies are much less feasible since payoffs will not materialise if legal and administrative conditions for IP or complementary policies are not in place. Prioritisation of specific types of IP or specific actors and/or sectors is a more reasonable approach to follow if resources and/or time constraints do not permit addressing all policy factors simultaneously.

Actors

Prioritisation among actors should focus on where IP can have greater payoffs and, when it comes to complementary policies, where contextual conditions create strongest bottlenecks for impacts on innovation performance. This suggests a focus on universities and PRIs in innovation contexts where these concentrate leading research capacities. Initial success can provide further support for additional reforms so as to successively involve an even larger group of actors. However, it is also important to actively involve a large group of actors as a way to avoid bias in the IP system and confront corresponding political pressures, as well as to provide wider innovation opportunities. Therefore, specific projects to support the informal and traditional sectors can be valuable even if initially adopted at a smaller scale.

Types of IP

Weaknesses in research capacities suggest a need to explore other types of IP than patents, in particular trademarks and possibly utility models. PVP and industrial design can similarly be important, notably where the agriculture and textile sectors are significant. The most advanced sectors and those that employ the most are equally relevant factors in setting priorities with regards to types of IP.

Compatibility

The impacts of IP policies will depend on innovation policies and other types of policies (Figure 1.8). While complementary policies are needed to support innovation, other policies may be incompatible and effectively reduce potential impacts. This is particularly the case for IP policies to support the commercialisation of IP by public universities and PRIs. Such policies will only be successful if universities have policies in place that permit licensing to the private sector or alternatively the creation of spin-offs,

as well as adequate incentive schemes to encourage researchers to seek longer term engagements for the development of innovations based on initial inventions. IP support policies are incompatible with a rigid legal context.

Trade-offs

The trade-off between *static loss* over *dynamic efficiency* lies at the heart of IP policy. Exclusive ownership rights provide incentives to generate inventions and innovations (thus reducing access to them). It is difficult to determine where the line should be drawn and, thus, the question as to whether IP systems provide insufficient incentives or excessive rewards to inventors is in many ways inherent to IP policy. The difficulty of assessing social returns and costs, as these not only consider inventions produced but also those that will materialise for a given level of rewards, and the impossibility of doing so on a case-by-case basis, impose a necessarily imperfect approach to addressing the issue. The question of exemptions arises in this specific context with regard to cases where social welfare would be strongly diminished by costs imposed by IP. However, the costs of such measures in terms of future inventions can be substantial. Compliance with international treaties and access to foreign technologies impose additional costs. Provisions such as limited durations for IP, renewal fees, and disclosure and novelty requirements, seek to provide mechanisms for raising social returns without at the same time reducing dynamic gains.

Several additional trade-offs arise for different dimensions of the IP system:

- Regarding patents, setting the incentive step at a higher level could provide incentives for more substantial inventions and lower the number of applications and their impacts, including processing delays and costs. However, this approach might exclude a substantial number of valuable inventions from the system, which would then not be disclosed. The threshold level is difficult to determine and has triggered substantial debates between the US and European models. Where the diversity of innovation capacities is substantial, as is the case for developing and emerging countries, a utility model system can help to reconcile different objectives.
- Another trade-off relates to duration and subject matter and patent scope as they critically set the reward for the inventor and the economic costs that patents generate.[6] In such cases the impacts depend on the fields of IP use as well as the competitive environment, and critically affect access to knowledge and dissemination. The fundamental question here is the extent to which these can be set to avoid restraining future innovations excessively. Moreover, exclusive rights over an invention can impose particularly high social costs if there are few close substitutes for the invention. At the same time a proliferation of patents of smaller scope can be a restraint if it leads to excessively dispersed ownership of parts of an innovation.
- The question of IP ownership of research results produced by universities and public research institutes, and funded by public resources, has also been raised as a possible barrier to the dissemination of knowledge. It has been argued that having such knowledge in the public domain could facilitate future research over the potential of IP to help foster the commercialisation of such IP. However, exclusive rights are sometimes a necessary condition for a business to invest in an invention.

Principles for country policy assessments

Box 1.10. Principles for country policy assessments: Connecting IP to innovation policies

Creating a powerful functioning co-ordinating body for IP from the perspective of innovation.

The existence of a functioning co-ordinating body that supports IP-related policies from the perspective of innovation is necessary for effective IP policies for innovation. Co-ordinating bodies for IP policy have been created in several countries including Colombia and Indonesia. The challenge often consists of ensuring the following functions are provided:

- Governmental institutions closely involved in economic development and innovation strategies should shape the agenda and policy orientations. Otherwise such bodies risk focusing only on questions more closely associated with the operation of IP systems, such as procedures and enforcement.
- A council positioned at the highest level of the executive (i.e. presidential or prime ministerial level) will ensure that IP systems are accorded sufficient importance. An example is Japan's IP commission.
- The co-ordinating body has to have the authority to take decisions and assess their enforcement by different IP institutions. In its absence the co-ordinating body will not have the capacity to put in place needed reforms.
- Transparency on the part of institutions is needed to avoid the risk of capture by specific interest groups.
- Consultations should be open to a variety of actors including representatives from diverse IP user groups. The private sector should also be involved.

IP systems can be powerful in development contexts, but also have limitations.

The patent system rewards inventions with the highest commercial value and allows for incentives on a larger scale compared to other innovation policy schemes, because customers rather than government budgets finance rewards. The system also places on the government less of a burden for "getting it right", compared to other types of innovation policies, such as innovation grants, since customers decide on rewards. These factors make the patent system an attractive tool for innovation policy for all countries. *Thus, IP systems should also be used in development contexts in support of innovation.*

IP-based innovation policies have their limitations. Patent-based support schemes give rewards only to those inventors who already fulfil relevant pre-conditions for conducting research at a high enough level to stand a chance at obtaining patents. This applies less strongly for other types of IP such as trademarks, utility models and design rights. However, taking advantage of IP systems generally requires access to finance, suitable skills, infrastructure and having opportunities for commercialisation. In an economic system with multiple market failures and less developed markets for technology, IP titles alone might not offer sufficient rewards. *Complementary innovation policies will be necessary to support the entire innovation system and the performance of the IP system.* This is even more so for development challenges.

IP policies have to combine types of policies, but should prioritise actors with the highest potential and largest constraints.

IP systems require adequate legal and administrative conditions and adjustments for users in a development context if they are to successfully support innovation. Priorities should be set by supporting actors for activities with the highest potential return from IP use and for those most in need of complementary support. While arguments can be made as to why the IP system cannot from a legal and administrative perspective treat users differently depending on their sectors of activity, the same does not have to apply to innovation policies using IP. Such an approach maximises opportunities for initial policy success and supports future reforms.

IP policies must be compatible with a wider set of policies that impact innovation.

IP policies will not be successful in isolation. Moreover, if they are in conflict with other relevant policies for innovation, they will likely have no impact. To avoid incompatible policies it is important that the design of IP systems considers the perspective of potential users and the conditions they face in innovating. This not only requires adequate governance of IP systems, but also close assessment of user needs so as to provide corresponding policies.

Trade-offs should be set to best service development contexts.

Trade-offs necessarily arise when setting IP policies. These should be set with a view to best supporting users in specific contexts. With respect to the inventive step, the trade-off can be effectively addressed by implementing adequate utility model systems.

Notes

1. OECD (2009) provides a more detailed description.
2. EPO (2010) provides a more detailed discussion.
3. Refer to www.wipo.int/tk/en/databases/tkportal/.
4. In fact, some of the increase in patent registrations in leading IP offices is due to increased applications for biotechnology and IT.
5. Fernandes and Paunov (2012) analyse the innovation-survival link and how it relates to various types of risks associated with innovation.
6. By reducing competition and increasing prices, they exclude some consumers. Customers willing to pay more than the marginal cost but less than the mark-up price cannot buy the good. This generates an economic inefficiency, a deadweight loss.

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Annex 1.A1

Implications for conducting analyses of IP systems

An analysis of IP systems in emerging countries based on this framework will require collecting different types of information through desk research, so as to identify specific policy recommendations. In order to assess different challenges posed by the IP system, analysts will need to interview the key actors of the IP and innovation system and, in so doing, should focus on the IP system dimensions described by the framework. The following five types of information will be required for the assessment:

Information on the legal and administrative conditions of IP systems

This covers various aspects of operations of the IP system including the legal and procedural dimensions of national IP systems. Over the past years, WIPO has implemented a variety of surveys and country case studies on specific IP issues that provide access to relevant information on those questions. This includes: (i) the Questionnaire on Exceptions and Limitations to Patent Rights, (ii) the Questionnaire on Trademark Law and Practice, and (iii) the 2010 Surveys of Existing Practices, Protocols and Policies relating to the safeguarding of, access to, ownership of and control over cultural heritage. However, consultations with national IP offices will be important to complement the information for the purposes of conducting a country assessment. They will notably provide an opportunity to discuss bottlenecks faced by various institutions and the (often unexpected) challenges that arise when taking steps to address some of these shortcomings.

Information on policy making regarding IP and innovation

This is information on IP support policies, including those related to procedures and to the wider set beyond, such as complementary efforts aimed at supporting commercialisation. Information has to be gathered on the governance of innovation and IP systems, and the nature of co-ordination among the various actors. Consultations with various institutions are useful, since institutional practice is critical to understand governance.

Statistical information on the use of IP

Statistical information on some types of IP will be important to understand the relative and absolute importance of the use of IP. At the same time, it is worth noting that such statistics are also partly affected by shortcomings of the system, as there might be potential demand that is not taken up because of the weaknesses of national IP systems. Box 1.A1.1 provides a basic list of indicators of interest.[1] The information provided for registered IP allows, moreover, for a much richer assessment of use profiles. A wide set

of basic statistics are available from the WIPO IP Statistics Data Center with an annual overview provided by the World Intellectual Property Indicators publication.

In this context, it is particularly important not only to know about a country's overall IP performance, but also how different groups of users benefit and operate with IP. Some information is available from firm innovation surveys with the shortcoming that the information on IP titles is often limited. In order to have better information it is necessary to link information from IP databases with information on firm characteristics from firm surveys. Several initiatives have started to systematically link firm and IP information. These allow the collection of economically relevant factors as to types and issues affecting patenting. Notably, WIPO has supported efforts aimed at linking information on different types of IP such as patents, trademarks, utility models and design, and matching them to the firm-level census data and innovation surveys. Two studies on Brazil and Chile provide the resulting statistical evidence (WIPO, 2013b, 2013c). The OECD has also conducted work to link firm micro data from the Orbis firm database with IP data, both to produce statistical indicators and to conduct analytical studies on their basis.

Box 1.A1.1. List of quantitative indicators on IP needed for analysis

Patents:

- national patents, resident and non-resident, by office, origin and technology class, relative to regional and world performance
- patenting abroad: PCT, patent family databases, Triadic Patents, USPTO, EPO, JPO and domestic patents.

Utility models:

- breakdown of models, resident and non-resident, by office, origin and technology class, relative to regional and world performance.

Trademarks:

- national trademarks, resident and non-resident
- trademark application abroad: USPTO, Madrid system where applicable

Design rights:

- breakdown, resident and non-resident, by office, origin and technology class

Royalties and licenses:

- possible use of data on net payments and receipts on royalties and licensee fees

Survey data on firm's use of IP:

- relevant questions on IP use and licensing activities from innovation surveys or statistics based on matched firm-IP databases, where available, linking firm characteristics with IP uses

Information on the socio-economic context

The socio-economic context is of relevance in identifying particularly important groups of innovators. It also helps to assess the framework conditions that these groups face and thereby ascertains the necessary operational conditions for the IP system to support innovation. Understanding developmental objectives and opportunities can also help to highlight the areas where IP can make meaningful contributions. Box 1.A1.2 describes those dimensions and a selection of relevant indicators.

Box 1.A1.2. Relevant country information and indicator requirements on economic characteristics and social challenges

- *Macroeconomic performance*: GDP, GDP growth, GDP per capita, trends over past years including major crises, major developments and forecasts
- *Social challenges*: absolute and relative poverty indices, inequality
- *External trade, international competitiveness and foreign investment*: trade/GDP, FDI, FDI by sector, position in global value chains, main traded products and markets, main trade partners, trade policy, trade agreements, tariff policies
- *Productivity performance*: TFP and labour productivity measures
- *Economic structure*: structure of manufacturing including share of low-tech, medium-tech and high-tech industries, share of agriculture, manufacturing and services in GDP, importance of raw material-based industries, existence of biological resources, relevance of traditional knowledge
- *Industry structure*: importance of small, medium and large firms, entrepreneurship, rate of firm creation and firm exit, state of competition across different sectors, informal sector
- *Education and skills*: literacy, educational attainment levels, PISA quality of education indicators, evidence on reported shortages of skills in labour markets
- *Financial sector*: financial sector and access to finance, government involvement, other financial markets especially for innovation, such as VC, equity/stock market capitalisation
- *Framework conditions*: administrative burdens and red tape faced by entrepreneurs, costs of opening and operating businesses, major constraints faced by businesses including corruption, transport and ICT infrastructure, access to finance
- *Policy*: main national development objectives as well as aid policies and actions undertaken by NGOs as they relate to applying technologies to inclusive development, health, environmental and social questions.

Information on innovation systems and their relation with IP policy

It is essential to focus on the national innovation system to position IP policy accordingly (see Box 1.A1.3 for some key indicators, although a full assessment of innovation policies will provide even better insights). As discussed in the framework, it is critical that the process take into account different groups on the production side and their conditions for engaging in innovation activities. Consultations with national stakeholders will be important for discussion of specific bottlenecks and experiences with potential solutions. The WIPO Methodology for the Development of National Intellectual Property Strategies addresses some of the relevant questions.

Box 1.A1.3. The national innovation system, its performance and policy

- *General characteristics*: GERD/GDP, general performance, patents, evolution and weight of specific sectors/activities, trademarks, human resource indicators most specific to innovation, such as engineering and scientific disciplines
- *Government and university research sector*: GOVERD, HERD, scientific publication statistics, organisations, leading institutions, private vs. public funding, leading research domains, and nature of public governance of research, policies regarding research including funding conditions and amounts, levels of independence, performance-based efforts, policies and state of commercialisation, research quality of universities, national universities in international rankings, publication statistics for national institutions, major international co-operation agreements and co-operation among researchers, international co-publications, exchange programmes for researchers with foreign universities
- *Business performance*: BERD, export performance, levels of machinery investments, top national and foreign R&D investors, R&D by industry, firm size, performance of foreign compared to domestic businesses, export unit values, additional data from innovation surveys if any, and other specific sources on specific domains
- *Innovation policy*: national innovation strategy and its objectives, government support, policies, agencies, statistics, both direct and indirect measures for businesses, specific policies on clusters, thematic programmes especially health and social challenges.

Note

1. Refer to country profiles at www.wipo.int/ipstats/en/statistics/country_profile/ and statistical data at www.wipo.int/ipstats/en/.

Chapter 2

Study of Colombia's national intellectual property system

Colombian firms and research institutions use intellectual property (IP) much less to protect inventions than their regional neighbours and most OECD countries. Only some universities and a few large firms file for international patents. Lack of skills, weak research infrastructure and low levels of business innovation capabilities contribute to weak performance. IP policy therefore must be embedded in a broader set of innovation policies. Recent reforms have considerably improved legal and administrative conditions. More has to be done to assist a wider group of innovators in identifying how IP can serve their business activities. Researchers need further support to engage in spin-offs and public universities to co-operate with industry. Expert support services should also be expanded. Colombia's Intersectoral Commission for Intellectual Property (CIPI) could be enabled to play a significant role in pushing the "IP for innovation" agenda forward.

2.1. Overall assessment and recommendations

Introduction

Since 2006, policy makers in Colombia have developed an intellectual property (IP) strategy oriented to supporting innovation and national competitiveness. This has resulted in various reforms that have helped to improve the legal and administrative conditions of the IP system, and thus have created opportunities for the IP system to play a more prominent role in support of innovation. In light of these developments and with the current re-orientation of Colombia's innovation policy, this report, which is based on the framework developed in Chapter 1, provides recommendations to help support Colombia's IP policy for innovation at this critical stage.

The study is based on an analysis of the national intellectual property systems, which draws on a country mission conducted in January 2013 that gathered detailed information and feedback from more than draws on about 50 interviews with public and private research institutions and companies; representatives from IP offices in Colombia, including the Superintendency of Industry and Commerce (SIC), the Colombian Agricultural Institute (ICA) and the Colombian Copyright Office; and representatives from governmental institutions in charge of conducting IP and innovation policy, including the Technical Ministry for Science, Technology and Innovation (Colciencias), the National Planning Department (DNP), and the Ministry of Trade, Industry and Tourism (MCIT).[1]

This chapter is structured as follows. Section 2.3 provides an overview of the socio-economic and innovation context of Colombia; section 2.4 examines the use of IP in Colombia; and section 2.5 describes the various dimensions of the IP system with respect to its relationship to innovation.

The socio-economic and innovation context of Colombia and IP policy

In Colombia, recent years have seen the end of two consecutive decades of slow economic growth transforming the country into an emerging middle-income market. Since 2000, average GDP growth has been 4.27%. Nevertheless, the country still faces many structural challenges. It remains one of the most unequal countries in the world and has suffered from ongoing internal conflict for more than 60 years. Productivity remains low because of poor quality of education, weak infrastructure, persistent informality and low governance levels. These factors also hinder innovation system's performance. However, the current mineral sector boom provides new opportunities in this regard as 10% of royalties will be dedicated to building up the innovation system, providing an opportunity to strengthen skills, business-framework conditions, interactions and linkages. Meanwhile, large commodity-related foreign direct investment (FDI) inflows and exchange-rate appreciation are increasingly generating worries of Dutch disease. Table 2.1 provides a summary of the strengths, weaknesses, opportunities and threats (SWOT) to Colombia's innovation system.

Table 2.1. Summary SWOT analysis

STRENGTHS	OPPORTUNITIES
• Strong economic performance over most of the last decade. • Strong political commitment to education and increasing participation rates. • Strong commitment to strengthen innovation as a sustainable and inclusive driver of development. • Some research institutions with strong research capacities and international linkages. • Confidence, enthusiasm and willingness to innovate among the national STI policy leadership. Similar qualities at departmental and municipal levels in some areas. • Strong political commitment to grow the Colombian digital economy and the deployment of a fibre backbone throughout the country.	• Improved security and framework conditions for innovation and commitment to further integration of Colombia in the global economy. • To focus policies on making business the main driver of the innovation system. • The prospect of rising levels of royalty-derived funding for STI activities. Inclusion of a wider spectrum of stakeholders in the allocation of resources and capability development across regions. • To provide incentives for companies to enhance local development of operating skills and innovative capabilities. • To establish an infrastructure of strong government laboratories, research and technology organisations and universities with evolving interaction with business. • Recent initiatives to raise the quality and capability of Colombia's IP system to encourage innovation.
WEAKNESSES	**THREATS**
• Low levels of business innovation capabilities and productivity, with a long "tail" of weak companies. • Increasing reliance on mineral commodities and slow diversification into new economic activities. • High levels of inequality in income and opportunity, in particular in access to tertiary education. • The small scale of the formally organised innovation system and its concentration in an "island" of academic and research institutions. • Resource and human capital constraints in research-performing institutions resulting in a small (although rising) research output of variable quality. • Shortcomings in technological, technical training and learning in production enterprises. • High levels of social need for innovation that are insufficiently articulated in demand and poorly linked to innovation. • An unbalanced STI policy mix overly focused on a narrow range of innovation modes of limited relevance to most businesses and to social innovation. • Limited policy co-ordination among ministries and across regions.	• Failure to diversify and move into higher-value segments, to exploit the up- and down-stream opportunities of the minerals boom. • Failure to embed innovation pervasively in businesses and in the fabric of society. • Failure to reorient STI policy towards addressing a broader range of firms with different needs and to provide support more directly. • Cumbersome project application and lengthy decision procedures that weaken resource mobilisation and project impacts. • Insufficient mobilisation of human capital and capacity to exploit the window of opportunity offered by the STI royalties fund. • Inability to upgrade skills and quality sufficiently to support the needs of the wider innovation system for human capital and knowledge. • Failure to pursue agendas that serve wider societal and economic needs.

Source: OECD (forthcoming), *OECD Reviews of Innovation Policy: Colombia*, OECD Publishing.

The socio-economic context of Colombia and the characteristics of its innovation system (section 2.4) are crucial to the capacity of IP to support innovation in Colombia, as the following points make clear:

- Colombia's good economic performance in the last decade, its strong macro-economic discipline, its well-integrated trade environment and its increased national security, *provide the right context for strengthening its innovation system, including its IP system, to enhance its contributions to innovation.* Colombia has also substantially reduced tariffs and barriers to FDI and signed various free trade agreements including with the European Union (EU) and the United States. This has raised opportunities for accessing and tapping into

knowledge from abroad. *The incentives of foreign companies to engage in knowledge transfers will also depend on whether they perceive Colombia's IP system as one that provides them with sufficient legal security to protect their IP.*

- A small number of well-known universities produce qualified scientists and conduct research in an expanding higher education sector, while in the private sector a small cadre of innovation-oriented companies have grown to appreciate the benefits of innovation. *A key implication for IP policies, particularly those based on patents, is that a focus on leading research institutions offers the greatest opportunities for success. This will also require engaging private actors in fostering commercialisation and engaging in efforts to develop licensing and markets for IP, as research institutions do not have the capacity for commercialisation. Given the weaknesses of private sector activities in innovation, foreign markets for IP might be particularly attractive outlets.*

- Colombia has a low-technology base and declining exports of high-technology products. Many private sector actors in low-technology manufacturing and services have been only modestly engaged in innovation activities and only slightly engaged in technology-based innovations. *With such a low-skills base, patents will not be attainable for many actors in the innovation system.*

- Colombia's biodiversity offers potential opportunities for inclusive economic development, in particular with increasing demand on international markets for natural products and developments in biotechnology. *A focus on ownership and the access rights of genetic resources can be important in this specific context, as they determine how benefits are shared and enable their use for commercial purposes.*

- Colombia has low levels of industrial innovation, which need to be addressed. However, some sectors outside those traditionally considered as innovation-intensive can provide opportunities for developing innovation capacities. This includes extractive industries, which require innovation-based services adapted to local conditions. In fact, Colombia's most active patenting company is the state-owned firm, Ecopetrol. *IP policy that is relevant for different actors in these sectors can be useful as a way to raise the contributions of IP to innovation, especially in conjunction with corresponding innovation policies. A focus on IP for industrial innovations in manufacturing alone might not be as useful.*

- Inequality is an important challenge for Colombia. Given that the informal sector employs about half of the labour force, the question of how to integrate groups commonly excluded from innovation cannot be easily dismissed. *While IP policies are certainly not the primary solution, their importance demands that attention be paid to ways in which IP can support innovators in informal and traditional sectors, and provide a contribution to addressing this social challenge.*

- Several types of market failure constrain the performance of innovators in Colombia. These include limited access to capital for innovation and high barriers to business entry. *While IP can provide powerful incentives, returns such as royalties will only arise for inventors who have successfully commercialised their inventions. This means that IP will only be used by those who are least affected by market failure, including access to capital and other barriers to entry, unless complementary policies can address these issues. Small entities such as universities and small businesses will face difficulties in obtaining returns from their inventions on domestic markets.*

2.2. Key recommendations

Main lines of policy action

The national IP system in Colombia can help to strengthen the country's innovation system; however, it must be accompanied by a range of complementary policies. These include policies to encourage interaction among actors in the innovation system, address the weak-skills base, and contend with shortcomings in the business framework, such as the limited opportunities for innovators to obtain external financing and the substantial transportation costs to reach markets given inadequate infrastructure.

Substantial delays in processing IP litigation and a lack of relevant knowledge on the part of judges have acted as constraints on the effectiveness of the IP system. To help remedy this weakness, IP offices were granted judicial powers in 2012, but this approach must be complemented by corresponding resource decisions and continued efforts aimed at improving efficiency if it is to be effective. Efforts aimed at improving the quality of IP examinations while reducing delays in processing should continue, so as to reinforce recent achievements by the SIC. In addition, provision of regional IP services, particularly in regions where industrial capacities are strong, can encourage use of the IP system outside of Bogotá. Furthermore, provision of information online on IP application procedures and effective use of IP by businesses can support these efforts, but should be complemented by capacity-building efforts, otherwise uptake is unlikely to increase substantially.

Colombia's private and public universities have begun to define IP policies to support commercialisation efforts. However, the fact that public sector officials cannot operate spin-offs impedes the ability of public universities to engage fully in commercialisation activities. This restriction is of particular relevance, as researchers do not receive substantial rewards as part of their salaries for obtaining or commercialising IP. Similarly public programmes aimed at supporting the use of IP have to be streamlined to allow them to play their intended role.

Focusing IP awareness and capacity-building initiatives on national actors with the strongest potential for obtaining revenue-generating IP can bring the highest payoffs for Colombia's innovation system. Moreover, geographical indication (GI) and trademarks have formed the basis of the successful "Juan Valdez" brand (Box 2.1). Replicating its success for other products requires complementary policies aimed at building effective collective associations. Engaging in such efforts for a selected set of products is preferable to expanding the number of GIs with the limited support of such associations.

Moreover, support for specialised services such as TECNNOVA, which conducts technology screening, is important as it enables Colombia's innovators to take advantage of information on technologies contained in patent application files, and thus promotes the "catching up" process.

Finally, the success of Colombia's IP co-ordination body, the Intersectoral Commission for Intellectual Property of Colombia (CIPI), in co-ordinating enforcement issues, should be capitalised upon with the creation of an institutional framework that would allow it to implement an "IP for innovation" agenda. Moreover, regarding the institutional context for Colombia's IP policy, the proposal to create an autonomous industrial property institute that deals exclusively with industrial property is an attractive option. Such a body could work to ensure that IP questions are given sufficient focus and that the functions of competition and IP granting authority are separated, as would be the case if implemented by separate institutions.

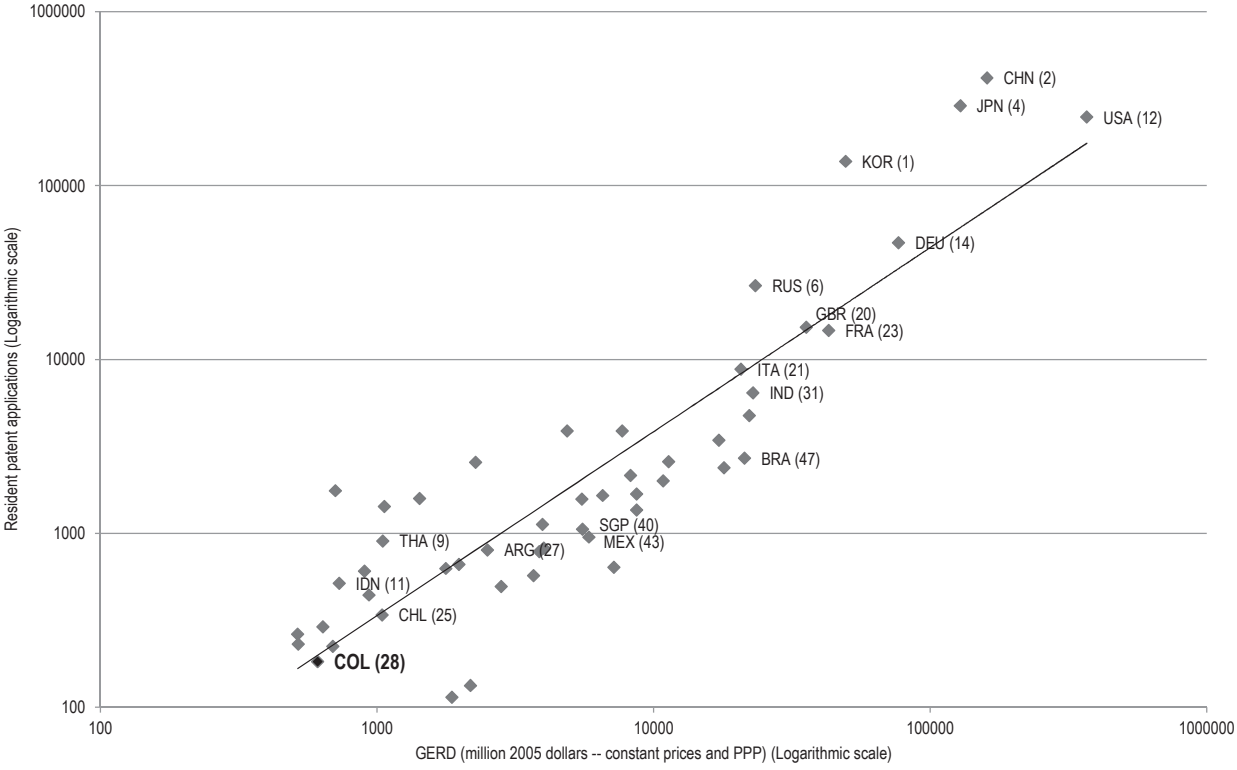
Detailed recommendations

Connecting IP policies to innovation policies

1. **IP can be a powerful support for Colombia's innovation system, but it is critical for Colombia to implement complementary innovation policies to strengthen its innovation performance.**

   Low levels of R&D investments in Colombia are a proxy indicating that inputs into innovation activities are still limited and thus the ability of the system to generate patentable inventions is low, independent of the state of the country's IP system. Figure 2.1 shows that the number of Colombian patent applications is highly correlated with the level of R&D investment.

Figure 2.1. Resident patent applications and gross domestic expenditure on R&D (GERD), 2011 or latest available year



Notes: 1. A resident application is an application filed with an IP office by an applicant residing in the country/region in which that office has jurisdiction. 2. Countries were selected if they had a GERD greater than USD 500 million PPP (in constant prices, 2005) and more than 100 resident patent applications. 3. Resident patent application data are for 2011 and 2010 for GERD, except for Belarus, Brazil, China, Egypt, Hong Kong, Indonesia, Mexico, New Zealand, Pakistan, Serbia, Slovenia, South Africa and Ukraine, (2010 and 2009 for GERD); for Switzerland (2009 and 2008 for GERD); and for Argentina, Greece, India and Thailand, (2008 and 2007 for GERD). 4. A ranking of "a resident patent applications-per-GERD" out of 50 offices for which data are available is displayed in parentheses.

Sources: OECD calculations based on WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch; OECD, *Main Science and Technology Indicators*, http://stats.oecd.org/Index.aspx?QueryId=33210; and UNESCO, http://stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx?IF_ActivePath=P,54&IF_Language=eng.

Indeed, a large number of universities, research institutions and companies lack the necessary research capacity to produce patents. Moreover, innovation capacities are generally low. This is related to a variety of challenges affecting Colombia's innovation system, which IP policies alone cannot address (see Annex A). This requires the implementation of policies aimed at enhancing the availability of skills and at strengthening connections between actors such as universities and private businesses. The OECD Review of Innovation Policy of Colombia will provide a comprehensive set of recommendations aimed at supporting innovation performance (OECD, forthcoming). Improvements will in turn allow the IP system to contribute even more substantially to innovation; for instance, better university-firm linkages help to improve opportunities for the commercialisation of IP at universities. In combination with such policies, the national IP system can be a powerful tool to help strengthen Colombia's innovation performance.

2. **Colombia's Intersectoral Commission for Intellectual Property (CIPI) could play a significant role in pushing the "IP for innovation" agenda forward. Success will require an explicit focus on innovation, involvement of the private sector, high-level policy buy-in and the implementation of decisions by the relevant public entities.**

   The various participants in CIPI have acknowledged the Commission's valuable contributions to improving co-ordination among actors of the IP system. Significant progress has been made on the operational side; however, there is currently no formal connection between CIPI and co-ordinating bodies responsible for competitiveness and innovation. This needs improvement. The role of CIPI will need to be adapted if it is to take the necessary steps to stimulate IP policy for innovation including: (i) high-level policy engagement, as is the case in leading innovating countries (e.g. in Japan, the Prime Minister heads the country's IP co-ordinating body); (ii) the adoption of an "IP for innovation" agenda, which would define specific targets and their periodic evaluation mechanisms; (iii) a requirement for participating institutions to implement these decisions; and (iv) the involvement of the private sector, including different types of actual *and* potential users (e.g. representatives from traditional industries). The latter are critical to effectively negotiating challenges to turning IP into an instrument for innovation.

3. **Colombia should consider creating an autonomous industrial property institute to deal exclusively with industrial property.**

   The SIC is responsible for IP operations and procedures regarding industrial property. At the same time it acts as Colombia's consumer protection agency and its competition authority. With increased uses of IP by local entities, these multiple roles may result in a conflict of interest. Moreover, the variety of tasks do not help the SIC to focus on IP and its role to support Colombia's innovation system. The proposal to create an autonomous institution, formulated in SIC's document *Propiedad Industrial 2020,* is therefore an attractive option.

Legal and administrative conditions of IP systems

4. **Colombia's IP offices will need adequate resources and staffing to carry out their new jurisdictional powers and must seek efficiency improvements where possible.**

   Users of the IP system in Colombia agree that the legal system is not equipped to efficiently support the enforcement of IP rights. Judges are often insufficiently trained on matters regarding IP and are not best prepared to pronounce on IP matters. The delays inherent in the judicial system constitute a more fundamental challenge; one caused by insufficient resources relative to the amount of cases presented to the courts. As criminal law cases have priority over civil law cases, IP law cases face even more substantial delays. For this reason, in 2012, Colombia's three IP offices received jurisdictional power allowing them to act as a court of first instance over IP conflicts. The effectiveness of this decision, however, depends on the allocation of necessary resources and staff, as well as the ability of IP offices to raise the efficiency of their operation. Needs will become clearer once the effective demand for these services becomes clearer.

5. **Efforts aimed at reducing backlogs need to continue.**

   Delays in processing IP applications can impede the effectiveness of the system. The SIC therefore decided to invest in reducing backlogs, increasing the quality and speed of examination processes also by seeking further automation of processes. The result was a reduction in processing times for different types of IP. However, continued efforts will be needed to keep the backlog under control. This also requires flexibility in the allocation of resources to allow the SIC to respond adequately to shifts in application numbers, as it does not have an autonomous budget. This question is particularly relevant in the current context with the new jurisdictional powers granted to the SIC. Colombia's SIC is well connected to other IP offices in the region, with which it continues to co-operate, and with the World Intellectual Property Organisation (WIPO), on initiatives to improve performance. These efforts help to maintain the effectiveness of the system and help avoid over usage of skilled workers needed elsewhere in the economy, notably to drive innovation.

Adapting IP systems to users

6. **Simplified IP application procedures and fee discounts can have more substantial effects if combined with innovation support policies.**

   Applicants from micro and small companies and inventors with low incomes received specific discount rates for IP applications to the SIC, contributing to a rise in applications among those groups. Another approach taken to improve both efficiency and access has been the introduction of simplified application procedures. The use of IP as part of a business's innovation processes, however, needs to go beyond the application stage. Most firms lack the expertise required to successfully exploit IP. This raises the risk of failed IP strategies and in reaction to failure potentially to firms' resistance to IP use in the future. The provision of adequate training courses and export support services for these users is, therefore, critical. Other useful approaches include the establishment of networks of firms to create mutual learning opportunities and support for expert advisory services. The initiative taken by the SIC to provide those participating in training activities with additional application discounts is a useful incentive-scheme to effectively increase uptake.

7. **It is important to create regional IP services to incentivise the wider use of IP and to help enhance the role IP can play in plans aimed at fostering regional S&T and innovation capacities.**

   At present, IP offices in Colombia are based exclusively in Bogotá. Given the complex geography and substantial regional differences, far higher costs to access IP services are incurred by users not based in the capital. About 80% of patent applications and 75% of other IP applications come from Bogotá. This concentration can only in part be explained by a strong concentration of economic activities in Colombia's capital. Providing regional IP services would be particularly useful in regions such as Antioquia with a high potential of benefitting from the use of IP. Different possibilities are discussed in the SIC document *Propiedad Industrial 2020* (2012). One possible option to reduce the upfront costs of opening new offices is to co-operate with institutions such as regional Chambers of Commerce among others. Online services could help to reduce IP application costs for those located outside of Bogotá, but will be insufficient to strengthen IP use among those with no prior experience.

8. **IP policy should address regulatory constraints faced by researchers in public universities and support services provided by external institutions such as TECNNOVA to help universities reach out to the private sector.**

   Public sector officials are not permitted to create spin-offs because of regulation prohibiting additional revenues outside their salaries. In 2013, Colciencias, the Universidad de Antioquia and the Colombian Association for the Progress of Science (ACAC) took steps to identify a legal alternative that would allow researchers to engage in such ventures. Possible approaches include more flexible work contracts providing researchers with the option to take leave if they wish to create a spin-off.

   The financing of TTOs is a challenge for a large number of universities, not only those in emerging economies. Reaching sufficient economies of scale is important for sustainable business models for TTOs. Since individual institutions might not have sufficient scale, promoting support services for several institutions is of interest. It is particularly worth supporting services that help to establish links with the private sector, in particular for universities with the capacity to produce patents of potentially high commercial value. Institutions such as TECNNOVA are good examples of this approach. In cases where the private sector is not well prepared to co-operate with universities, advisory services can play a key role in strengthening capacities to engage in co-operation.

9. **IP awareness and capacity-building initiatives should focus on national actors with the strongest potential for obtaining revenue-generating IP, as these can bring the highest pay-offs for the innovation system.**

   Successful IP uptake will depend on realisation among businesses of the value that IP can offer them. IP offices in Colombia have engaged in awareness-raising campaigns to this effect; however, specifically targeted services that provide firms with advice on the IP most useful to them (as proposed by the project *Propiedad Intelectual Colombia*) can optimise their impact on innovation systems (Box 2.4). Such services should target first national actors with the greatest potential for useful contributions to innovation.

10. **Colombia should support "technology screening" services that help firms and universities to take advantage of information on technologies contained in national and international IP application documents in support of research with higher potential economic payoffs.**

    Using information provided by nationally and internationally registered IP more systematically can strengthen efforts aimed at obtaining revenue-generating IP. Institutions such as TECNNOVA, which provide technology-screening services, are useful to orient research from the outset towards the highest possible future rewards. They play a crucial role in "catching-up" by allowing researchers to access the state of the art rather than replicating work that already exists. Continued efforts by the SIC to provide easy online access to IP information and technology information services for users are also helping to take better advantage of IP information.

11. **Colombia should continue efforts to support GIs by investing in building associations for selected high-potential GIs, rather than expanding the number of GIs.**

    GIs and trademarks can usefully assist not only Colombia's coffee producers, but also its handicraft workers, and in this way can support marginalised groups. Colombia's "Juan Valdez" (Box 2.1) is a local example that has demonstrated the potential benefits from GIs, but replicating its example has proved challenging in spite of the increase in number of Colombian GIs. This is due to a lack of associations capable of ensuring product quality and of GI marketing to reap commercial benefits. Policy has to address these issues.

12. **In order to create opportunities for economic development based on its biodiversity, Colombia should not only focus on ownership rights and access conditions, but should also seek to support the development of a sufficiently articulated domestic industry capable of exploiting those opportunities.**

    Colombia's biodiversity provides additional important opportunities for inclusive economic development across various regions. These opportunities are recognised by the National Development Plan 2010-2014. With the legal framework regarding access to genetic resources in place, Colombia has to develop a sufficiently articulated domestic industry capable of exploiting such potential. The Colombian National Economic and Social Policy Council's (CONPES) document 3697 (2011) explicitly acknowledges the need for a wider policy approach to develop economic opportunities based on the country's biodiversity and should be actively pursued, taking advantage of existing research capacities.

13. **It is useful to consider how policy can support the use of IP in sectors where Colombia has comparative strengths, including extractive industries.**

    Such support could take the form of networks, which would seek to expand the capacities of smaller players in those sectors to take advantage of IP and develop innovation capacities on their basis.

14. **Colombia's IP policy should not only focus on patents, but also, depending on the business activity, on trademarks, design and utility models. Colombia should address the weak use of utility models.**

    While patents play a crucial role supporting innovations, other types of IP can contribute meaningfully to innovation performance. Since they set a lower bar than patents, these other types of IP provide opportunities for a wider group of

innovators in Colombia, including across the country's different regions. Such an approach will help IP systems to support current regional S&T capacity-building efforts. At present, use of trademarks in Colombia is weak compared to other countries in the region. Promoting their use among firms can potentially support quality improvements in different sectors.

Use of utility models by residents is also limited in Colombia, whereas in other upper middle-income countries, such as Thailand, utility model applications outnumber those for patents. This should be investigated as utility models play a critical role in catching-up stages of development. Utility models currently provide a more affordable fee compared to patents and, with recent reductions in backlogs, are processed within a reasonable and shorter timeframe. The low use of utility models among local entities might be a reflection of long processing times in the recent past. If uptake does not rise, however, other factors such as limited awareness among potential users of the potential value of utility models might be a constraining factor. The novelty requirement applied is also worth investigating.

15. **Opportunities for filing and exploiting IP abroad for some leading inventions should be supported further, as this can encourage funding (foreign income and capital) to support innovation in Colombia.**

Given the weaknesses of private sector activities in innovation, foreign markets for IP might be particularly attractive outlets for some selected leading technical inventions. At present, Colombia has only limited experience with seeking foreign IP. However, with support more could be done to obtain IP abroad.

16. **Simplifying and shortening application procedures and accommodating concerns over sharing critical information about inventions in information requirements could heighten the impact of support schemes aimed at encouraging the use of IP.**

Several policies are in place to support use of IP by national actors, including programmes offered by Colciencias. However, users note that the procedures take a long time with the result that the technology may be outdated by the time a decision is taken. Several potential users of such grant schemes stated that requirements on information were sometimes problematic since some require the disclosure of substantial information regarding inventions, which they are reluctant to share in the absence of IP protection. Such rigour in the support-granting process is understandable given governmental concerns over corruption in the use of public funds. Yet, the overall effect can reduce the desired impacts of grant schemes by failing to attract potentially valuable projects. This needs to be addressed by designing simpler but also rigorous processes.

2.3. The socio-economic and innovation context of Colombia[2]

The socio-economic context for innovation

Colombia's socio-economic performance

Colombia's economic and social development has reached the point at which important decisions must be taken. Following the recession at the turn of the millennium, the country's economy expanded between 2003 and 2011 at rates that were, with a brief interruption in 2008-09, much higher than those of the previous two decades. Per capita

income also rose much faster. By 2012 Colombia – the region's third most populous country after Brazil and Mexico – was the fourth largest economy in Latin America after Argentina. Growth in income per capita helped reduce the share of the population living in poverty by nearly 10 percentage points between 2002 and 2010. Yet income inequality, especially in rural areas, remained at the high end of the range for Latin America and high compared with most countries in other world regions. Although growth was strong, especially compared to many OECD countries, labour productivity and GDP per capita still lag other countries, including in Latin America. The 2013 OECD Economic Assessment of Colombia identifies three areas for policy attention: adjusting to the commodity boom, boosting productivity growth and reducing income inequality (OECD, 2013). Innovation can play a part in all three areas, as the Colombian authorities are well aware.

Colombia's economic and industry structure

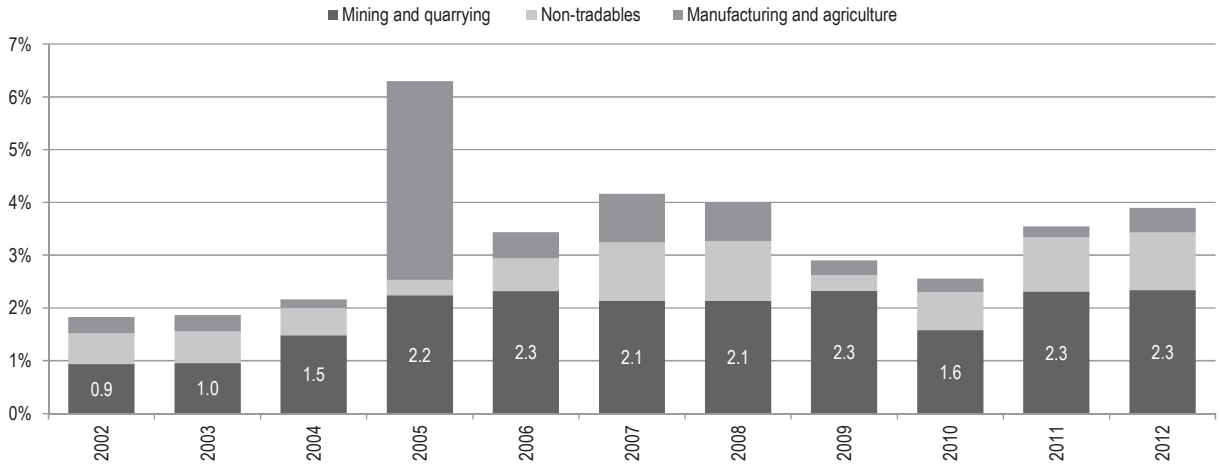
Along with the expansion of output and average incomes over the past three decades, the sectoral composition of the Colombian economy has also changed substantially. The share of GDP due to non-manufacturing industry (mining, including petroleum; construction; utilities) increased rapidly, from less than a tenth to over a fifth of output, while the manufacturing sector either stagnated or contracted, falling from just over a fifth to about a sixth of output. This may reflect a significant long-term trend of relative "de-manufacturisation", which mirrors to some degree the experience of other Latin American countries, as the scale and scope of manufacturing exports, especially from Asia, has increased.

The shift towards an economy heavily based on the production of commodities has been driven by rapid growth in mineral exports (especially oil) and rising commodity prices and has been supported by large capital inflows, primarily to the minerals industries. Sluggish growth in manufacturing after the slowdown of 2008-09 has prompted concerns about the sustainability of the current growth path and the international competitiveness of agriculture, manufacturing and tradable services.

External trade and foreign direct investment

In the 1990s, as part of wider liberalisation efforts, Colombia substantially reduced tariffs and barriers to foreign direct investment (FDI). It recently entered into several Free Trade Agreements (FTAs) with the European Union and the United States. Colombia's trade structure is characterised by a low share of high and median-tech exports. The country exports mainly primary goods and manufactures based on natural resources. Flows are highly concentrated in a small number of trading partners, with a predominant role played by the United States. Given the low diversification, Colombia is vulnerable to shocks affecting the demand for its products by leading partners. Moreover, Colombia has become an attractive investment destination with higher FDI inflows than the regional average, especially in recent years. FDI inflows are mainly related to the mining and quarrying sector (Figure 2.2).

Figure 2.2. FDI inflows (% of GDP)



Source: OECD (2013), *OECD Economic Surveys: Colombia 2013: Economic Assessment*, OECD Publishing, doi: 10.1787/eco_surveys-col-2013-en, http://dx.doi.org/10.1787/888932764325.

Education and skills

There has been considerable progress in developing human capital over the last decade:

- At the secondary level, enrolment rates increased rapidly between 2002 and 2009. Scores on the OECD's PISA exercise improved significantly between 2006 and 2009, not only in reading but also in maths and science. However, many high school graduates are still not "college-ready" in terms of their attainments in science and maths.
- At the tertiary level, student enrolments expanded from about 1 million in 2000 to nearly 1.7 million in 2010, and the proportion of the university age cohort (17-21) enrolled as undergraduates increased from 24% to 37%.
- A larger share of these students is enrolled in science and engineering than in other LAC countries. However, despite the rising levels of participation in tertiary education, Colombia lagged six other LAC countries in terms of overall tertiary-level participation in the late 2000s.
- The disparity was even greater at the PhD level where, per 100 000 inhabitants, the number of doctoral graduates, in general and in science and engineering, lagged ten other LAC countries.
- SENA, the long-established and nationally prominent vocational education and training agency, which is funded by a payroll levy, plays a major role in training the workforce below tertiary level. It provides some tertiary-level education (to about 3.8% of those aged 15-24) but its main task is to develop vocational skills. In 2011 it provided training to 7.9 million through its 116 training centres.

The importance of gender, income and regional inequalities in access to tertiary education has declined but remains an issue. Other inefficiencies also hamper the transition from school to university.

The balance between technical education and higher education is problematic in much of Latin America, often with 70% of a cohort in higher education and 30% in technical education. This "inverted pyramid" exists in Colombia. The ratio in OECD countries (especially in some parts of Europe) is typically the opposite. Given Colombian companies' relative lack of middle-level technical occupations, this appears to explain to some degree repeated industry comments about a skills shortage and lack of experience in middle-level functions.

At current levels, flows of human resources from tertiary education do not seem sufficient to allow the country's innovation system to narrow the gap with international competitors rapidly. In fact, in spite of their growth during the last decade, human resources may constrain the innovation system's capacity effectively to absorb the expansion in STI funding expected to follow from fundamental recent changes in the political and institutional context of the country's innovation system and the strong commitment of the Colombian government.

Framework conditions: Financial sector, infrastructure and business conditions

While the banking system is well capitalised and profitable, domestic credit as a share of GDP has been historically low and remains so both with respect to regional peers and to OECD countries. Colombian firms often face financial constraints. Credit is costly and in low supply because of a tax on financial transactions and the cap on interest rates. Moreover, banks have a high-risk aversion because of poor loan contract regulations. Financial access is especially low for micro, small and medium-sized firms (MSME).

Infrastructure is a significant structural constraint in Colombia, which faces high internal transport costs because of insufficient investment and a complex geography. Regarding information and communication technologies (ICTs), while mobile penetration is relatively high and close to the OECD average, the penetration of fixed lines is low, with marked regional disparities; in some major cities Colombia is at the OECD level. Mobile networks fill in where fixed-line networks are not available, but their lack can delay the development of services that require high-speed fixed networks.

The national innovation system

Basic characteristics

At the end of the last decade, the Colombian innovation system was relatively small. Overall expenditure on STA (science and technology activities) (including but not only R&D) has grown slowly and, as a share of GDP, lags well behind that of a number of other Latin American countries with comparable GDP per capita. Expenditure on R&D as a share of GDP was about one-quarter of the regional average in 2010. Similarly, while the numbers of STI workers have risen significantly, they constitute a smaller share of the workforce than in the rest of the region.

The traditional measures of STI output are also modest. The volume of scientific publications has been growing in recent years, but at about four publications a year per 100 000 population, Colombia is about two-thirds as productive as Latin America overall and well under the OECD average of a little less than nine. Like the scientific output of most Latin American countries, Colombia's is far less frequently cited than that of OECD countries and lags most comparable Latin American and Caribbean (LAC) countries.

Business innovation

Innovation surveys suggest that innovation in manufacturing increased little during the past decade. Only about a third of manufacturing firms have introduced innovations in recent years. Yet business innovation is crucial for building endogenous capability, enabling networking with other firms and wider sources of knowledge and innovation, and establishing the absorptive capacity to support these interactions.

Since the primary source of growth and jobs is the innovation activities of firms, these need to account for the dominant share of national innovative activity. However, while business R&D in Colombia represented 30% of the total a decade ago, it dropped to 20% around 2005, and has only now returned to about 30%. This is well below the share not only of leading OECD economies but also of major emerging economies in Asia and Latin America. By comparison, it represents 65-75% of total R&D in Finland, Japan and the United States. The share in Latin America as a whole is around 40%.

Innovation institutions: universities and (public) research institutes

"Innovation institutions" in Colombia comprise a growing and evolving university sector and non-university research institutes, whose number, scale and functions have changed relatively little.

Colombia has a total of 81 universities (32 public and 49 private). Three-quarters of the student population attends public universities. Only a small share of teachers in tertiary education have a PhD and they are concentrated in the elite universities. Rising external funding from the middle of the last decade and the government's new impetus for research and innovation appear not only to have driven a rise in the national production of PhDs but also to have encouraged universities to "professionalise" research management with vice-rectors for research.

Universities' research funding comes from several sources. A small proportion of core funding is now allocated on the basis of the number and quality of the universities' scientific output. Project-based income comes from Colciencias-managed grants and other external contracts. Income from industrial contract research is minimal. The intensity of links between universities and industry is similar to that of a number of other Latin American countries, but is nonetheless regarded by industry and many in the universities as inadequate.

As in other countries there are three types of autonomous research institutes: (i) basic research institutes such as FIDIC (immunology); (ii) some 19 government laboratories that primarily produce knowledge for making laws, regulations or other government purposes; and (iii) research and technology organisations (RTOs), whose main purpose is to produce knowledge and services for industry.

The economic and social relevance of public research is conditioned by other aspects of the system. In a weak business innovation system, there is limited demand for innovation from producers: non-innovative companies do not ask their suppliers to innovate. There is some interaction between business and the institutes, but there is relatively little co-operation between business enterprises and research-performing institutions.

STI governance

A national innovation system encompasses a wide range of actors: business, research-performing organisations, government and a variety of other institutions. In Colombia, the strongly regionalised nature of the country also plays a role. At national level, the National Planning Department (DNP) provides overall co-ordination of government policy for economic and social development.

Colciencias is a key player in STI. According to its strategic plan for 2011-14, it has three main activities: co-ordinating, developing and implementing policy for the "national system of science, technology and innovation"; developing innovation and research capacities and programmes in order to support economic and social development in the higher education and research sector and in business; and developing human capital for research and innovation. Colciencias operates a wide range of funding instruments for innovation and research. It runs 11 research councils, two-thirds of which are composed of researchers. It has strong networks with the academic community, but much less so with business. It encompasses the roles of science ministry, research council and innovation agency (so that policy making and execution are not functionally separate) and co-ordinates innovation and research policy across government. As a result, its performance is very important to the success of the research and innovation system.

Colciencias provides the secretariats of the National Advisory Council on Science, Technology and Innovation and the National Programmes Council, which oversees a series of innovation-oriented programmes. The effort to improve competitiveness is co-ordinated by the National Commission on Competitiveness and Innovation through the so-called "national system of competitiveness and innovation". The president of Colombia chairs the annual meeting of the Commission's public- and private-sector stakeholders, which include the sector ministries and the private sector's competitiveness council. The executive and the secretariat of the Commission meet frequently. Counterpart commissions in each region plan the development of the regional innovation systems and provide input to national planning. In effect, there are two parallel governance systems dealing with innovation, one from the perspective of research and the other from that of competitiveness. While the sector ministries are involved in the National Commission of Competitiveness and Innovation, they also maintain separate, individual strategies.

The laboratories of the sector ministries provide mission-related research and technical services. The Ministry of Trade, Industry and Tourism (MCIT) has significant innovation-related activities, including the Productive Transformation Programme, which co-ordinates development activities around human capital development, regulations, infrastructures, sustainability, strengthening industry and innovation in 16 "strategic" industries. It also funds the Innpulsa Programme, operated by Bancoldex, the state development bank, which promotes faster growth of business through a focus on innovation, entrepreneurship and regional ecosystems. SENA is linked to the Ministry of Labour. In addition to its role in vocational education and training, it has 15 technology parks, two dedicated technology development facilities, a small industrial extension service and funds training-related R&D projects. The Ministry of Information Technology and Communications (MinTIC) runs an extensive innovation programme with Colciencias to increase R&D in the information technology (IT) sector, foster innovation in the overall e-governance and ICT use by the public sector and promote innovation in ICT as a lever for economic development.

2.4. Colombia's IP system and innovation

Organisation of the Colombian IP system

IP law and regulations

Colombia has comprehensive legal provisions in place that regulate IP. As a member of the World Trade Organization, the country has implemented obligations specified in the Agreement on Trade-Related Intellectual Property Rights (TRIPS). As a member of the Andean Community, Colombia has IP regulations that impose even higher standards in some cases than those stipulated by the TRIPS Agreement.[3] Regulations also use safeguards set forth in TRIPS related to patentability and new uses. Andean Decision 486 is the applicable IP law for trademarks, patents and other rights in the Andean Community, which includes Bolivia, Colombia, Ecuador and Peru. Andean Decision 351 covers copyright and has been in force in Colombia since 1994. Andean Decisions 345 and 391 cover rights of breeders of new plant varieties and questions regarding access to genetic resources, respectively. The Colombian legislature cannot legislate on substantive matters already regulated by Andean Decisions except for limited procedural aspects.[4] Regulations covered by Andean Community norms still need to be implemented for certain areas in Colombia, such as genetic resources. Negotiations with the European Union and the United States have introduced some modifications regarding IP legislation.

Colombia is also a signatory of major international IP treaties, including the following:

- Berne Convention for the Protection of Literary and Artistic Works (1988)
- International Union for the Protection of New Varieties of Plants (UPOV Convention) (1996)
- Paris Convention for the Protection of Industrial Property (1996)
- Patent Cooperation Treaty (2001)
- Madrid Protocol Concerning the International Registration of Marks (2012)
- Trademark Law Treaty (2012).

Governmental stakeholders and co-ordination mechanisms

The starting point for a more co-ordinated policy approach to IP is the Colombian National Economic and Social Policy Council's (CONPES) document 3533 of 2008, which formulates an action plan regarding IP from the perspective of national competitiveness and innovation (CONPES, 2008). A central issue addressed is the decentralised nature of IP policy and the need for a co-ordinating body to introduce greater coherence regarding how IP is handled in Colombia. Colombia's National Development Plan 2010-2014 also identifies IP as one of four key working areas.

This led to the creation of CIPI in 2010 with the presidency held by MCIT, the Vice-President of Foreign Trade acting as head, and the DNP in charge of the Technical Secretariat. CIPI functions as a co-ordinating body bringing together various institutions involved in IP policy making. Different governmental stakeholders have stated that CIPI has helped them to co-ordinate effectively with others and to identify a consensus on questions of IP in international negotiations. Prior to its creation, different governmental institutions held different positions on IP, which posed a challenge for international IP

negotiations. Functioning has improved over the past two years, with CIPI providing an increasingly useful forum for discussion of IP-related topics. Most participants found that the institution added few additional burdens as a result of a conscious effort to reduce these burdens. This positive perception of CIPI is a valuable asset for Colombia to strengthen the contribution of its IP system in support of its innovation performance.

The main achievements of CIPI to date have been related to tackling questions of enforcement, including capacity-building for judges, identifying common positions in IP negotiations, and focusing on questions of IP for innovation. The institution is not formally connected to bodies in charge of promoting national competitiveness and innovation, such as the Commission on Competitiveness. However, to achieve wider impacts the range of themes covered by CIPI needs to be expanded to include a stronger focus on both potential and actual local users of the IP systems and ways in which a variety of policy instruments can, if combined with IP policy, stimulate successful innovation performance.

Moreover, while offering a forum for consultation has permitted initial improvements in policy co-ordination, the role of CIPI will need to be adapted if it is to take the necessary steps to stimulate IP policy for innovation. These will include, notably: (i) high-level policy engagement, as is the case in leading innovating countries (e.g. in Japan, the Prime Minister heads the country's IP co-ordinating body); (ii) the adoption of an "IP for innovation" agenda, which would define specific targets and mechanisms for their periodic evaluation; (iii) a requirement for participating institutions to implement these decisions; and (iv) the involvement of the private sector, including different types of actual *and* potential users (e.g. representatives from traditional industries). The latter are critical to effectively address challenges innovator's face so as to turn IP into an instrument for innovation. Several governmental stakeholders suggested that a useful starting point for a comprehensive strategy could be an evaluation based on CONPES 3533 (see above) conducted by the DNP.

Colombia's innovation system involves a variety of public institutions that implement IP support policies:

- *Colciencias'* IP-related projects include platforms and initiatives aimed at raising awareness among actors in the innovation system about IP matters, sectoral networks and support for financing IP application fees for universities and small companies. However, IP policies in support of innovation are not a main priority for Colciencias. This is partly a consequence of the institution's fairly new mandate as Administrative Department for Science, Technology and Industry.
- *DNP* is the organiser of CIPI and oversees the different actors and their activities.
- *MCIT* is involved in IP policy making with regards to international treaty negotiations and business development activities, including Bancoldex and iNNpulsa. While the former is co-ordinated by the Vice-Minister of Foreign Trade, the latter is co-ordinated by the Vice Minister of Enterprise Development. This means that MCIT is also concerned with the use of IP by local businesses (i.e. their use in support of innovation) and not merely compliance with international treaties.

Table 2.2 provides an overview of the institutions involved in Colombia's IP system and their tasks.

Table 2.2. Colombia's IP system: An overview

Tasks\type of IP	Copyright	Plant Variety Protection	Industrial Property
Co-ordination agency	Intersectoral Commission for Intellectual Property (CIPI) Ministry of Trade, Industry and Tourism (MCIT) & National Planning Department (DNP)		
Policy design	Colombian Copyright Office, Ministry for Internal Affairs and Justice	Ministry of Agriculture and Rural Development	Ministry of Trade, Industry and Tourism (MCIT)
Administration of IP	Colombian Copyright Office	Colombian Agricultural Institute (ICA)	Superintendency of Industry and Commerce (SIC)
Foreign policy design	Ministry of Foreign Relations; Ministry of Trade, Industry and Tourism (MCIT)		
Enforcement	Colombian Copyright Office	Colombian Agricultural Institute (ICA)	Superintendency of Industry and Commerce (SIC)
	Attorney General, Customs Authority, National Police and others		
Entities in charge of supporting the IP system	Ministries of Culture; Agriculture and Rural Development; Trade, Industry and Tourism; Information and Communication Technologies; Education and others Colciencias, SENA, collecting societies, Artesanías de Colombia and others		

Source: OECD based on CONPES (2008) incorporating institutional changes implemented since 2008.

IP operations and procedures

Institutions granting intellectual property rights: Functions

There are three institutions in charge of granting IP in Colombia: the SIC, the ICA and the Colombian Copyright Office (Oficina de Derechos de Autor). The SIC is in charge of industrial property, the ICA takes care of Plant Variety Protection (PVP) and Colombia's Copyright Office handles copyright and related rights. Each of these institutions falls under the authority of a different institution. The Colombian Copyright Office is part of the Ministry of the Interior, the ICA is attached to the Ministry of Agriculture and the SIC is attached to MCIT. In addition to handling IP applications since 2012, all the IP offices have been given jurisdictional roles allowing them to act as courts of first instance with regard to IP litigation. Another commonality for all IP offices is their active involvement in awareness-raising activities, notably the organisation of various types of events for different target groups. These tasks are co-ordinated between the offices and various actors in the IP system.

The SIC is in charge of industrial property, a role to which it devotes 93 of its 516 staff. It is also responsible for consumer protection and competition. The SIC is an autonomous institution but is not self-financing, its activities based on the fees it collects for IP applications. At ICA, two staff members handle requests and engage in other activities including awareness-raising. This limits their ability to co-operate more actively with their counterparts in other institutions. The Colombian Copyright Office employs 46 people. Although a recent increase in staff has taken place at the SIC, no major staffing changes have occurred at the other two IP offices. With the addition of tasks as a result of the new jurisdictional powers, the resource/staffing question will have to be re-evaluated. The Colombian Copyright Office has recently asked an external company to conduct a study on ways to improve their performance in the light of the new judicial functions.

Directorate General of Intellectual Property Rights: Disclosure of IP information

The SIC is in the process of digitising all national documents to permit quicker searches of national and international documents. This joint activity with WIPO plans to digitise all patent documents by 2013. Moreover, the SIC is involved in the LATIPAT

project with WIPO, the EPO, the Spanish Patent Office and other Latin American IP offices, to provide public online access to technological information in Spanish and Portuguese from patent documents published by all these agencies. The SIC is also engaged in further activities to strengthen the use of information contained in IP applications by firms. Five people are in charge of dealing with company requests for information on IP. At present, the number of requests is still modest, at 381 in 2011, along with a large number processed in the same year. The SIC also produces technology-specific booklets to support companies in the most promising sectors. Booklets are also published by WIPO. Both provide information on national and international patents held by different actors in a specific field.[5]

The Colombian Copyright Office is working to provide all information online by 2013 and is in the process of digitising all its records. They aim to provide a more user-friendly experience and to allow online consultation for the general public. The ICA still requires users to present applications in person, and as yet no information is available online. A quarterly publication provides information on PVP registrations.

Application fees

Recently several changes were implemented regarding application fees. The fees charged by the different IP offices were judged to be too high by some of the universities and small businesses interviewed. In response to such complaints, the SIC has recently revised its fee policy. Substantial discounts for patent, trademarks and other types of IP are provided for small businesses, universities, individuals with limited income and non-for-profit organisations (Box 2.1). Colciencias supports those discount rates. The discount rates for micro and small firms in trademark registration fees were set at 15% following an assessment of the impacts of discount rates applied in 2010-11. The rate effectively led to an increase in trademark registration by those entities indicating in this way that the use of trademarks was price sensitive (SIC, 2013). Some fee reductions were also implemented for all users. Notably, trademark fees were reduced by more than 33% after a comparison of fees charged by other IP offices indicated that fees were high by international standards (Cantor Vargas, 2013).

Box 2.1. Application and processing fees in Colombia

Regular patents require an application fee of USD 278 (COP 500 000) plus a fee of USD 295 (COP 530 000) for the examination of patentability with a 50% discount for micro, small and median firms, universities, non-for-profit organisations and individuals with limited income.

Patents filed through the Patent Co-operation Treaty (PCT) require a fee of USD 481 (COP 865 000) with a discount of 25% for the same groups.

Utility models require an application fee of USD 150 (COP 270 000) plus USD 184 (COP 330 000) for the examination of patentability with the same discounts as for regular patents.

Trademarks require an application fee of USD 417 (COP 750 000) for one class plus an additional USD 209 (COP 375 000) for any additional class in the same request, and USD 557 (COP 1 000 000) for applications for collective or certification marks, with a 15% discount for micro and small firms (25% for those participating in training events and forums organised by SIC or associated entities).

Industrial design requires an application fee of USD 278 (COP 500 000).

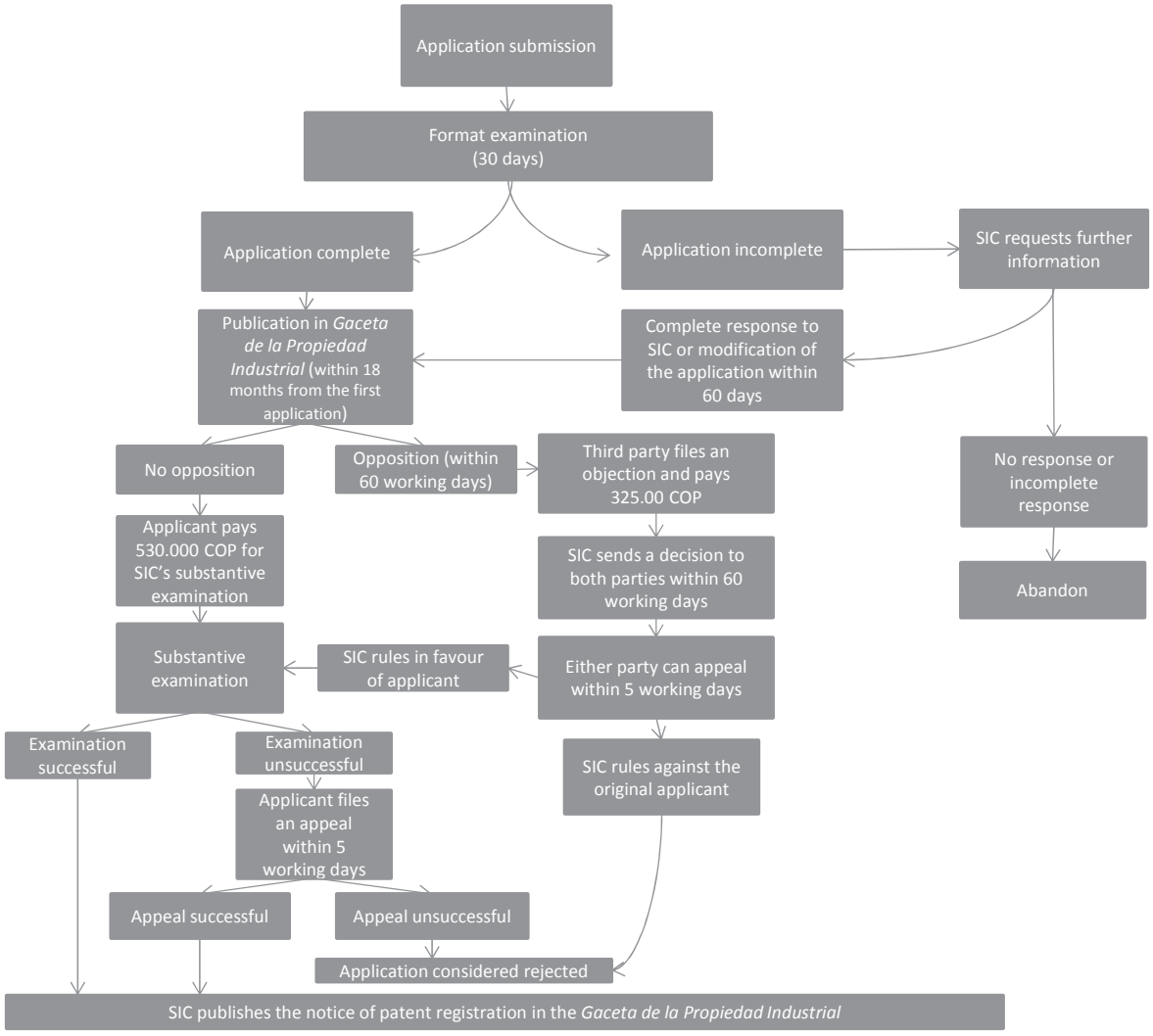
Source: MCIT, SIC, Resolution 163, 11 January 2013.

Also, the utility model application fee is set at 54% of the cost of patents and effectively provides a more affordable alternative to patent applications. However, the experience with discount rates in Colombia has also shown that the application of discounts as a means to substantially increase application rates has limitations. Financial constraints are not the only constraining factors. For this reason, more emphasis has been placed on the capacity-building of potential users, and the SIC provides additional discounts as an incentive to engage in such activities. Universities have noted that costly renewal fees in particular can be a challenge for them. This likely implies that protected technology has not been successfully introduced on markets, as otherwise royalties might provide sufficient rewards to pay annuities and/or renewals. Patent renewal fees increase with duration following a common practice adopted by various IP offices (EPO, 2010).

Processing and duration

Figure 2.3 describes the steps involved in SIC patent applications.

Figure 2.3. The patent application process in Colombia

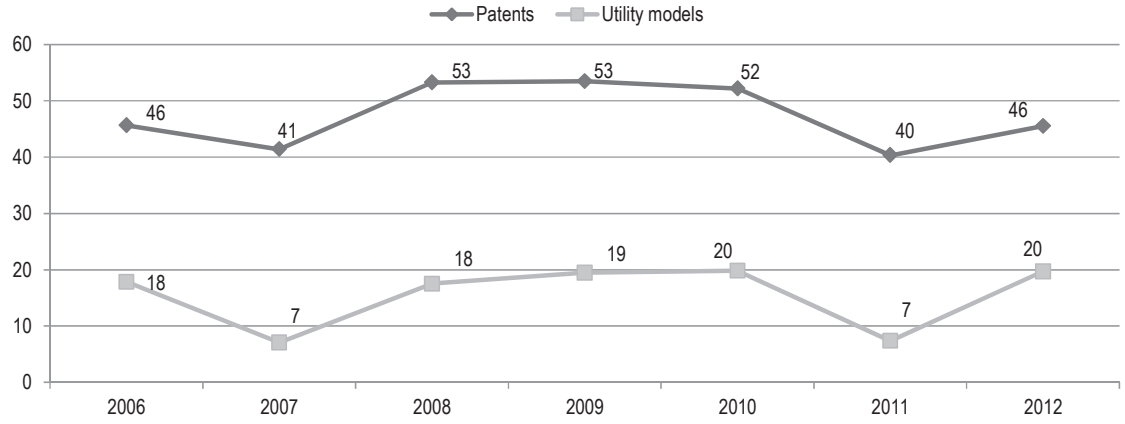


Note: Resolution No. 173 of 11 January 2013 replaced Resolution No. 69699 from 30 December 2009.

Source: Superintendencia de Industria y Comercio (SIC).

The SIC has recently engaged in substantial efforts aimed at raising the legal quality of its examination process. One measure taken to improve quality has been the creation of examination manuals to standardise examination criteria. Capacity-building activities of examiners were also a priority in 2013. Another recent modification has been to increase acceptance rates for patents changing practices from the previous high-refusal regime. The evidence on rejection rates for patents and utility models shows a decrease for 2011 with, however, an increase for 2012 (Figure 2.4). The evidence needs to be interpreted with some caution as, in the case of patents, more than twice the number of decisions were taken in 2012 compared to 2011. This said, it is worth investigating the novelty threshold applied for their award in view of the limited use of utility models by Colombian firms (see Figures 2.12 and 2.13).

Figure 2.4. Percentage shares of rejected patents and utility models over total decisions taken, 2006-12



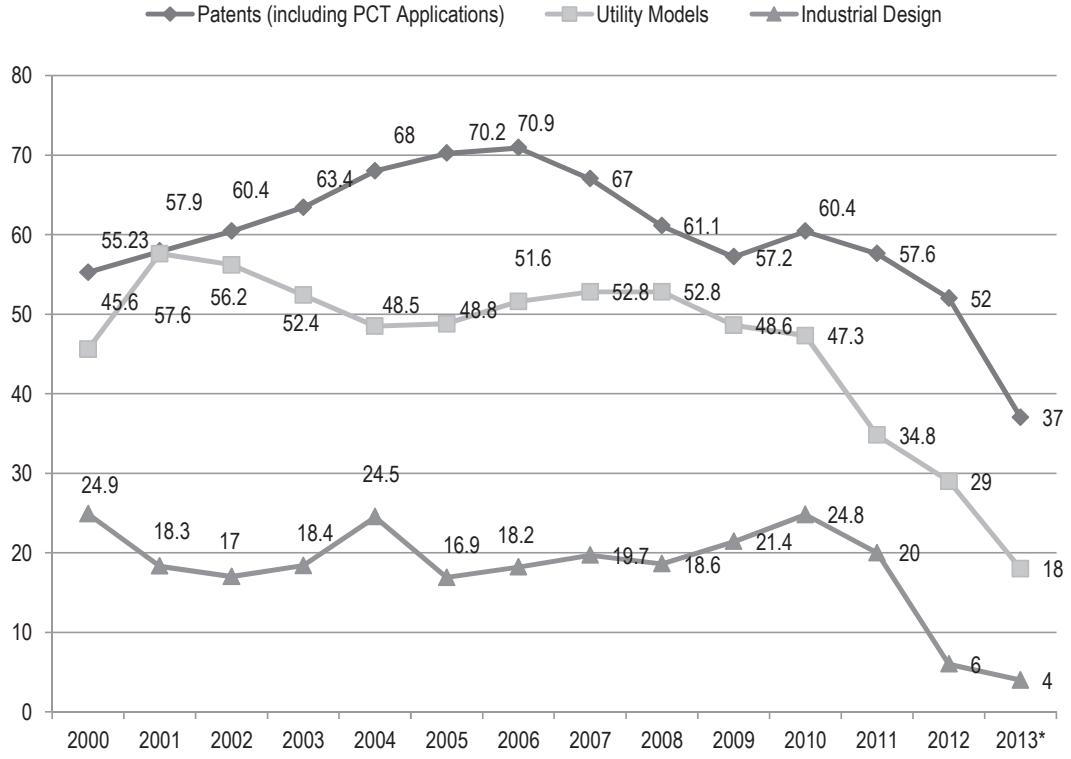
Note: The reported rejection rates exclude withdrawals by applicants in the application process. Applications filed through the PCT application process are included.
Source: Data provided by the SIC to the OECD based on Annual Reports of the National Planning Office of Colombia.

A further challenge for the SIC concerns ways to process IP applications more quickly. In addition to efforts aimed at fostering automation, the SIC has outsourced some of its studies on patentability, a step that has helped reduce processing times. It is important, however, to guarantee the quality of examination procedures even if such services are outsourced. Additional resources and staff hired to deal with backlogs have also helped to substantially reduce the times needed for processing IP (Figure 2.5). It is worth noting that the substantial reduction in processing affected not only patents, but also utility models and industrial design. Moreover, the commitment taken by the SIC to compensate applicants if processes take longer than legally stipulated is a useful measure to raise users' confidence in the IP system. A few points are worth noting. The processing duration for utility model applications has only recently shortened to a point that renders them a viable, quick alternative to patents. This might explain the limited use of utility models to date. Continued efforts will be needed to keep the backlog under control. However some resources were not allocated on a permanent basis, so further processing innovations are needed to sustain the momentum. If these improvements fail to support performance, then additional resource investments may be necessary. This will require flexibilities in the resource allocation process as the SIC does not have an autonomous budget.

Finally, the SIC is engaged in several international projects aimed at supporting its IP application procedures. It has signed a Patent Prosecution Highway (PPH) with the United States. Under the PPH, an applicant receiving a ruling from either the SIC or the

USPTO, for which at least one claim in an application is patentable, may request that the other office fast tracks the examination of corresponding claims in corresponding applications. The trial period started in September 2012. The SIC also plans to sign PPHs with other national IP offices and is a partner to other multilateral projects such as PROSUR, a regional co-operation system on IP involving Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Suriname and Uruguay. The PROSUR initiative is supported by WIPO and aims to improve services to local and international users of the IP system, initially through sharing patent examination results and other IP resources. A related activity is CADOPAT, a web portal created by the Mexican Patent and Trademark Office, which shares information from patent examinations with more than nine countries from the Caribbean, Central America and Colombia.

Figure 2.5. Time required for processing IP applications, averages in months for 2005-11



Note: Data for 2013 are provisional reflecting processing times for January–June 2013.

Source: Data provided to the OECD by the SIC in July 2013.

Regarding copyright, the Colombian Copyright Office allows for the registration of works both on a paper basis and online. In 2010, 74% of registrations were made online. The procedure lasts 15 days. Regarding PVP, processing at the ICA takes 3-10 years depending on testing requirements.

The possibility to apply for IP protection online can lower some application costs, particularly for actors not based in Bogotá. Online application for trademarks and copyright registration has been very useful in this respect. There are also plans to allow online patent applications. However, this does not fully compensate for regional IP services, which, according to some firms based outside of Bogotá, would be valuable for their operations. Online services are expected to support those users already aware of IP;

however, they have less impact on those with no IP experience. Moreover, online services can only be offered once IP offices have adequate IT infrastructure in place. This requires additional investments. Currently, about 80% of patent applications and 75% of other IP applications come from Bogotá. The possibility of creating regional IP offices is discussed in the SIC's *Propiedad Industrial 2020* (SIC, 2012).

IP enforcement system

All stakeholders in the IP system agree that substantial shortcomings in the judicial system weaken IP enforcement. Insufficient training of lawyers on IP matters is the central issue. Moreover, the judicial system is overloaded and cannot guarantee effective enforcement of IP. These shortcomings explain why IP offices can now act as courts of first instance in IP law cases. If this approach helps to improve enforcement, it may result in increased user satisfaction with the IP system and, in consequence, further its use. However, adequate staffing and resources, as well as continued efforts aimed at improving efficiency, will be necessary to enable IP offices to take on the new task successfully. Furthermore, Chambers of Commerce, which handle arbitration and mediation functions, can be useful actors in supporting enforcement.

Counterfeiting and IP violations

Counterfeiting and violations of IP rights are a challenge in Colombia. Stakeholders are aware that such infringements weaken IP market opportunities. Several efforts have been undertaken to improve enforcement and CIPI has actively engaged in this task. The private sector has also undertaken activities to fight piracy. The Directorate of Taxes and Customs of Colombia, which institutes controls over counterfeited goods, uses a comprehensive directory of owners' intellectual property rights, which allows IP owners to be contacted in cases where their merchandise may have been infringed. The latter was created by means of Decree 4540 of 2006, which also empowers the customs authority to intervene with regard to allegedly pirated or counterfeit trademark goods linked to an import, export or transit operation.

International dimensions

Colombia's IP legislation is aligned with international and regional agreements. Colombia also co-operates actively with WIPO to improve procedures related to granting IP. Experts from IP offices in Brazil, Chile and Mexico have, for example, contributed suggestions to *Propiedad Industrial 2020* and have provided feedback on adequate institutional settings, whereby the SIC can improve its contributions towards national competitiveness (SIC, 2012). Several specific co-operation initiatives aimed at improving IP application procedures have been described above. Future co-operation with the European Union, Switzerland and the United States should similarly adopt a focus on IP as an instrument to support Colombia's innovation system.

IP skills and training

Lack of awareness on IP issues is widespread among institutions in charge of the legal and administrative aspects of the IP system and users. With respect to legal training, the law school at Universidad del Externado was cited as providing good courses on IP legal matters, while other institutions were seen as having improved the IP legal training they provide. A wider number of institutions, including the National University of Colombia, the University de los Andes and the University of Antioquia, provide training on copyright and related IP. These improvements, however, will not have an immediate effect on the capacity of judges, who often lack training to deal adequately with IP

matters. To address these shortcomings, Colombia's Escuela Judicial Rodrigo Lara Bonilla has offered training courses on IP for judges, but not on a regular basis. Colombia's IP offices, including the Colombian Copyright Office, have also provided various capacity-building courses to judges and prosecution authorities. Moreover, IP offices have also provided courses to enforcement agencies including, notably, the police force. Due to staff rotations these courses have to be provided on a constant basis to improve the capacities of those in charge.

Raising awareness and building capacities among potential users of the IP system is also a key activity of IP offices. The Colombian Copyright Office, for instance, provided 146 training courses to about 8 175 individuals in 2011. The Copyright Office also operates a free telephone inquiry service for its users, so as to respond to specific queries. Resource and staff constraints, however, limit the possibilities for expanding courses to satisfy demand. Colciencias is also actively engaged in supporting such training and skills development. More specific examples are provided in section 2.3 of this report.

IP, markets and diffusion

IP, markets and diffusion: Licensing and markets for IP, open innovation and open source

Licensing and markets for IP are weakly developed in Colombia, as the innovation capacities of the private sector are not strong. However, a few institutions, such as TECNNOVA, have been instrumental in improving the state of development. In operation for about eight years, TECNNOVA, a private entity financed by an association of universities, tries to foster co-operation with research institutes and firms, as well as with national and regional governmental agencies such as Colciencias and SENA. Another regional initiative with a similar purpose is Bogotá Connect, a project based on the successful model of San Diego Connect. Likewise, the Redes programme, supported by Colciencias, SIC and WIPO, supports a network of peer institutions in key subject areas such as the network on industry and energy. Members receive advanced services and jointly establish business plans to commercialise their IP. The network has also invested in an advanced search engine documenting its IP.

IP, markets and diffusion: Competition

Competition is a major issue in Colombia in that some leading actors exercise significant monopoly powers. In such contexts, IP will not incentivise innovations. On the contrary, lack of competition can reduce opportunities for inventors to successfully commercialise their IP. The main challenge, however, is an institutional one, as the SIC is at once an IP-granting institution and the competition authority, leading to a potential conflict of interest. The proposal to create an autonomous IP institution solely responsible for IP is thus of particular merit, and would allow the institution to focus specifically on IP.

2.5. Users of Colombia's IP system

Types of IP used in Colombia

The descriptions and charts below contain information on the use of different types of IP in Colombia, including national patents, utility models, trademarks, GI, design rights, and international patents and trademarks.

Colombian residents are relatively weak users of the IP system in general and of the patent system in particular. While its nationals make greater use of utility models and trademarks compared to patents (Table 2.3), the absolute application numbers are equally low. Likewise, few Colombian companies have sought international IP applications via the PCT procedure or applied for patents in Europe, Japan or the United States.

Table 2.3. Resident and non-resident IP applications in different filing offices, 2011 or latest available year

Office	Patent		Utility model		Trademark		Design	
	Resident	Non-Resident	Resident	Non-Resident	Resident	Non-Resident	Resident	Non-Resident
Indonesia (2009 for design data)	9%	91%	81%	19%	95%	5%	79%	21%
Malaysia	17%	83%	56%	44%	45%	55%	40%	60%
Philippines	6%	94%	94%	6%	57%	43%	48%	52%
Thailand	24%	76%	92%	8%	60%	40%	77%	23%
Brazil (2010 for all)	12%	88%	97%	3%	82%	18%	70%	30%
Chile	12%	88%	76%	24%	68%	32%	11%	89%
Colombia	9%	91%	92%	8%	58%	42%	38%	62%
Ecuador (2010 for all)	1%	99%	41%	59%	54%	46%	32%	68%
Mexico	8%	92%	89%	11%	71%	29%	46%	54%
China	79%	21%	99%	1%	92%	8%	97%	3%
France	87%	13%	42%	58%	92%	8%	95%	5%
Germany	79%	21%	80%	20%	88%	12%	89%	11%
Japan	84%	16%	79%	21%	78%	22%	87%	13%
United States	49%	51%			84%	16%	57%	43%

Note: Latest available year displayed in parentheses when different from 2011.

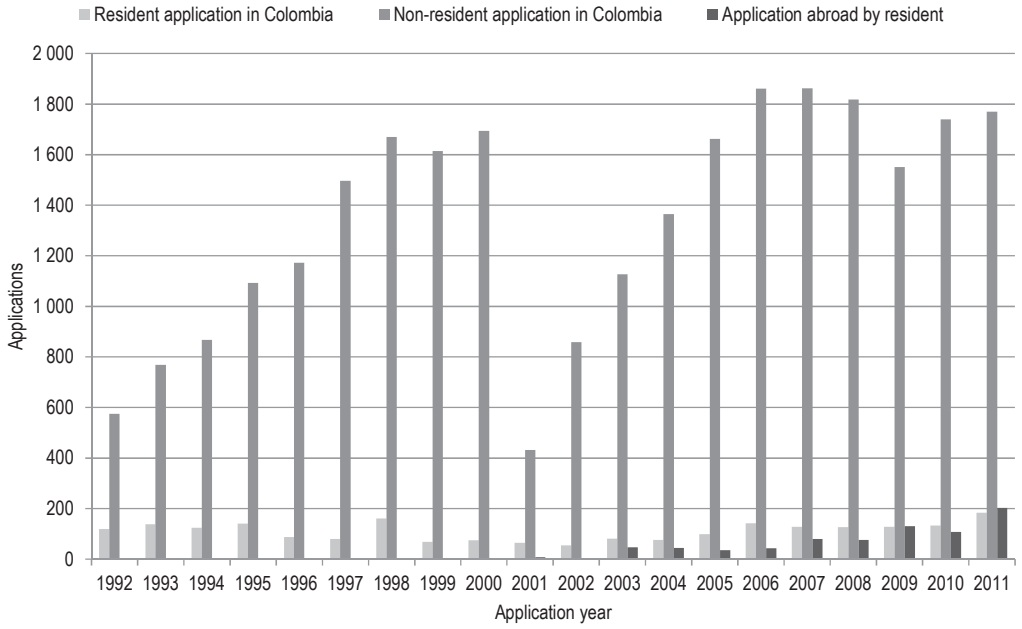
Source: WIPO, IP Statistics Data Center, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Importantly, this is not an indication of Colombia's innovation performance compared to that of other countries.[6] In fact, the number of IP titles should not be seen as a core benchmark for innovation policies. The main issue is the quantity-over-quality ratio, whereby many applications add substantial costs to the system by increasing the number of IP applications patent offices need to process, although only those of sufficient potential commercial value will support innovation systems.

Patents

The main applicants for Colombian patents are non-residents (Figure 2.6). The dip in application numbers in the early 2000s was caused by Colombia's decision to join the Patent Co-operation Treaty (PCT). The number of Colombian resident applications has not changed much over the past two decades and is low in absolute terms compared to other IP offices in the region (Figure 2.7). Colombia ranks 58th internationally out of 105 IP international offices (Figure 8), and the country's performance is equally weak if applications are ranked by population (74th position) or GDP (75th position). The list of top 10 Colombian applicants during 2007-11 reflects the concentration of leading research capacities in the selected universities with four listed in the ranking (Figure 2.9). It also gives an indication of the inventive capabilities of the oil extraction industry with state-owned Ecopetrol by far the largest applicant over the past four years, in addition to Serinpet, a provider of services to the oil industry.

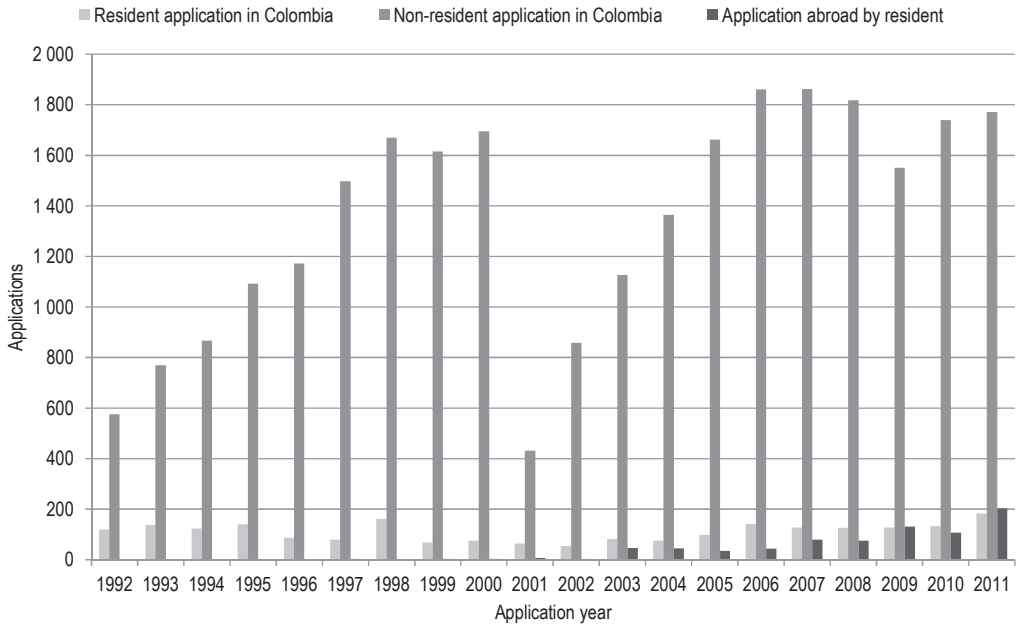
Figure 2.6. Patent applications for Colombia



Notes: A resident application is an application filed with an IP office by an applicant residing in the country/region in which that office has jurisdiction. A non-resident application is an application filed with a patent office of a given country/jurisdiction by an applicant residing in another country/jurisdiction. An application abroad is an application filed by a resident of a given country/jurisdiction with a patent office of another country/jurisdiction. Colombia became a contracting state of the Patent Cooperation Treaty (PCT) in 2001, following which the number of applications received declined temporarily as non-resident applicants switched from using the Paris route (direct route) to the PCT system.

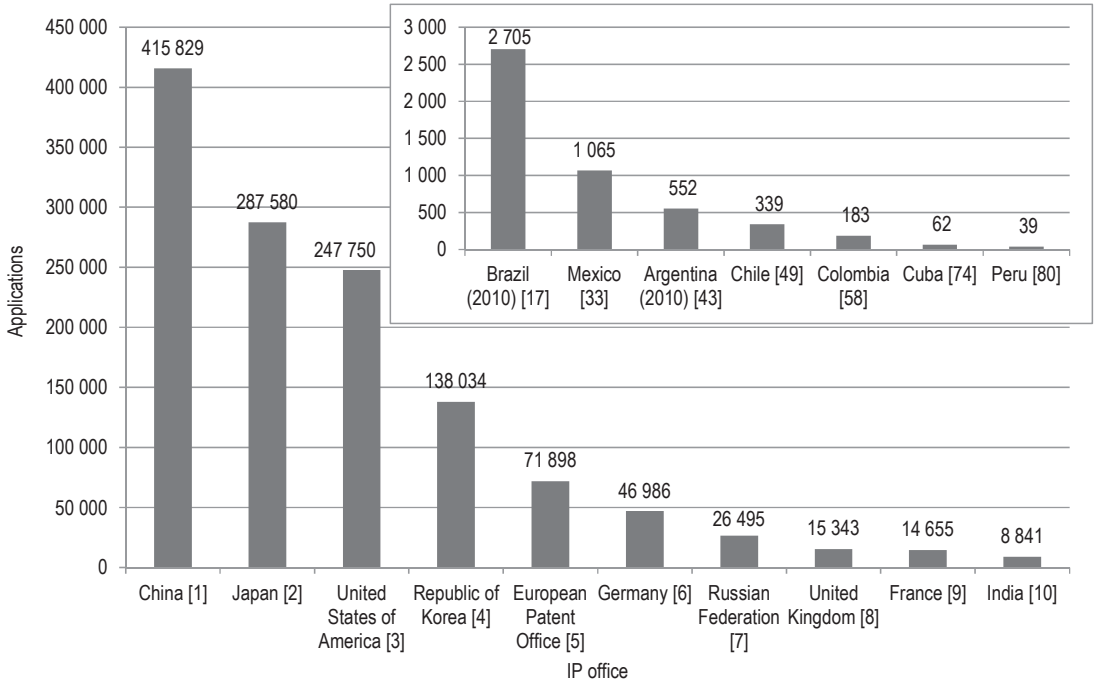
Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 2.7. Resident patent applications for selected Latin America and Caribbean IP offices



Sources: WIPO, Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch; except for Argentina (2009, 2010) taken from RICYT www.ricyt.org/index.php?option=com_content&view=article&id=150&Itemid=20.

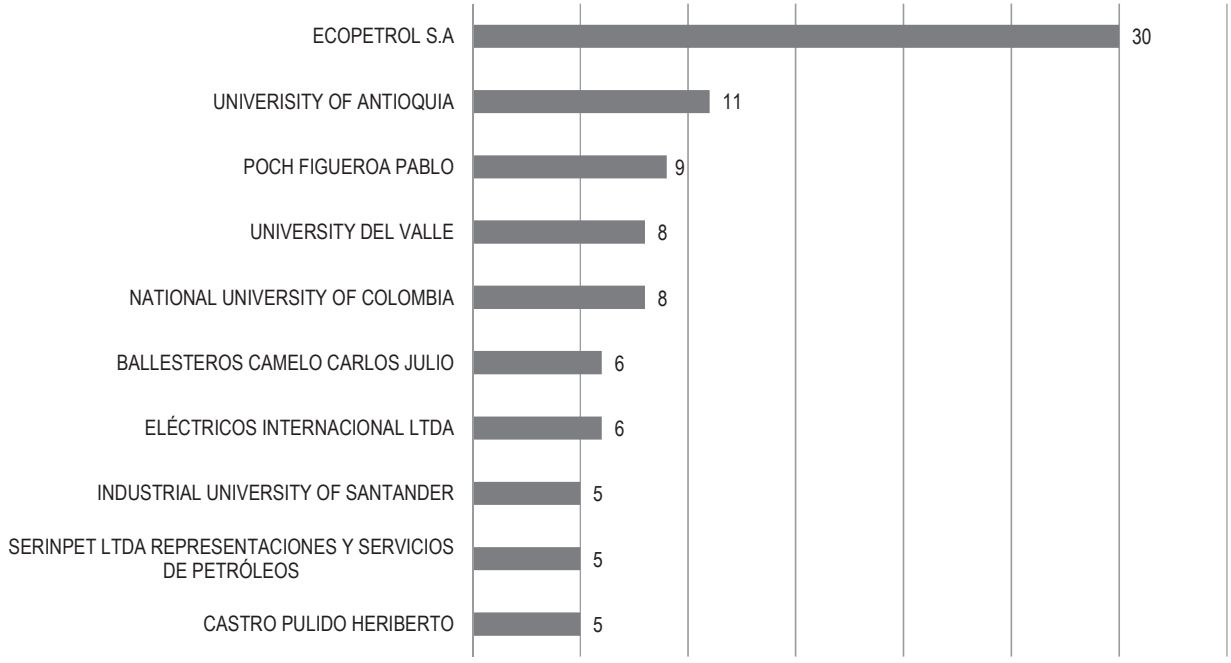
Figure 2.8. Resident patent applications by IP office, 2011 or latest available year



Notes: Latest available year displayed in parentheses when different from 2011. Ranking of the number of applications out of 105 offices for which data are available are displayed in square brackets.

Sources: WIPO, IP Statistics Data Center, http://ipstatsdb.wipo.org/ipstats/patentsSearch; and RICYT for data on Argentina, www.ricyt.org/index.php?option=com_content&view=article&id=150&Itemid=20.

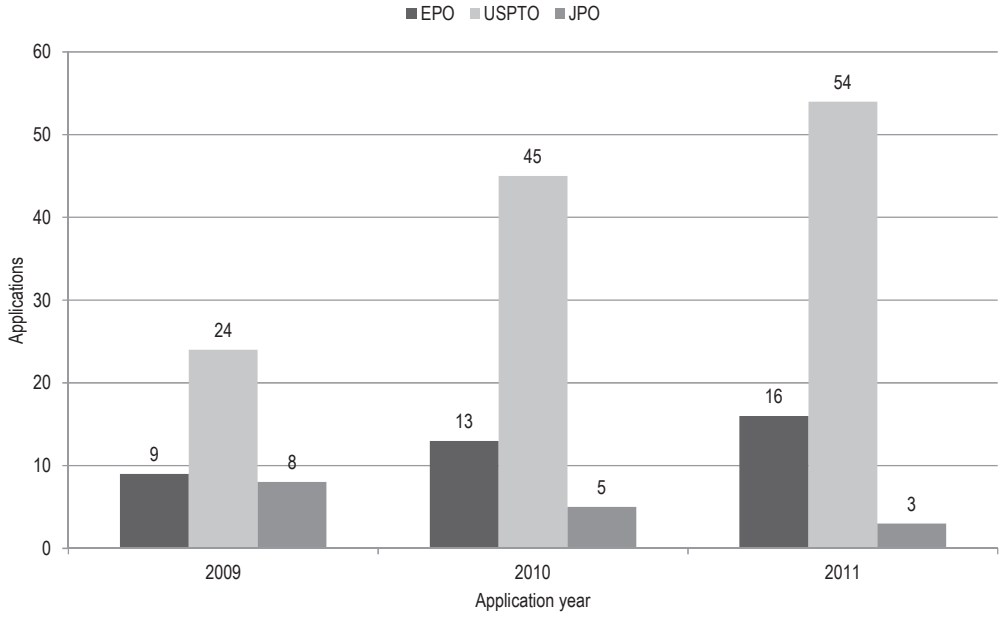
Figure 2.9. Number of patent applications for the top 10 Colombian entities for 2007-12



Source: Data provided to the OECD by the SIC in July 2013.

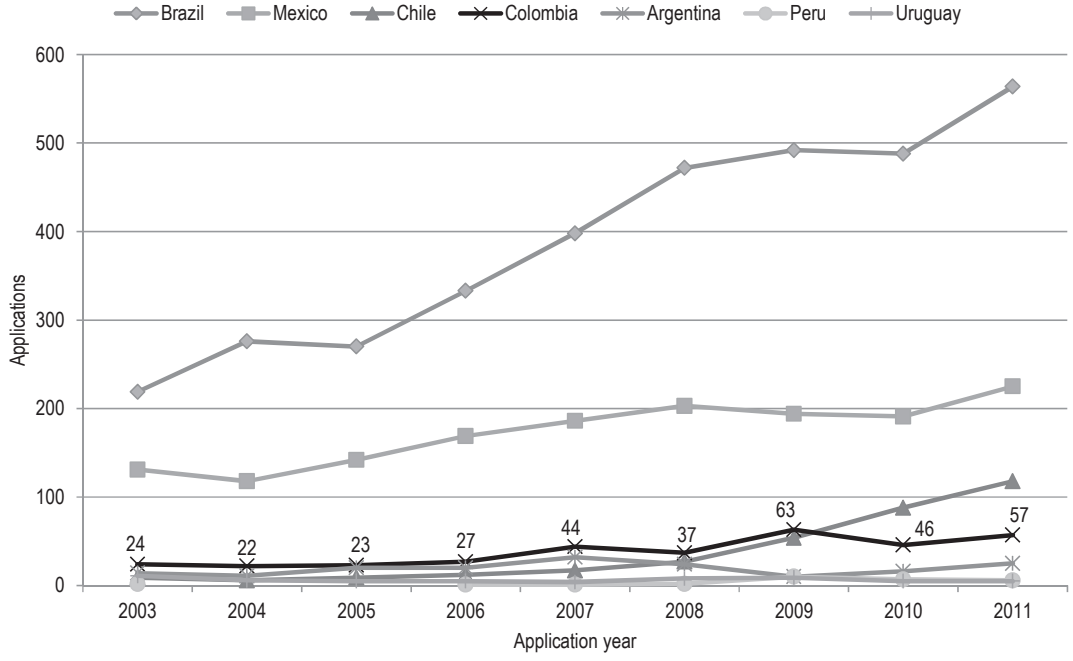
To date, Colombian residents have filed only a handful of applications at the three major IP offices, the European Patent Office (EPO), the United States Patent and Trademark Office (USPTO) and the Japan Patent Office (JPO), while most applications were filed at USPTO (Figure 2.10). PCT applications are moderately similar to those deposited by nationals of regional neighbours, although much lower compared to those in Brazil and Mexico (Figure 2.11).

Figure 2.10. Patent applications by an applicant residing in Colombia at EPO, USPTO and JPO



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 2.11 PCT applications for Colombia selected Latin American IP offices

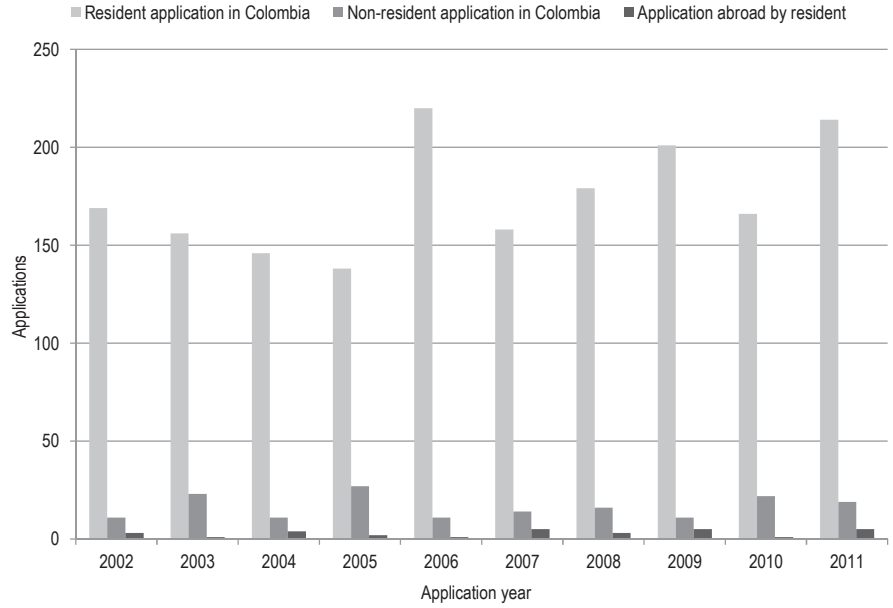


Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Utility models

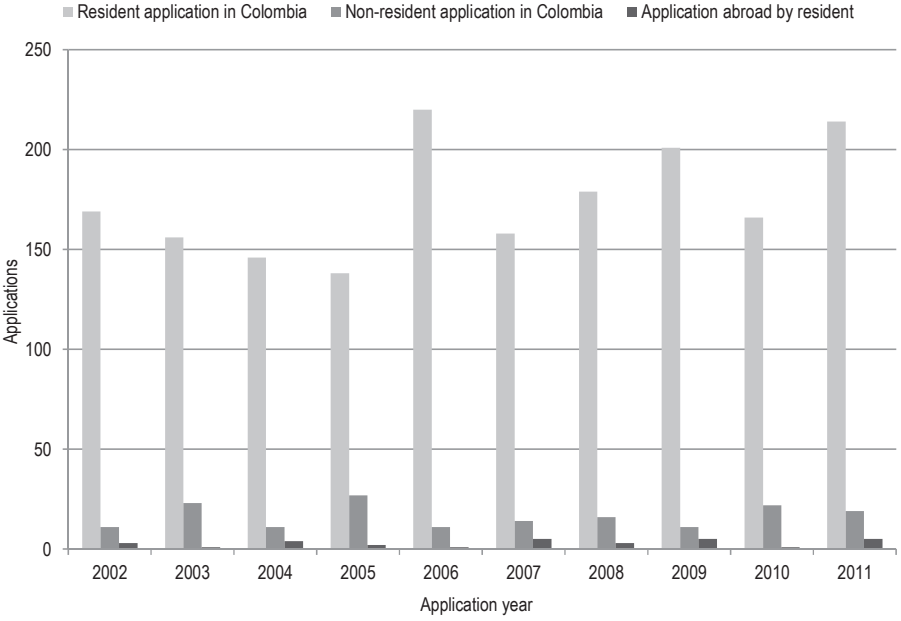
The use of utility models, mainly by Colombian nationals, is relatively moderate (Figure 2.12). In absolute terms, Colombia ranks in mid-position compared to both its neighbouring countries and to countries using utility model systems worldwide (Figures 2.13 and 2.14). As to the profile of national utility model users in Colombia, it is worth noting that in 2012 about two-thirds (65.6%) of applications were filed under the provision of discounts (i.e. they were filed by small entities including small firms and universities).

Figure 2.12. Utility model applications for Colombia



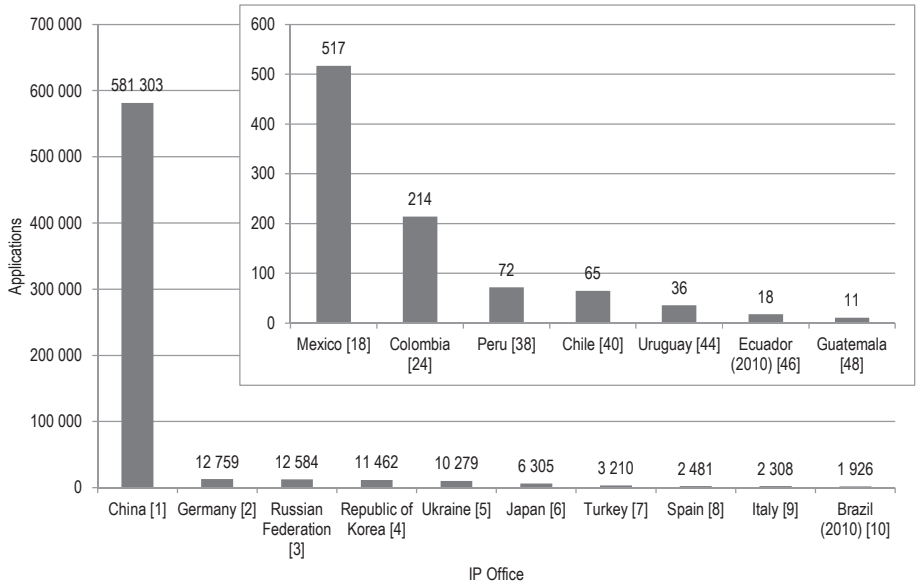
Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 2.13. Resident utility model applications for selected Latin American IP offices



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 2.14. Resident utility model applications for selected IP offices, 2011



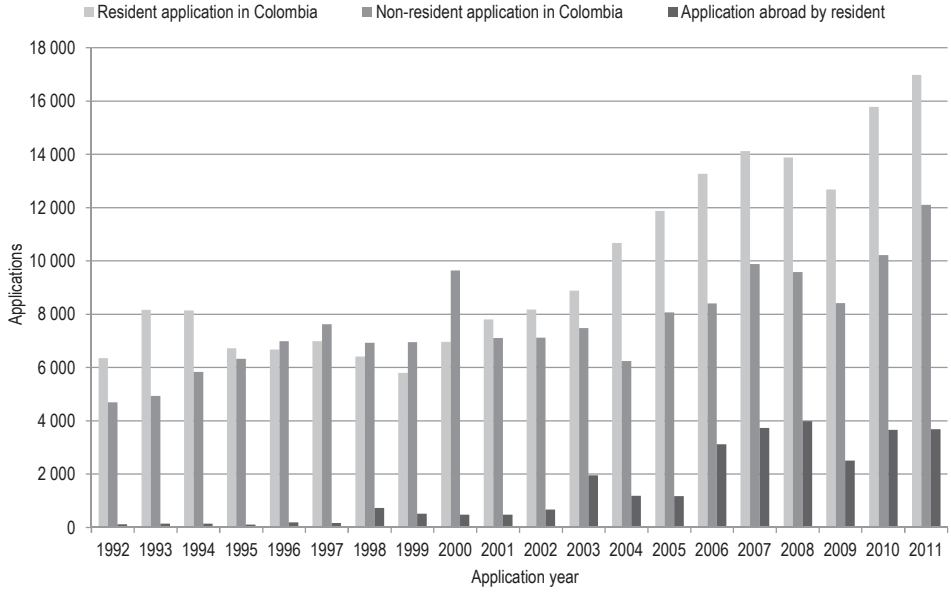
Note: 2010 instead of 2011 for Brazil and Ecuador. The number displayed in square brackets represents a ranking of the number of applications out of 55 offices for which data are available.

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Trademarks

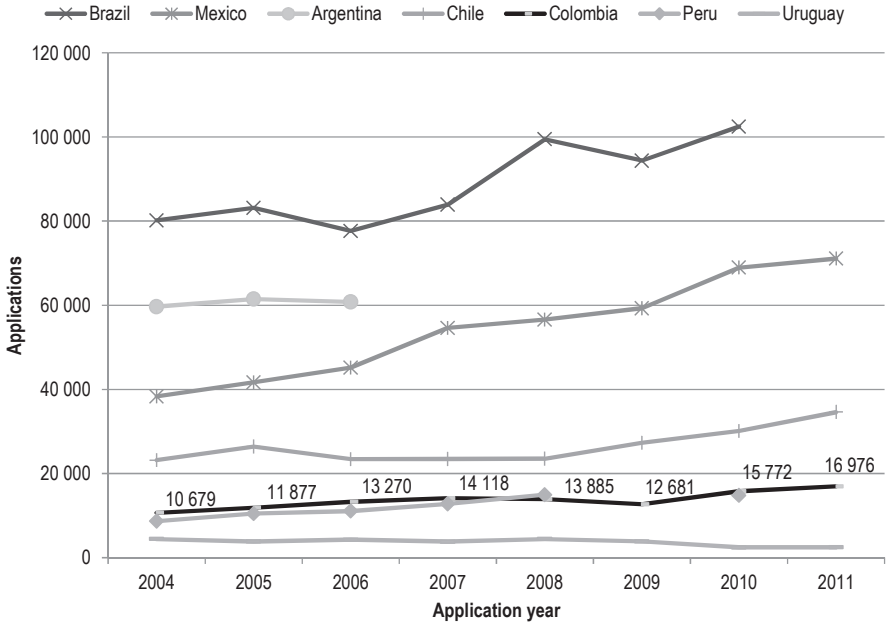
Trademark applications by Colombian residents have increased since 2000 (Figure 2.15). Compared to its regional peers, Colombian residents are rather weak users of trademarks (Figures 2.16 and 2.17). In a comparison of performance across IP offices worldwide, Colombia ranked 24th in its use of trademarks; its ranking is lower if adjustments for population or GDP are made.

Figure 2.15. Trademark applications for Colombia



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

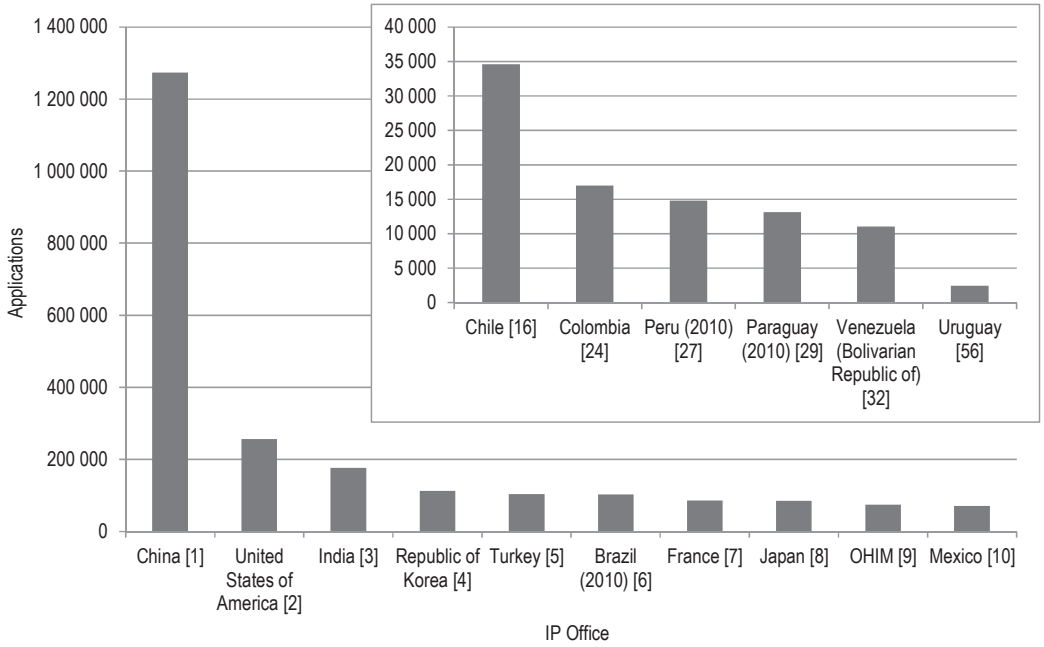
Figure 2.16. Resident trademark applications for selected Latin American IP offices



Note: National office figures are not directly comparable as some countries have single-class systems (Brazil, China, Colombia, South Africa), whereas others have adopted a multi-class system (many European offices, India, Japan, the Republic of Korea, Russian Federation and the United States).

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 2.17. Resident trademark applications for selected IP offices, 2011



Note: 2010 instead of 2011 for Brazil, Paraguay and Peru. National office figures are not directly comparable as some countries have single-class systems (Brazil, China, Colombia, South Africa), whereas others have adopted a multi-class system (many European offices, India, Japan, the Republic of Korea, Russian Federation and the United States). The number displayed in square brackets represents a ranking of the number of applications out of 97 offices for which data are available. OHIM = Office for Harmonisation in the Internal Market.

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

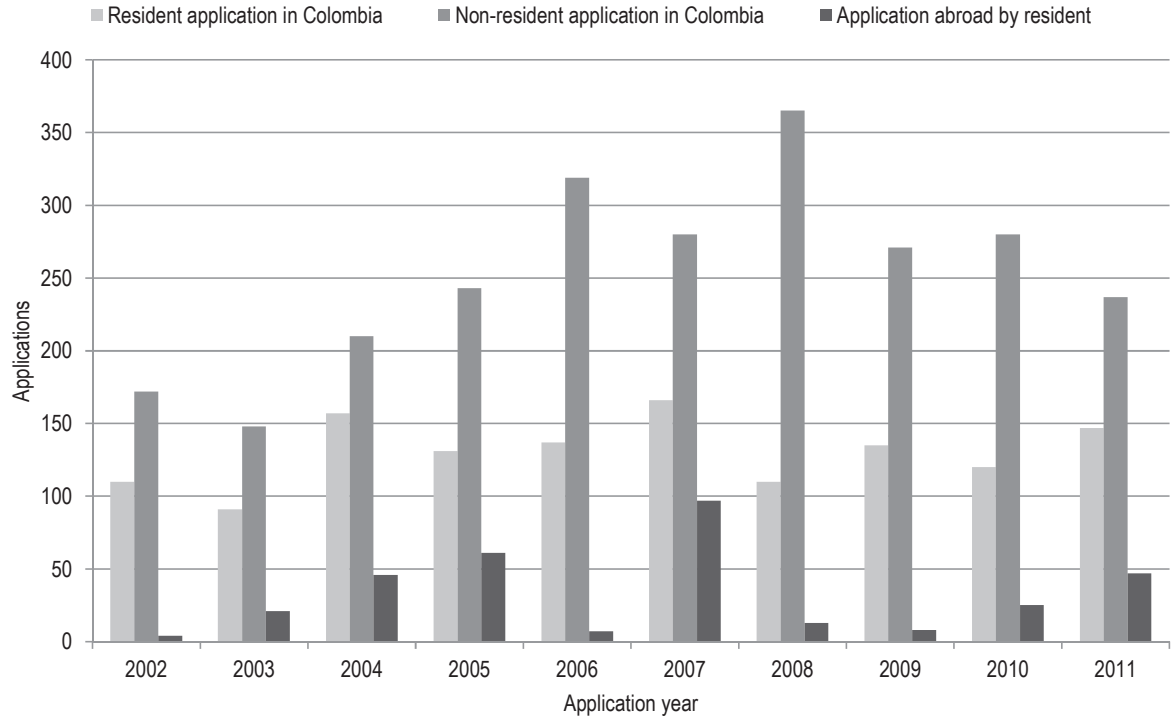
Geographical indications

The use of GI in Colombia is fairly recent. In 2008, Colombia had only two GIs: Café de Colombia and Cholupa del Huila. By 2012, 19 products were registered at the SIC (2012). In Colombia, handicrafts and not only agro-food products qualify for GI protection. However, only one is being actively administered – the case of Café de Colombia. The administration of the GI was transferred from the SIC to an association representing beneficiaries, the Federación Nacional Cafeteros de Colombia. This indicates an incipient use of GI in Colombia (see below).

Industrial design

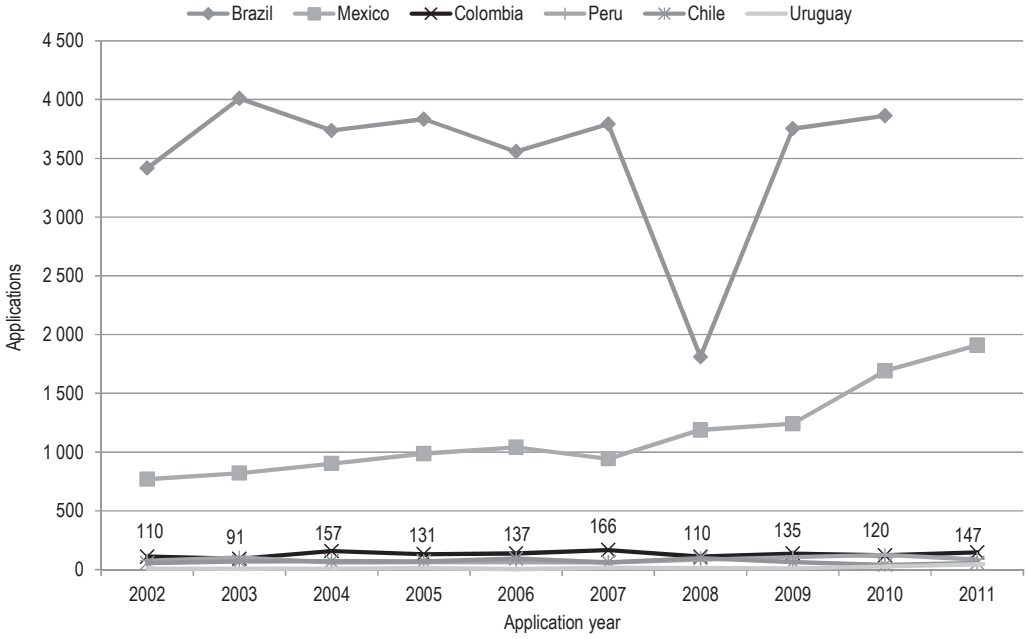
Industrial design protection is used weakly by residents compared to non-residents (Figure 2.18). Colombia's use of design application is below that of its regional neighbours, Brazil and Mexico (Figure 2.19), and ranks 50th worldwide (Figure 2.20). The country ranks 75th and 78th if industrial design use is adjusted for GDP and population, respectively.

Figure 2.18. Design applications for Colombia



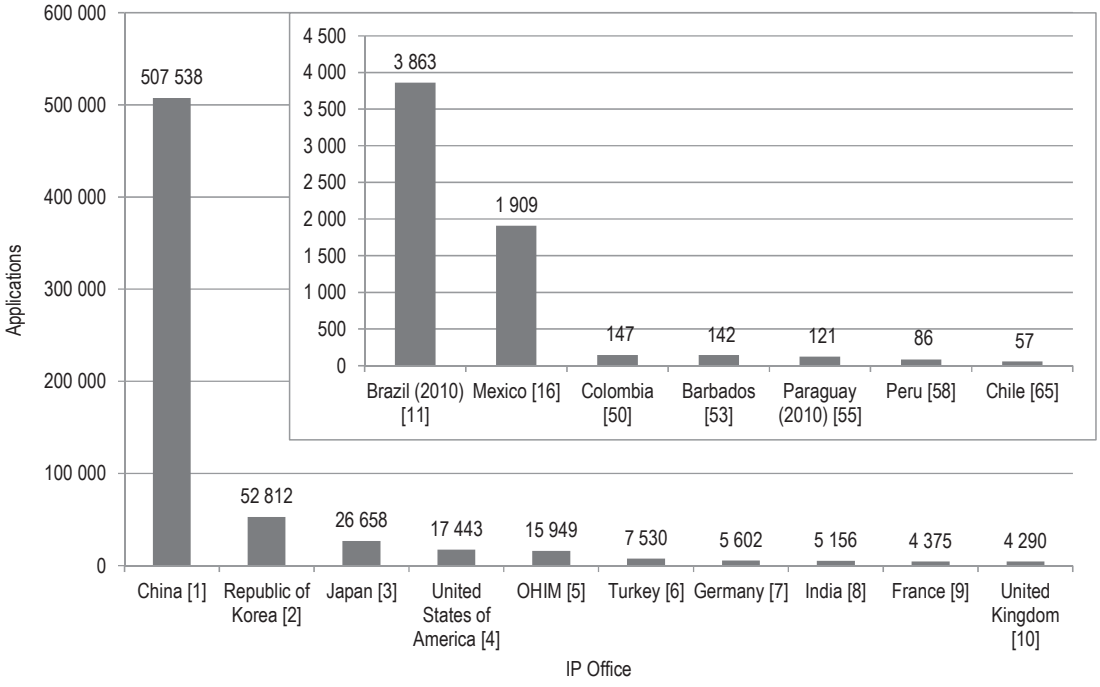
Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 2.19. Resident design applications for selected Latin American IP offices



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 2.20. Resident design applications for selected IP offices, 2011*



Note: *Or most recent available year. The latest available year is displayed in parentheses when different from 2011. The number displayed in square brackets represents a ranking of the number of applications out of 105 offices for which data are available.

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

IP opportunities and challenges faced by different users

Innovators in traditional and informal sectors

Coffee, handicrafts and GI

Colombia's experience with GI began in the mid-2000s in the context of negotiations with the European Union regarding a free trade agreement (FTA), and in July 2013 the SIC introduced the Denomination of Origin Seal. In the early 2000s, Colombia had only three registered GIs, which compared weakly to the many GIs of the European Union. This led to an exercise conducted on behalf of the DNP, which identified a large number of potential Colombian products that could qualify for such IP protection. The main purpose was to ultimately support the competitiveness of Colombian companies once the FTA came into force. A major challenge for making GI work, however, has often been the lack of effective producer associations with the ability to support GI effectively. The major exception is "Café de Colombia", managed by the Federación Nacional de Cafeteros, which has succeeded in creating a commercially successful IP strategy. Recognition of the "Juan Valdez" brand, in particular, has ensured its success (Box 2.2). This has generated valuable social contributions with mechanisms implemented by the Federation that ensure a fair distribution of export revenues, stabilise the incomes of coffee growers and provide support for their education (El Benni and Reviron, 2009). Efforts undertaken to foster regional economic development for other products, such as the Paipa cheese – a product of the Boyacá region recognised as a GI since 2011 – include the creation of a producer association. In addition, Artesanías de Colombia, the Colombian association for handicrafts, an independent institution under the MCIT, has undertaken a variety of campaigns in support of the use of IP by the sector.

Box 2.2. Juan Valdez

Perhaps the most successful case of IP use in Colombia relates to the careful and strategic use of IP by the Colombian Coffee Federation (FNC). Starting in the 1950s, this strategy successfully differentiated and added value to one of the country's most important products, through the use of certification marks, trademarks and GI.

During the 1950s coffee prices plummeted due to an excess supply on the world market. In response, the FNC started a campaign to differentiate Colombian coffee by creating Juan Valdez®, the image of an archetypical Colombian coffee grower with a traditional hat and a faithful mule, carefully growing coffee in the Colombian mountains. Origin awareness and demand for Colombian coffee increased from 4% in the United States in the 1950s to 91% in Canada, Spain and the United States in 2004. Since its creation, Juan Valdez coffee has existed at a premium of 20% over other coffees worldwide. In 2005, "Café de Colombia" became the first non-European product to be a protected geographical indication under the European Union system.

To obtain a license to use the Juan Valdez trademark, the product must consist of 100% Colombian coffee and meet quality standards stipulated by the FNC. The FNC has made extensive investments in R&D and training programmes to ensure this quality mark. In particular, it invested considerably in appropriate technology to ensure that the coffee marketed worldwide as Colombian is indeed 100% Colombian.

Source: WIPO (2013), *Case Studies on Intellectual Property*.

Traditional knowledge

Colombia is a country with considerable biodiversity and substantial cultural diversity over its large territory. This provides potentially valuable sources of traditional knowledge. At present, no database has been created to document Colombia's traditional

knowledge, a step that might further help promote its economic use to the benefit of the different groups that own such knowledge. The case of Oro Verde illustrates how a specific type of traditional knowledge related to responsible, ancestral mining techniques has supported small producers and helped address environmental challenges (Box 2.3).

Box 2.3. Oro Verde

Illegal mining is one of the most pressing environmental and social dangers facing Colombia. It not only uses extractive processes that endanger the rich biodiversity of the country, but also leaves the local community with extremely little or no revenue. "Oro Verde" (green gold) was created to respond to these challenges. The Oro Verde brand promotes responsible, ancestral mining techniques in Chocó, in the Pacific region of Colombia, empowering small producers and helping them to commercialise their products at a green premium.

The brand ensures that ancestral mining techniques are used in production with no use of chemicals and controlled environmental impact. In particular, green gold producers are committed to restoring the landscape after cessation of mining activities, which also helps to reduce their dependency on mining and increase their food security.

Oro Verde implemented a clear and verifiable chain of custody process that producers need to satisfy in order to obtain the green gold certification. Green Gold was registered as a trademark in the United States in 2010 and in the United Kingdom in 2012. The model has been very successful receiving several awards, and has been replicated in Bolivia, Ecuador and Peru.

Source: WIPO (2013), *Case Studies on Intellectual Property*.

Exploiting the potential of Colombia's biodiversity

Biodiversity provides additional opportunities for inclusive economic development across various regions in Colombia. These opportunities are recognised by the National Development Plan 2010-2014. This requires improvements in institutional capacity to implement the legal framework established by Andean Community Decision 391 of 1996, which regulates the question of Access to Genetic Resources. Colombia also signed the 2010 Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilisation (ABS), and is a signatory to the Convention on Biological Diversity, which provides a transparent legal framework for the fair and equitable sharing of benefits arising out of the utilisation of genetic resources.

Setting up clear legal and administrative conditions is an important pre-condition for exploiting economic opportunities, which can notably arise in such areas as pharmaceuticals, cosmetics and agro food products. The example of ecoflora Agro illustrates such business opportunities and the contributions of IP to their development (Box 2.4). Exploiting economic opportunities requires, however, a sufficiently articulated domestic industry capable of exploiting such potential, which Colombia currently lacks. The Ministry of the Environment received only 93 requests for access to genetic resources between 1997 and February 2011, of which only one was for commercial purposes. Other requests were for research purposes only (CONPES, 2011). Bioprospecting, the process of discovery and commercialisation of new products based on biological resources, is rarely undertaken from a commercial perspective. The Colombian National Economic and Social Policy Council's (CONPES) document 3697 of 2011 explicitly acknowledges the need to address those challenges and should be actively pursued.

Box 2.4. ecoflora Agro

ecoflora Agro is a biotechnology and natural products company inspired by indigenous Colombian traditional knowledge. It is focused on quality, value-added and environmentally friendly goods developed by a state-of-the-art R&D team of scientists and technologists based in Medellin, Colombia.

ecoflora Agro has developed dyes, pigments, oils, waxes, pesticides, deodorisers and soaps inspired by Colombia's vast biodiversity. For example, *CosmeBlue*, ecoflora Agro's leading product and brand, is a blue dye developed from the raw juice of the Jagua fruit used as a natural colouring agent in foods, cosmetics and textiles.

ecoflora Agro has collaborated closely with the University of Antioquia, Colciencias, the Ministry of Commerce, Industry and Tourism of Colombia, and the Spanish Agency for International Cooperation. An essential element of its success is the extensive use the company makes of the IP rights system. In particular, it has registered brands and national, regional and international trademarks for its corporate name; filed patents for its inventions; and built up a considerable portfolio of trade secrets. The company has received various awards for innovation and, as of 2012, has become a multi-million dollar company with major international growth projections.

Source: WIPO (2013), *Case Studies on Intellectual Property.*

Collective management societies

A critical factor in the effective use of works, artistic performances and phonograms is the role of collecting societies in negotiations, as dealing with each individual rights holder creates too large an obstacle for commercial uses of artistic creations. Only a small slice of the creative industry sector relates to artistic creations by informal and traditional groups. Collecting societies thus offer wider opportunities for other businesses. At present, there are five collecting societies in Colombia. In order to serve and carry out the collect and distribution of economic rights to their associates, collective management societies must obtain the legal status and operation authorisation from the Colombian Copyright Office. In order to ensure the effective working of these institutions, the Colombian Copyright Office inspects and controls their activities to ensure that the rights of members and users are respected. Previous experience with collecting societies has shown it is important to monitor their activities. Thanks to a Presidential initiative, as of 2013 the use of works, artistic performances and phonograms can be secured through a single window of payment, which can serve to support creative industries more widely. This can facilitate access to copyrighted materials for firms whose businesses rely on such content.

Equity and IP

The topic of intellectual property over genetic resources has generated substantial controversy with intended legislation failing because of resistance from the afro-indigenous community. This indicates the importance of establishing dialogue with the community to establish how their own use of IP can offer them opportunities and benefits.

"Catching-up" firms and leading "frontier" businesses

Concerns regarding the state of the IP system are not a top priority for many businesses. However, in response to a survey of 8 643 manufacturing firms in Colombia, a substantial share expressed concerns regarding the capacities of Colombia's IP system (Table 2.4). Moreover, firms were preoccupied with a lack of resources, uncertainty

regarding demand for innovations, and difficulties in accessing finance. They also mentioned fear of imitation by competitors as an inhibitor for investments. While IP cannot fully address this concern, it can help to reduce the threat in some cases, provided that the judicial system can effectively enforce IP rights.

Table 2.4. Obstacles for investing in R&D, 2009-10

	High	Medium	Low
Scarcity of own resources	25%	41%	33%
Easiness of imitation by third parties	22%	34%	45%
Uncertaintly on the demand of innovative goods and services	18%	41%	41%
Difficulties in accessing external financing for the firm	17%	32%	51%
Scarce possibilities of cooperation with other firms	15%	30%	54%
Scarce information on public instruments of support	15%	31%	53%
Insufficient capacity of the intellectual property system	13%	28%	69%
Uncertainty on the success of the technical execution of the project	13%	43%	45%
Low rentability of innovation	11%	41%	48%
Lack of qualified personnel	10%	41%	49%
Scarce information on markets	9%	38%	53%
Low offer of inspection services	8%	31%	61%
Scarce information on technology available	7%	38%	56%
Difficulty in complying with regulations	7%	34%	59%

Source: DANE - Encuesta de Desarrollo e Innovación Tecnológica (EDIT) V, 2011.

Addressing needs for SMEs

Most small and medium businesses in Colombia consider IP to be irrelevant for their activities and accessible only for large firms. Often firms are unaware as to what type of knowledge they should seek to protect and how they should go about doing so. This is a common perception noted by various government institutions that have engaged in awareness-raising campaigns aimed at modifying these views. An interesting initiative that aims to go beyond providing general information to these firms is "Propiedad Intelectual Colombia". Financed by the Inter-American Development Bank (IADB) and by seven Colombian Chambers of Commerce, the project provides direct advice regarding IP to a group of selected firms for which they have trained consultants (Box 2.5). Some of the participating companies indicated that the programme helped them identify how to use IP (mostly trademarks) to the benefit of their business. However, while their business operations benefitted, the costs required to use IP were judged too high for many small firms in the absence of this type of project. Another example of an institution that has been instrumental in assisting firms with IP is TECNNOVA. The SIC also co-operates with Spain on an IP auto-diagnostic tool for firms.

Box 2.5. Propiedad Intelectual Colombia

The project Propiedad Intelectual Colombia, funded by the IADB (USD 1.4 million) and Chambers of Commerce (USD 1.3 million), aims to foster the use of IP by micro, small and medium-sized Colombian firms. The project has a regional focus covering Antioquia, Bogotá, Cali, Cartagena and Barranquilla. The IADB via its Multilateral Investment Fund (FOMIN), the Chamber of Commerce of Medellin and the SIC jointly implement the project over an initial period of four years.

The project supports the development of simplified IP application procedures and online modules for trademarks and patent applications. It has also developed various tools to inform businesses about the strategic value of IP, with the aim of overturning the widespread view of IP as a purely legal tool of little value to businesses.

The project's most ambitious service consists of providing specialised IP consulting services to around 400 companies, for which 150 national consultants have been trained. The process involves four steps. The first involves a detailed diagnostic of individual firms' use and management of IP from the perspective of innovation. The second step comprises practical courses to support innovation, help companies identify sources of financing for innovation activities, and train firms about useful information provided by publicly available IP databases. The third step involves the development of recommendations, based on inventory of intellectual assets, for better management of a firm's intangible assets. Finally, the fourth step takes the form of a concrete plan detailing which IP the firm should apply for, how to conduct enforcement, and what strategic priorities to set regarding IP.

Initial feedback from participating firms has been positive. However, further evaluation in the future will reveal which long-term benefits were derived from the project and, in particular, whether the training has provided firms with the opportunity to manage their IP effectively beyond the project phase.

Source: Presentation at one-day workshop in Medellín as part of an OECD mission to Colombia, www.propiedadintelectualcolombia.com/site/.

Leading "frontier" firms

As with other countries, including emerging and developing economies, firm size in Colombia is positively correlated with the probability of holding quality certifications and/or patents. Similarly, a high share of skilled workers and exporter status positively correlate with IP ownership (Table 2.5). This partly reflects the fact that larger businesses can benefit more from IP, given some of the sunk costs involved in enforcement (see Chapter 1).

Table 2.5. Ownership of IP and firm characteristics in Colombia

	Quality certification	Domestic patents	Patents abroad
Firm size	+	+	+
Firm age	+	0	0
Exporter status of the firm	+	+	+
Importer status of the firm	0	+	0
Firm has its own website	+	0	+
Firm has access to financial services	0	0	0
Firm provides formal training	+	+	+
Share of skilled workers	0	+	+
Firm uses of foreign technology	0	0	0

Note: Results are based on probit regressions and include controls for size-of-locality, sector and country-year fixed effects, as well as investment in fixed assets and foreign ownership status. The share of skilled workers is defined as the share of permanent full-time, non-production workers over total full-time workers. Size is defined as the logarithm of employment, while access to finance indicates whether the firm has an overdraft facility or not. Results for quality certification regressions are based on 692 firm observations and those for domestic and foreign patents include 689 firm observations.

Source: Paunov (forthcoming), "Democratising Intellectual Property Systems: How Corruption Reduces Opportunities" [working title], based on World Bank Enterprise Surveys.

Several leading and frequently large businesses in Colombia now support internal processes to promote the importance of IP. In many cases, global competitors raised awareness among national companies of the relevance of IP to their operations. For instance, Empresas Públicas de Medellín has created an IP committee that brings together legal experts and their counterparts from technical fields to promote the use of IP. The committee selects inventions whose patentability will result in a high commercial value for the company. They found that recognition by the company is as important as financial incentives in stimulating employee interest in obtaining IP. Negotiations are carried out with each researcher for each project and employment contracts provide incentives for researchers to obtain IP. Similar efforts have been implemented in other large companies. A key challenge has been lack of recognition of the importance of innovation and the long-term commitment of senior management. The tendency is to see investments in research as a cost rather than as a long-term investment in competitiveness. Such a long-term strategic perspective is necessary, however, to ensure the success of a patent and innovation-based business strategy.

Ecopetrol, the largest company in Colombia, is an exceptionally advanced IP user with 44 patents and 33 trademarks. These IP titles are the result of substantial internal research capacities and co-operation with national and international research centres. For example, Ecopetrol makes strategic use of technical information provided in international patent applications to orient research from the planning stage. They had only made limited use of patent information in the past and found this had weakened the effectiveness of their IP strategy.

Since many local companies do not have internal capacities to do so, services provided by institutions such as TECNNOVA, which evaluate the potential impact of research projects by referring to state-of-the-art information in the field, are critical. TECNNOVA has evaluated technologies and developed corresponding strategies for the information and communication technology (ICT), energy and health sectors.

Challenges to public support for IP

Some voices in the private sector have raised concerns about some support programmes aimed at improving companies' IP performance. One case is Convocatoria 564, a Colciencias programme that covers IP application fees for selected projects. This programme received only 16 project applications of which five were approved. Colciencias asked applicants to provide detailed technical information in their submissions, but provided no guarantees that the information would be treated confidentially. Since the selection process involved peer reviews, some applicants believed that their competitors could review the technical information. Predictably, this caveat resulted in relatively few applications. The high rejection rate for applications further reduced the perceived benefits for industrial applicants. Discussions are currently underway to change the programme requirements so as to render it more appealing to private sector applicants without compromising the rigour required in the selection process.

Another challenge relates to the desirability of making knowledge created by public financing publicly available, so as to ensure that the returns from investments of public resources are shared as widely as possible. If private companies are to co-fund and co-operate, the right balance has to be drawn ensuring their interests are also satisfied or otherwise private businesses will not see any benefit of such financing opportunities. A final concern raised by private businesses is that project approval can be very slow, which is a challenge as technical project proposals might become obsolete if granted more than a year after the initial application.

Research institutions and universities

Incentives

There is wide agreement among observers that lack of incentives precludes researchers from filing IP applications. The "publish or perish" rule that often motivates researchers towards publication can lead them to overlook the fact that publishing is not necessarily incompatible with registering IP, if timeframes are correctly observed. While private universities may freely establish their own remuneration schemes, public universities have less autonomy. The current situation, set out by Decree 1279 of 2002, provides much larger returns to publications, and while it provides rewards for granted patents, it gives only minor rewards for technological innovations and, therefore, does not reward researchers substantially for commercialisation of their IP. Moreover, a dominant academic tradition sees IP as fundamentally opposed to the purposes of academic research. However, a law established in 2008 stipulates that any IP created from a Colciencias-funded project is owned by the inventor and not by Colciencias, with the exception of projects serving public security. Moreover, all universities are free to negotiate shares of IP royalties with their researchers, as this forms part of their own budget. The Universidad de los Andes has decided not to fix rates, but instead takes decisions on a case-by-case basis, a practice followed by the Sorbonne in France, and Yale, Harvard and MIT in the United States Public and private universities have adopted various approaches to providing incentives for registration of IP and commercialisation of inventions. While researchers were initially not overly interested in obtaining IP, this attitude is now changing. For instance, at present, the Universidad de los Andes receives more requests than the legal staff in charge of IP can cope with.

Technology Transfer Offices

The creation of IP services and eventually TTOs is on the agenda of many of Colombia's leading research institutions including the Universidad de los Andes, the Univerdad Nacional, the Universidad Eafit and the Universidad de Antioquia. In 1996, the Universidad de los Andes, Colombia's leading private university, had no trademarks or patents, as researchers were neither aware nor incentivised to obtain IP. However, following systematic university-wide efforts, two staff members were assigned to the judicial office in support of IP. Other leading universities have also invested similar resources. Most IP cases are negotiated on a case-by-case basis before projects commence. This is probably a reasonable approach given that these activities are still emerging.

In addition to providing support for applications and engaging in awareness-raising activities, the staff in charge of IP at the Universidad de los Andes screen applications with the highest potential before proceeding with IP applications. The staff is also involved in creating inventories of university IP. However, most of their work has been confined to assisting in negotiations with industry partners, they are as yet not working on identifying suitable partners.

Universities are currently considering the creation of a TTO as part of a wider strategy to foster relations and partnerships with industry. One approach has been to consult with universities abroad regarding their experiences. The question of how to create a sustainable business plan for the TTO still remains to be addressed, however. Overall, university bodies in charge of IP are still young and rely on limited resources. Furthermore, reaching sufficient scale to reduce costs is difficult for individual institutions as IP activities are often still incipient.

Co-operating across institutions (e.g. at a regional level) can, however, provide such opportunities, and can also provide mutual learning processes. The "Network for the Management of Intellectual Property" (Redes de Manejo de la Propiedad Intelectual para el Fortalecimiento de la Capacidad de Investigación) Project has helped to exploit such economies of scale at a sector level. The project, supported by Colciencias since 2007, has created four networks composed of research institutions in the sectors of health, agriculture, industry and energy, as well as defence. They provide a variety of services to their members including the provision of support for drafting IP applications or licensing agreements and other types of training programmes, and allow for the exchange of relevant experiences.

Commercialisation

There is awareness among those responsible for IP at universities that payoffs require commercialisation and interest in supporting commercialisation. However, the commercialisation of IP from public universities faces a major challenge: researchers, as public sector officials, cannot claim sources of income other than their salary and, therefore, cannot engage in spin-offs. Several public universities have affirmed that this constitutes a barrier for researchers seeking commercial applications based on their IP. Some officials from public universities expressed a concern that these constraints might lead the best researchers to depart for the private sector, thus weakening the quality of research at public universities. The question of spin-offs also needs to be addressed by private universities in that the law on non-profit organisations, which applies to Colombia's private universities, stipulates that they cannot create for-profit activities. Notwithstanding those challenges, a few spin-offs have been created (the Universidad de los Andes has created four). A few public universities, such as the Universidad de Antioquia, have also worked with retired researchers no longer bound by the same rules and regulations.

One fundamental challenge to commercialisation is the limited nature of partnerships with the private sector. In the case of the Universidad de los Andes, only about 10% of funding in 2001-11 was received from industry. Factors pushing university researchers to co-operate with industry include the opportunity to raise additional funding and also the opportunity to address "real" research problems. Grants provided by Colciencias for joint university-industry projects also led some researchers to seek co-operation with industry. Several researchers at the Universidad de los Andes who created spin-offs or co-operated with industry found that establishing contacts with the private sector was a much bigger challenge than regulations. In addition to the difficulties involved in finding interested partners, researchers encountered difficulties in negotiating with companies who often wanted an excessive share of their joint IP. Researchers felt the university had provided adequate support to researchers in such negotiations, when needed. Private companies also wanted solutions to short-term projects, so it was often necessary for researchers to explain that research requires long-term investments. A more structural constraint for further co-operation is the weak innovation capacity of the private sector in Colombia; only a few firms have the capacity to effectively engage with industry. This requires complementary efforts aimed at developing the research capacities of industries to go beyond IP policies.

The private sector also identified challenges for co-operating with universities to commercialise university IP. In addition to conflicts over the share of benefits from commercialisation, conflicts arose over unforeseen difficulties. Private companies often discovered that the shared IP was in fact not yet commercially applicable and would

require further investments, especially in the development of prototypes. However, they were not necessarily able to contribute. Private industry also reported that complex norms and regulations tended to complicate co-operation with public universities. This is partly a consequence of the legal framework for public research institutions, which is not designed for co-operation with the private sector. Once initial projects had been set up, however, it was often easier to co-operate on further initiatives. This is because many of the costs incurred by firms were linked to initial co-operative agreements with universities. The role played by "bridging" institutions such as Ruta N and TECNNOVA in fostering the commercialisation of IP is worth emphasising. Both private sector and universities found that the services they offered helped their efforts to achieve successful exploitation of IP.

Notes

1. The composition of the interviews, conducted in January 2013, was as follows: 32% of respondents were from the main governmental agencies involved in IP and innovation policy (i.e. Colciencias, the DNP, MCIT), 21% of respondents were from one of the three IP offices (i.e. the ICA, the SIC, the Oficina de Derechos de Autor), 19% were from various public and private universities, 17% were from diverse public and private companies, and 11% were from other institutions.
2. This section draws on OECD (forthcoming).
3. For instance, regarding copyright the term of protection is the life of the author plus 80 years. For a legal entity, it is granted for a term of 70 years counted from the production, dissemination or publication of the work.
4. Andean Decision 486 is regulated by Decree 2591 of 13 December 2000 and SIC's Special Circular.
5. SIC (2012) describes various specific activities that the institution engaged in to support the use of patent documents by firms.
6. If IP measures are used as indicators of innovation performance, comparisons of IP applications from different countries to different IP offices are difficult, as they also reflect different examination standards applied by different IP offices. For this reason, international comparisons commonly compare IP applications from different countries to a single IP office, such as to the United States Patent and Trademark Office (USPTO), the Japan Patent Office (JPO) and the European Patent Office (EPO), or to Patent Cooperation Treaty (PCT) applications (see OECD, 2009). These patent applications are, however, less informative in the context of emerging countries where the number of IP applications tends to be fairly low.

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Chapter 3

Study of Indonesia's national intellectual property system

Indonesia needs to develop its innovation capacities if it is to sustain growth and address key social challenges. Intellectual property (IP) policy can become a powerful policy tool to support these efforts if effective co-operation with actors involved in IP policy is achieved. Indonesia's businesses and research institutions are currently weak users of IP notably of patents and utility models. Legal and administrative reforms are needed to improve the quality of the IP system. Efforts must also be taken to include smaller entities and businesses in remote geographic areas. Traditional knowledge protection and geographical indications can permit the inclusion of a wider group of innovators, but will require investments aimed at generating economic value on their basis. IP policy also has to focus on commercialisation by resolving the legal uncertainty about the licensing of IP generated from public funding sources and implementing effective support programmes and services.

3.1. Overall assessment and recommendations

Introduction

Indonesia's policy makers recognise the importance of the IP system and have begun implementing multiple policy initiatives to strengthen the role that IP plays for Indonesia's research organisations and businesses. This analysis of Indonesia's IP system, which uses the framework described in Chapter 1, contributes to this initiative. The analysis is based on a review of the national intellectual property system, which draws on more than 50 individual and group interviews with representatives from the Indonesian Ministry of Science and Technology, the Directorate General of Intellectual Property Rights (DGIPR) and several other key governmental agencies, research institutions and universities, as well as companies.[1]

This chapter is structured as follows. Section 3.3 provides an overview of the socio-economic and innovation context of Indonesia; section 3.4 describes the various dimensions of its IP system; and section 3.5 examines the various types of IP used and the challenges facing users. The appendix provides a list of the country's main IP laws.

Implications of Indonesia's socio-economic and innovation context for IP policy

Indonesia is the fourth most populated country in the world with 237 million inhabitants. Its GDP places it among the top 20 countries. In 2001-12, a timeframe which includes the Global Financial Crisis, the country's average annual growth rate was 4.3%, compared to a much lower average of less than 1% for OECD countries during the same 11-year period. Moreover, its growing domestic market and solid base in one of the world's most dynamic regions offers many opportunities for further growth. This, however, requires addressing a series of challenges, including huge infrastructure gaps, substantial pockets of poverty, and a weakly articulated and poorly performing innovation system (OECD, 2013). Table 3.1 provides a summary of the strengths, weaknesses, opportunities and threats (SWOT) of Indonesia's innovation system.

The socio-economic context of Indonesia and the characteristics of its innovation system (section 3.3) are crucial to the capacity of IP to support innovation in the country, as the following points make clear:

- Southeast Asia is one of the world's most dynamic regions, exceeded only by East Asia. Europe, Latin America and North America have lagged behind, especially since the onset of the Global Financial Crisis. Indonesia's recent growth experience follows this dynamic, regional trend, while its huge, growing domestic market offers significant opportunities for future national growth (Oberman et al., 2012). *This performance will continue to attract foreign companies to the Indonesian market and, thus, provide opportunities to draw on their technological expertise (e.g. by seeking licensing arrangements). However, incentives for foreign companies to engage in those transfers will depend on their perception of the local IP system and the level of legal certainty it offers them.*
- While innovation has played little role to date in Indonesia's growth, there has been an improved contribution of total factor productivity (TFP) to output growth. In addition, there are indigenous pockets of concentrated S&T and R&D expertise, especially in the public sector where most expenditure on research

occurs. A small number of well-known universities produce qualified scientists and conduct research in an expanding higher education sector, while in the private sector a small cadre of innovation-oriented companies have grown to appreciate the benefits of innovation. *A key implication for IP support policies, particularly those based on patents, is that a focus on leading public research institutions offers greater opportunities for success in Indonesia. This will also require engaging with private actors for commercialisation. Given the weaknesses of established private sector activities in innovation, commercialisation of the most advanced technical inventions produced by public research institutions should go hand-in-hand with entrepreneurship policy (including, for example, support for science parks), and might sometimes target foreign markets.*

Table 3.1. Summary SWOT analysis

Strengths	Weaknesses
• Strong natural resource base • High trade-based growth rates largely linked to natural resources • Good trade links with Japan and the United States, and improving trade links with regional neighbours and China • Reasonable levels of international competitiveness • Improved contribution of Total Factor Productivity (TFP) to output growth • Pockets of concentrated S&T and R&D expertise, though primarily in the public sector • Expanding higher education sector and small number of well-known universities • Small cadre of companies appreciative of the benefits of innovation • Recent attempts to focus government policy on innovation-related growth • Recent attempt to improve overall co-ordination of government R&D and innovation policies.	• Low GDP per capita and high poverty levels • Slow shift away from a low-technology base • Low productivity levels and TFP growth rates • Modest and highly volatile levels of foreign direct investment (FDI), with few technology or innovation-related spillovers • Underdeveloped infrastructure, including information and communication technology (ICT) infrastructure • High perceived levels of bureaucratic inefficiency and corruption • High barriers to business formation • Limited access to capital for innovation • Low public and private investment in R&D • System-wide failure to generate and diffuse technology • A low-ranked higher education and training system • Small number of researchers and scientists for a country of its size • Poor publication and patent performance • Highly fragmented R&D and innovation governance structure, with limited attempts at overall co-ordination • Lack of indicators and evidence base to underpin innovation policy.
Opportunities	**Threats**
• Appreciable innovation potential and scope for moving up value-chains • Large, young population • Scope for improving qualified human resource base • Market expansion in Southeast Asia and China • Scope for more coherent R&D and innovation policies • Scope for more innovation-friendly FDI • Scope for raising S&T competence levels via greater international co-operation • Scope for making public sector R&D more relevant to industry needs • Scope for increasing private sector involvement in R&D and lowering barriers to innovation • Scope for service sector innovation.	• Volatile global financial situation • Increased competition from emerging and developed countries • Depletion of natural resource base and related problems of environmental degradation • Continued emphasis on trade-based rather than knowledge-based growth • Continued under-investment in infrastructure, higher education and R&D • Failure to attract and retain qualified human resources • Inadequate incentives for innovation generally • Inadequate incentives for innovation-friendly FDI • Inefficient implementation of R&D and innovation-related policies.

Source: OECD (2013), *Innovation in Southeast Asia*, OECD Publishing, doi: 10.1787/9789264128712-en.

- Indonesia is very slowly moving away from a low technology base with declining exports of high-technology products and an increasing reliance on imports of these goods. Many private sector actors in low-technology manufacturing and services have, to date, only been modestly engaged in innovation activities and very few are involved in technology-based innovations. *This means that patents will not be attainable for many actors in Indonesia's innovation system, as they lack the needed research capacity. However, this is less the case for utility models, design rights and trademarks.*
- Poverty and inequality are key challenges for Indonesia. Given that the informal sector in Indonesia employed 68% of the population in 2009, the question of how to integrate the contributions of this sector, which are commonly excluded from innovation, cannot be easily dismissed. *While IP policies are not a solution to poverty and inequality, the importance of addressing these challenges requires a focus on the opportunities and challenges of IP for innovators in informal and traditional sectors.*
- Several forms of market failure affect innovation performance in Indonesia: weak infrastructure, bureaucratic inefficiencies and limited access to capital for innovation. *While IP can provide powerful incentives, in practice, incentives are provided to inventors who have successfully commercialised products. This translates into IP systems that only provide incentives to those less affected by market failures, such as large companies, unless complementary policies are used to address market failures. It is important, therefore, to focus on how IP support policies can ensure benefits for "catching-up" firms.*
- Indonesia has multiple traditional industries and a rich repository of traditional knowledge, some of which (e.g. traditional bhatik textiles, handmade furniture and traditional medicines) can offer opportunities for developing innovative markets with additional opportunities on international markets. Developing these industries can also provide opportunities for a more inclusive development strategy in Indonesia. *IP policy needs to focus on the requirements of these sectors, as well as on potential challenges they might face in their development.*

3.2. Key recommendations for Indonesia

Main lines of policy action

Indonesia's IP rights policy has to be complemented by other policies to boost the country's innovation performance; however, reform of current IP policies could strengthen the innovation system.

Regarding operation of the IP system, efforts aimed at automating procedures to increase the processing efficiency of IP applications should be a priority, as lengthy delays weaken incentives. The new Arbitration and Mediation Agency created in 2012 is a positive step towards reducing enforcement costs and needs to receive the necessary political support to ensure its success. Policy steps also have to be taken to avoid the potential exclusion of smaller entities, as well as businesses in remote geographic areas, because of barriers of access to the IP system. Such steps can involve differential pricing strategies and the provision of online and regional services.

Policies should also encourage the use of IP by national actors, including the launch of IP awareness and capacity-building initiatives. They should also focus on those actors with the greatest potential for earning revenue-generating IP, as this will ultimately generate the highest payoffs to the country's innovation system. Incentive schemes should give researchers a stake in the returns from their inventions, by rewarding most those who commercialise inventions with high industrial applicability. This requires resolving legal uncertainties regarding the licensing of IP generated from public funding sources. Since obtaining IP alone does not generate value unless it leads to innovation, Indonesia's IP policy should take further complementary steps to support their commercialisation.

It is worth emphasising that a different mix of IP compared to that of OECD countries would serve Indonesia best. Trademarks, design rights and utility models will better serve a larger group of innovators, since only a small number have the capacity to seek patents. Embracing "new" types of IP, such as traditional knowledge, genetic resources, folklore and geographical indications (GIs), will be attractive for Indonesia, but these need to be used to generate value if they are to serve the innovation system. IP in agriculture is another priority and should be explored and developed much further. In addition, some leading research institutions should examine the opportunities of IP abroad, as foreign markets can provide higher returns for Indonesian inventions, especially as domestic markets for IP are weak.

To achieve these objectives, the country's IP policy has to undertake a more coherent approach involving the various actors of Indonesia's innovation governance system, particularly if the system is to support innovation performance. Indonesia can also further optimise its innovation and IP policies by sharing IP best practices with other countries.

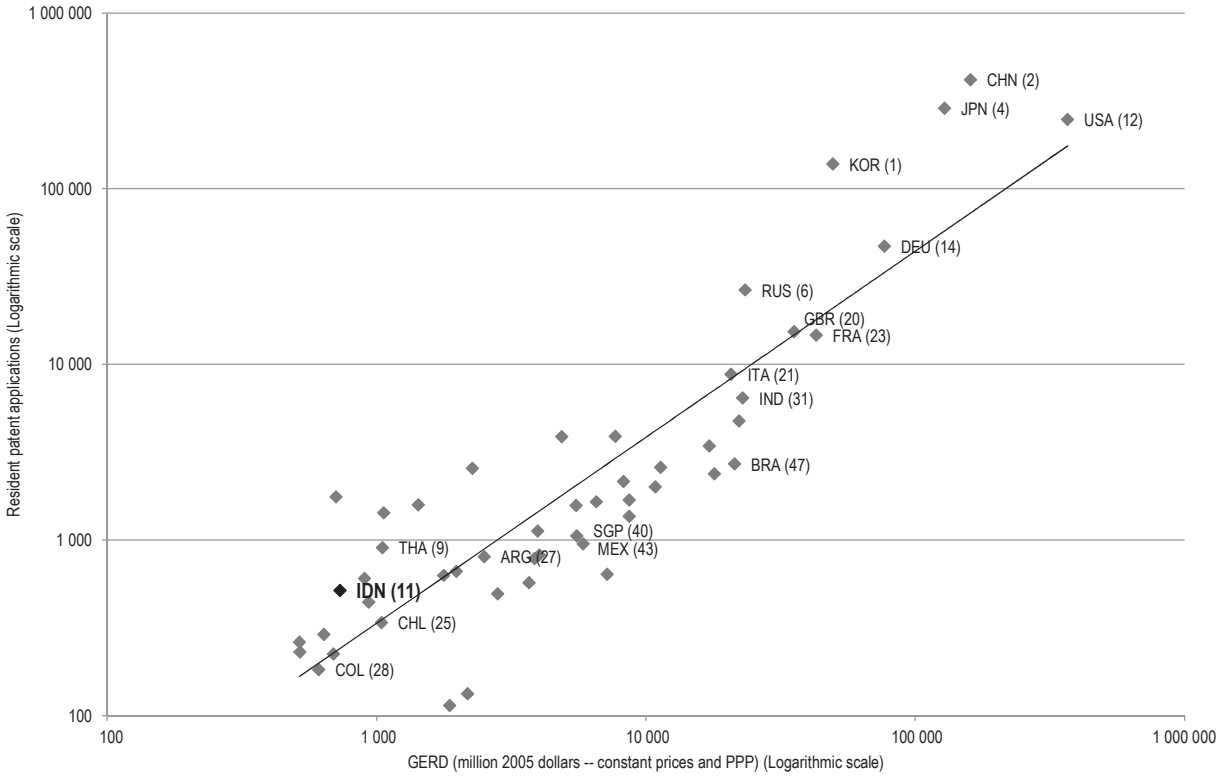
Specific recommendations

Connecting IP policies to innovation policies

1. **IP can be a powerful support to Indonesia's innovation system, but implementation of complementary policies is crucial to strengthen innovation performance.**

   Low levels of R&D investment indicate that inputs into innovation activities are still limited. Accordingly, the ability of Indonesia's IP system to generate patentable inventions is low, as are the stock of human capital and level of industrial specialisation. Figure 3.1 illustrates the relatively high ratio of resident patent applications to R&D expenditures, above the level expected from a linear trend based on performance of all countries (with available data). While the IP system itself can provide incentives for more R&D, a variety of weaknesses in Indonesia's innovation system, such as shortcomings in human capital and weak linkages among actors of the system, require attention to boost research capacities to enable IP. In addition, several interviewees reported that some research was not of sufficient quality to obtain a patent. This is not to say that Indonesia's IP system cannot play an important role, but rather that other innovation policies are needed with IP policies to play a complementary but not exclusive role.

Figure 3.1. Resident patent applications and gross domestic expenditure on R&D (GERD), 2011 or latest available year



Notes: 1. A resident application is an application filed with an IP office by an applicant residing in the country/region in which that office has jurisdiction. 2. Countries were selected if they had a GERD greater than USD 500 million PPP (in constant prices, 2005) and more than 100 resident patent applications. 3. Resident patent application data are for 2011 and 2010 for GERD except for Belarus, Brazil, China, Egypt, Hong Kong, Indonesia, Mexico, New Zealand, Pakistan, Serbia, Slovenia, South Africa and Ukraine, (2010 and 2009 for GERD); for Switzerland (2009 and 2008 for GERD); and for Argentina, Greece, India and Thailand (2008 and 2007 for GERD). 4. A ranking of "a resident patent applications-per-GERD" out of 50 offices for which data are available is displayed in parentheses.

Sources: OECD calculations based on WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch; OECD, *Main Science and Technology Indicators*, http://stats.oecd.org/Index.aspx?QueryId=33210; and UNESCO, http://stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx?IF_ActivePath=P,54&IF_Language=eng.

2. Indonesia's IP policy should emphasize effective co-operation with the actors in Indonesia's innovation governance system with an explicit focus on innovation and high-level policy support.

Several policy actors in Indonesia's IP system have increased policy efforts to foster IP awareness and uptake. However, one major policy challenge is weak co-ordination among different institutions. The only formal instance of inter-ministerial co-ordination in Indonesia is the Task Force for IP Enforcement. The Task Force focuses mostly on enforcement, but not on co-ordinating IP support policies for innovation implemented by different ministries and agencies. Given the wide variety of ministries who conduct innovation policies, co-ordination of their activities would lead to a more coherent approach to IP policy. The creation of an IP co-ordination body with an explicit focus on innovation to complement the activities of the Task Force should therefore be considered. This would create

a governance structure for IP matters suitable to effectively fostering the contributions of Indonesia's IP system to innovation. High-level policy support is critical to introduce such change.

3. **Additional efforts aimed at increasing exchanges on IP policy with experienced policy makers and country experts can help enhance policy impacts.**

   Efforts to optimise innovation and IP policy pose challenges for Indonesia. The country could benefit substantially from sharing best practices with other economies, especially those with a similar model of development. These can help to inform policy choices and enrich IP-relevant training opportunities for government officials and practitioners at various stages of the IP process. Learning from the mistakes of others will allow Indonesia to improve the implementation of IP-based innovation policies, and avoid approaches proven to be inefficient. In addition, the country could strengthen co-operation by adopting a stronger, tighter focus regarding the kind of support it seeks from abroad. In general, it should concentrate on the larger questions of innovation, rather than on purely procedural aspects.

Legal and administrative conditions of IP systems

4. **Indonesia can increase the efficiency of patent application processing by prioritising automation. The quality of the examination process should also be improved.**

   Users of the Indonesian IP system have experienced significant delays in the processing of patent applications. Such administrative inefficiency can discourage IP applications and slow down the commercialisation of IP. Automating processes can be of substantial help in this respect, taking advantage of opportunities provided by information and communication technologies (ICTs). Continuing co-operation with the World Intellectual Property Organisation (WIPO) can be particularly useful.

   The quality of examination processes is similarly critical to IP systems operations. The publication of examination manuals to standardise and improve the quality of processes can be an effective way to send a positive signal to users that their patent applications will be dealt with objectively.

5. **The new Arbitration and Mediation Agency created in 2012 must receive the necessary policy support to operate effectively and support the IP system.**

   Enforcement of IP rights is a challenge in Indonesia. Litigation processes are often lengthy and costly particularly for smaller firms. The inability to enforce IP rights also effectively reduces the perceived value of IP for Indonesian firms. The creation of the Arbitration and Mediation Agency in 2012 is a useful approach to address this problem, but the new agency will require policy support and adequate resources and capacities if it is to operate effectively.

Adapting IP systems to users

6. **Expanding the provision of online and local IP services would help attract new users from regions other than Jakarta.**

   The majority of IP services are available in the metropolitan area of Jakarta. Users outside the area, though, have to cope with infrastructure shortcomings, which raise transportation costs. Expanding online services is an attractive solution for reducing both regional barriers to IP access and application costs for users not located near Jakarta. However, online services work less well as a means of attracting new users to the IP system. In such cases, a better option is greater availability of local services to orient new users to the system. These could be organised in co-operation with regional business associations.

7. **Focusing IP awareness and capacity-building initiatives on national actors with the strongest potential for obtaining revenue-generating IP can bring the highest payoffs for Indonesia's innovation system.**

   There is a widespread lack of awareness among national actors in Indonesia's innovation system regarding the potential value and payoffs of obtaining IP. Policy makers from various institutions involved in IP policy have identified this as a major shortcoming. Awareness-raising initiatives are implemented by a variety of actors, including DGIPR, the Indonesian Ministry of Science and Technology (RISTEK), research institutes and universities, and various ministries. Together, this probably represents the largest share of expenditure on policies aimed at supporting the use of IP. While these initiatives play a valuable role in support of the IP system, prioritising target groups, starting with national actors with the greatest potential for innovation, would optimise the impact on innovation systems. This is even more important as public resources available to support national actors are limited. Notably, these initiatives could target pockets of leading inventive capacities, especially in activities where IP is critical, such as pharmaceuticals and chemicals for patents. Such support need not necessarily be confined to frontier sectors: another possibility consists of targeting the use of trademarks and other relevant IP among traditional industries with innovation potential, such as *bhatik* producers. To facilitate uptake, consultancy services can help firms identify how to apply IP to their specific context. By taking this approach, rather than offering generic advice, consultants can foster uptake among potential users with only limited prior exposure to IP.

8. **Indonesia has to adopt a scheme whereby public sector researchers receive a share of returns from their inventions. Resolving the current legal uncertainty about licensing of IP generated from public funding sources should be made a priority.**

   The vast majority of leading research in Indonesia is conducted at public research institutions. The leading IP users are thus more likely to come from these institutes. However, a major sticking point concerns the incentives these researchers receive for obtaining and generating revenue from their IP. Currently, public institutions are not legally allowed to reward their researchers with shares in the royalties from any IP they create because of a lack of regulations. The only rewards researchers can expect are minor enhancements to their academic careers, making IP far less attractive than other activities with higher returns such as publications. The short-term budgetary allocations for research projects received

by research institutions create additional disincentives for commercialisation. To transform inventions into commercial products requires a long-term commitment from researchers, whose inputs are often essential for success. This lack of resources on top of limited opportunities creates an additional disincentive.

9. **Indonesia's IP incentive policy has to shift away from a "quantity" approach towards a "quality" approach, as the current focus on quantity generates effects that are counterproductive to strengthening the IP and innovation systems.**

   Valuable policy efforts in Indonesia have invested in supporting the IP registrations of national actors. However, a more sophisticated incentive structure is required, as many current programmes provide support and rewards for patent applications regardless of the chances of obtaining IP. These programmes also provide no additional rewards for innovations that reach the commercialisation stage. This approach potentially encourages a proliferation of bad-quality patent applications, rather than patent applications with potential to serve innovation. It also increases the amount of applications the IP office has to process and, consequently, the amount of human and financial resources. Policy incentive schemes that provide bigger rewards for granted patents and additional rewards for their commercialisation would be more effective in support of innovation. This includes, for example, incentive schemes that offer matching funds against patent titles to allow national actors to commercialise their patents.

10. **Indonesia's IP policy should take further complementary steps to support the commercialisation of inventions by public research institutes. It should provide support for shared TTOs and replicate successful commercialisation experiences in other national institutions.**

    The number of granted IP rights is an indication of successful inventive capacities, but not necessarily of successful innovation performance. This requires an additional step – the commercialisation of IP. However, multiple obstacles can hamper licensing or exploitation of IP, particularly from public research institutes and universities in Indonesia. Finding suitable partners to commercialise inventions is also complex, as the country's institutions have only limited experience in this area. Technology transfer offices (TTOs) can play a critical role here, although only a few offices currently address these tasks well. This is also because sustainable business models are difficult to develop with incipient patenting activities. Shared TTO services among several institutions could help to realise economies of scale and provide a better service in support of commercialisation.

    Moreover, policy could provide support to other research institutes with IP suitable for licensing or commercialisation, replicating the example of the Indonesian Agricultural Research and Development Institute for Agricultural Technology Transfer, which effectively handles the entire process required for commercial application of inventions (Box 3.5). In so doing, these institutions can more easily obtain returns from their IP.

11. **Indonesian IP policies aimed at helping small companies should be complemented by policies supporting these firms' capacity to innovate.**

    Assistance provided to small companies to obtain trademarks can encourage them to invest in quality improvements in products and services and, thus, create an environment supportive of innovation. However, substantial investments in good quality products and marketing are also needed. Moreover, if market constraints,

such as lack of access to finance, prevent firms from upgrading product quality, then complementary support will be necessary to facilitate access to finance for those investments. Industry associations could play a meaningful role in providing targeted services to help SMEs build up their capacities and support for collective trademarks, which are essential for traditional industries.

12. **IP policy should further support technology-screening services that help firms and universities take advantage of information on technologies contained in national and international IP application documents.**

    IP titles are a valuable source of information regarding potential fields for profitable inventions. Screening IP at the onset of research ventures can be critical to channel investments towards the most revenue-generating types of IP avoiding investments that have low potential for success. Tapping into pioneering knowledge from abroad can also support national research and help avoid duplication. It can also empower national actors by allowing them to understand claims held by others operating in their industry both nationally and internationally. Such strategic uses of IP are incipient in Indonesia and support would be beneficial, specifically at institutions and companies where research capacities could clearly apply such knowledge and where IP is an important element, such as pharmaceuticals and chemicals.

13. **IP related to traditional knowledge, genetic resources, folklore and GI is particularly relevant for Indonesia. Policy should encourage communities to generate economic value based on their assets, as these uses will bring the biggest payoffs.**

    IP related to traditional knowledge, genetic resources, folklore and GI, has received substantial policy attention in Indonesia. There are multiple reasons why Indonesian policy makers are justified in their focus on these. Compared to other economic activities where foreign competitors often have leading positions, these activities provide a potential market advantage, aside from the ethical and social importance of IP protection. For instance, traditional medicines such as Javanese "jamu" have given local pharmaceutical companies an opportunity to engage in research on internationally "patentable standards". Furthermore, obtaining these potentially "lower-hanging fruits" does not require the same technical expertise required for research-leadership patents, given the novelty requirement of such patents and the foreign competition.

    In addition, the new forms of IP may constitute a potentially valuable asset for socio-economic groups, including disadvantaged communities. GI, for example, rewards certain regional products. In this respect, current efforts aimed at creating a comprehensive database to document Indonesia's traditional knowledge are worthwhile. They might also offer an opportunity for entrepreneurs to create innovations based on such ownership. In the case of GI, substantial communal investment by effective collective associations will be needed to ensure product quality and to support marketing for payoffs. Focusing on a few GIs but providing them with sufficient support offers a greater chance of success than attempting to create many GIs.

14. Depending on the activity, trademarks, design and utility models can involve a larger group of innovators than patents. Therefore, Indonesia should address the weak use of utility models by residents. Unregistered design rights can also be a way to support SMEs in fast-moving industries such as fashion. Moreover, exploring opportunities for IP in agriculture should be a priority.

While patents are crucial to support innovation, other types of IP can contribute meaningfully to innovation performance. Many other types set a lower bar than patents and thus provide opportunities for a wider group of innovators. IP support policies in Indonesia should therefore pay more attention to fostering their use. Utility models, in particular, are weakly used in spite of the size of Indonesia's industry. The utility model-to-patent ratio is very low compared to neighbouring countries such as the Philippines or Thailand, where usage surpasses that of patents. This indicates that many groups of innovators that lack the capacities to file for patents have opted for utility models as means to obtain IP. Indonesian innovators have not done so, possibly because of legal and administrative conditions of the IP system or because of the country's industrial structure. It is important to ascertain the exact reasons, as utility models could play a critical role in catching-up on development (see Box 1.6).

The importance of agriculture for rural populations underlines the need to support innovation in this sector. Existing research capacities and advanced technology transfer capacities should be exploited further to develop a model similar to that of Brazil's Embrapa. This requires steps to be taken to facilitate commercialisation, such as engaging in testing and customisation of technologies for potential licensees. Commercialisation needs to be strongly supported for both private and public inventors.

15. Opportunities to file and exploit IP abroad for some leading inventions should be supported further, since this can raise resources (foreign income and capital) to support innovation in Indonesia.

Given the weaknesses of private sector activities in innovation, foreign markets for IP might be particularly attractive outlets for selected leading technical inventions, including those produced by the country's best public research institutions. So far, Indonesia has only very limited experience with seeking foreign IP, however, further support would enable more to be done. Success will depend on developing adequate strategies to compete successfully in contested international markets. This will require screening of technological trends and market developments as part of the product development process, including by exploiting information provided by national and international IP application files.

3.3. The socio-economic and innovation context of Indonesia[2]

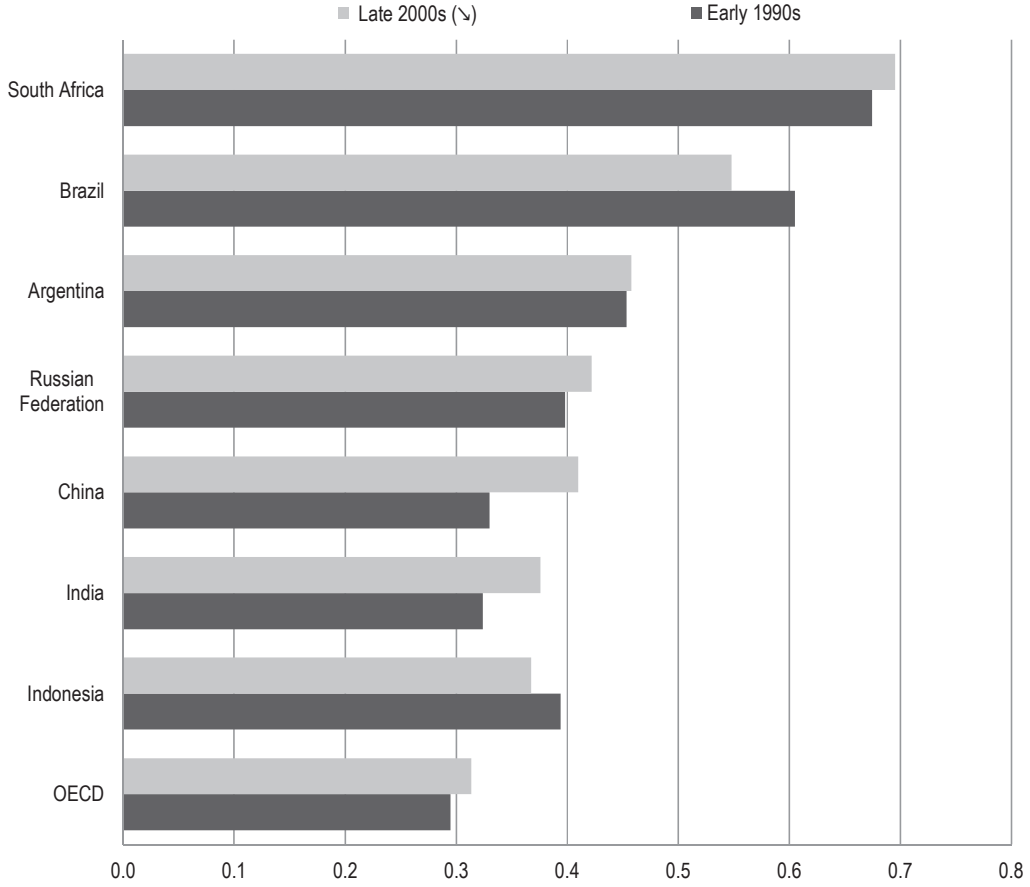
The socio-economic context for innovation

Indonesia's socio-economic performance

Southeast Asia is one of the world's most dynamic regions, exceeded only by East Asia. Indonesia has risen to become a middle-income economy through appreciable levels of economic growth, which have relied to a large extent on exports of natural resources and good trade links with leading global economies. For 2001-11, Indonesia's average annual growth rate was 4.1% in spite of the Global Financial Crises, in contrast

to the much lower average of OECD countries (less than 1%). It is the fourth most populated country in the world (242 million inhabitants) and its GDP places it among the top 20 countries. However, Indonesia's GDP per capita remains relatively low (USD 4 094 in 2011) and it has only attracted modest levels of foreign direct investment (FDI). Increases in TFP have contributed to economic growth, but TFP growth levels have been lower than in competitor countries. Moreover, poverty levels are high, with 18.1% of the population with less than USD 1.25 PPP in 2010. Inequalities in Indonesia are substantial compared to the OECD average (Figure 3.2).

Figure 3.2. Change in inequality levels, early 1990s versus late 2000s*



Notes: Figures for the early 1990s generally refer to 1993, whereas figures for the late 2000s generally refer to 2008. Gini coefficients are based on equivalised incomes for OECD countries and per capita incomes for all EEs except India and Indonesia for which per capita consumption was used.

Source: OECD-EU Database on Emerging Economies and World Bank, World Development Indicators

Indonesia's economic and industry structure

Indonesia has not developed a technology-intensive industry structure and imports of high-technology products outweigh exports. The country underwent an industrialisation process with remarkable growth of the manufacturing sector between 1982 and 1997, which ended with the arrival of the Asian crisis. During the following years, the industrial sector (excluding manufacturing) upheld growth, reflecting the primal role of commodity products during the 2000s. Manufacturing is no longer the engine of growth in Indonesia.

Agriculture activities have constantly decreased over the last two decades by 9 percentage points but remain the main source of employment (about 45% of the labour force) and income in rural areas (OECD, 2010a). For the years 1990-2010 the service sector grew slightly from 34% to 38%.

A few additional aspects of Indonesia's economic and industrial structure are also worth emphasising:

- State-owned enterprises (SOEs) continue to play an important role in the economy (OECD, 2010a).
- There is also a high level of corporate conglomeration and seller concentration in Indonesia.
- In 2006, SMEs employed 96.2% of the workforce and accounted for 53.3% of GDP (APEC SME Innovation Centre, 2007).
- The informal sector in Indonesia is also significant and employed 68% of Indonesians in 2009 according to the Central Bureau of Statistics.

External trade and foreign direct investment

Indonesia has endeavoured to open up its economy to foreign direct investment and trade over the past three decades. In 2010, the country's main outgoing products were petroleum oil and other non-refined derived products (13.5%), coal (10%) and palm oil (6.5%). Machinery and electrical products represented about 15% of exports. Japan and the United States became major export targets and have remained important export partners, though the relative share of exports to China, in particular, and India, Korea, Malaysia and Singapore, increased during 2000-10. Reforms also brought an increase of net FDI flows as a percentage of GDP, which, however, remain modest compared to those in other Asian countries. Moreover, Indonesia's innovation capacity has not benefitted greatly from FDI and technology transfer from other countries.

Education and skills

The proportion of GDP spent on education in Indonesia has increased from 0.7% in 1990 to 3.5% in 2007. Indonesia still lags considerably behind some of its ASEAN neighbours, however. The country's education system displays important weaknesses. The availability of skills for education is low. The ratio of natural science and engineering doctorates to all other doctorates is also low by international standards.

Framework conditions: Financial sector, infrastructure and business conditions

Access to finance is another factor limiting the establishment of new, innovative businesses. Banks remain the primary source of finance; however, the banking sector was badly affected by the Asian crisis and recovery has been slow. Venture capital and other sources of risk financing for newly established technology-based companies are weakly developed. Moreover, deteriorating transport infrastructure and shortages in energy supply are key obstacles for investors and have been identified as barriers to industry development (OECD, 2010b). Improvements regarding ICT infrastructure are also needed to increase quality and address regional digital divides. Finally, cumbersome administrative processes, lack of transparency and weak implementation of tax regulations pose additional challenges for businesses.

The national innovation system

General characteristics

Indonesia's investment in R&D to date is low. Over the period 1987-97, there were only 182 scientists and engineers per million inhabitants engaged in R&D, and total expenditure on R&D (GERD) amounted to 0.07% of GDP. This reached 0.08% in 2009. Government expenditure on R&D in Indonesia accounted for 84.5% of all R&D expenditure over 2001-06 (LIPI, 2009a), with business accounting for most of the remainder (14.7%) and only 0.8% from other sources. The vast majority of Indonesian companies do not invest in R&D and many are reliant instead on technologies developed elsewhere. Some, however, especially those located in high-technology sectors with export potential, are increasingly interested in raising R&D competence levels and have started to co-operate with foreign research institutions.

Performance of universities and research institutions

The bulk of R&D in Indonesia is undertaken by public research institutes (PRIs), in particular, government research institutions (GRIs). Seven research institutes report to RISTEK and the presidential office, and 16 others report to other government ministries or departments. The former accounts for almost 29% of government expenditure on R&D in the government sector, while the latter accounts for around 70%. The Indonesian Institute of Sciences (LIPI) also has a number of research centres covering numerous fields. Moreover, the 32 research centres of the Agency for Research and Development of Industry conduct applied research and offer a range of services to industry, while the Ministry of Internal Affairs co-ordinates 78 research institutions at the local level. Most of the money spent by GRIs on R&D supports projects in engineering and technology (32%) and agricultural and environmental sciences (30%), with natural sciences and social science each taking 18% of the budget and medical sciences and the humanities each taking a further 1% (RISTEK, 2010b).

Historically, the linkages between the various R&D and innovation performers in the Indonesian national innovation system are tenuous. Most research is conducted within GRIs, which tend to operate independently, and there are few research connections between the GRIs and university research units. Research linkages between GRIs and universities and the small industrial R&D community are also rare, with public sector inputs into the innovation process conspicuous by their absence.

Innovation policy

Until recently, government policies tended to neglect the development of an adequate scientific and technological base and framework conditions for innovation.[3] However, a new emphasis on policies and mechanisms is designed to stimulate innovation-led growth, with mechanisms freshly in place to oversee co-ordination:

- The Vision and Mission of Indonesian S&T Statement 2005-2025 emphasises science, technology and innovation (STI) as a source of future competitiveness. The current medium-term plan (2010-2014) focuses on developing the quality of human resources, increasing R&D capabilities by strengthening and articulating institutions, and economic competitiveness.

- The National Innovation Committee (KIN) was established in 2010 as an independent institution in charge of oversight, steering and co-ordination of national innovation policy. It is an autonomous body comprising 30 members and report directly to the President. It covers nine areas (energy, food and water, education, health and medicine, maritime affairs, defence and weaponry, transportation, ICT and the creative industries) and has established five working groups (innovation programme development, innovation in business and industry, innovation cluster development, innovation-related incentives and regulations, and economic, social and cultural aspects of innovation).

Another advisory body, the National Economy Committee (KEN), was set up to work closely with the Coordinating Ministry for Economic Affairs. Along with KIN, it contributed to the formulation of the Master Plan for the Acceleration and Enlargement of Indonesian Economic Development (MP3EI), launched in 2011. This was an ambitious attempt to maintain high growth (7-9% annually), while transforming the economy from a natural resource and trade-driven economy to an investment and innovation-driven economy.

Multiple ministries or departments with an interest in research populate the public sector institutional landscape, some of which also have an interest in innovation. Numerous agencies/institutions both implement policies and conduct R&D in their own multitudinous research institutions and laboratories. A small number of high-level advisory bodies advise on overall strategic direction and help formulate policies affecting different parts of the national innovation system.

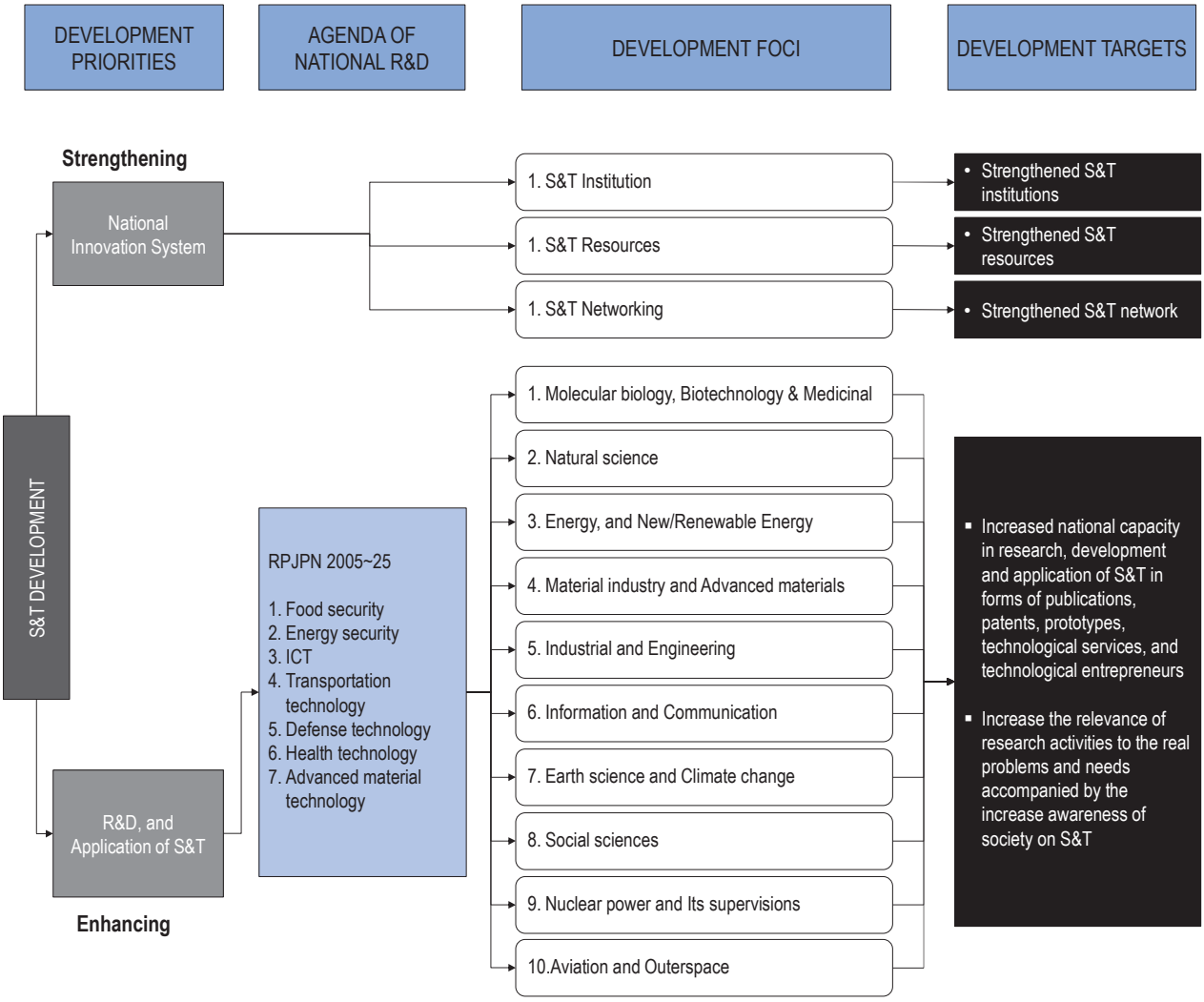
Research priorities suggested by the DRN feed into broader-based planning activities. Within the context of a long-term National Development Plan, covering the period 2005-25 (the RPJPN), Indonesia is producing a series of medium-term five-year plans (RPJMNs), each of which comprises five annual plans (RKPs). Figure 3.3 presents the vision outlined in the second RPJMN for 2010-14.

There are at least 19 ministries/departments with an interest in R&D. The ministry with the largest budget for R&D is the Ministry of Research and Technology (RISTEK), responsible for the formulation, co-ordination and implementation of S&T policy at a national level and the promotion of technological development. RISTEK oversees seven agencies/institutions (LPNK RISTEK) that operate in a fairly autonomous fashion and report not only to RISTEK, but also directly to the Presidential Office. Aside from RISTEK, the ministry with the biggest interest in innovation is the Ministry of Industry (DEPPERIN). Its R&D and innovation-related activities are co-ordinated by the Agency for Research and Development of Industry, which oversees 32 different applied research and service organisations. The Ministry of Industry is also responsible for setting R&D priorities for the transportation, ICT, agribusiness and ba RISTEK manufacturing sectors.

Budgets for S&T policy

The government's budget for S&T has decreased over the past four decades as a share of the total state budget (from 6.11% in 1970 to 2.34% in 1991 and 0.49% in 2006), reflecting dwindling support and belief in the importance of science and technology for development. Funding for S&T, research and innovation in Indonesia now takes the form of direct institutional funding rather than funding allocated via competitive programmes, with most funding used by public research institutes (PRIs) to conduct R&D and, on occasion, to provide technical services to industry.

Figure 3.3. The S&T vision in the Indonesian Development Plan, 2010-14



Source: Indonesian Ministry of Science and Technology (RISTEK) published in OECD (2013b), *Innovation in Southeast Asia*, OECD Publishing, doi: 10.1787/9789264128712-en

3.4. Indonesia's IP system and innovation

Organisation of the Indonesian IP system

IP law and regulations

Indonesia has introduced a variety of patent regulations designed to protect IP and stimulate innovation, first in the form of a decree in 1953 and then as the Patent Law of 1989. Significant changes to Indonesia's IP legislation were made in 1991 and again in 1995, when Indonesia became a member of the Trade-Related Intellectual Property Rights (TRIPS) Agreement upon its accession to the World Trade Organization (WTO). Indonesia is also a signatory to the Berne Convention, the Paris Convention, the Patent Cooperation Treaty and the Trademark Law Treaty. Changes to bring Indonesia in line with the TRIPS agreement involved the introduction of the Patent Amendment Law

(1997), the Copyright Amendment Law (1997) and the Trademark Amendment Law (1997). Over the past decade, Indonesia has implemented several major IP laws, including on trade secrets, industrial design, layout design of integrated circuits, patents, trademarks, copyright and GI. The appendix describes a list of the country's main IP laws. Box 3.1 details some of the provisions not regulated by TRIPS. A few legislative processes for drafting and approving the regulations for implementation are still pending, including for licensing, which remains an area of legal uncertainty. A license registration system, general license and compulsory license are provided in patent law. However, there is no regulation to implement it.

Box 3.1. IP law in Indonesia

Utility models

Indonesia's IP system grants utility models, which run for a 10-year term (Law 5 of 1984). A utility model is referred to as a "simple patent" and is protected under patent law (Law No. 14 of 2001). Simple patents are granted to any invention in the form of a product or device without restrictions on the field of technology (Article 6).

Patent examiners verify that the applied invention satisfies the *novelty* requirement. This requirement is limited to simple inventions made in Indonesia. However, the "inventive step" is not required to receiving such protection.

Patents

Concerning medicines derived from substances found in nature, Indonesian law does not state the extent to which such medicines are eligible for patents (UNCTAD, 2011). Micro-organisms and substances existing in nature are patentable; however, if they are plant or animal varieties, they must be registered at the Ministry of Agriculture.

Once a patent is registered patent owners have an *obligation* to use their patents or license them to others within three years. Non-compliance with this obligation results in compulsory licensing by governmental use order.

Trademarks

At present, there is no three-dimensional mark under Indonesian trademark law. However, a draft amendment to trademark law exists, and three-dimensional marks may be available after 2013.

Plant variety protection

Indonesia is not a member of the International Union for the Protection of New Varieties of Plants (UPOV), but has UPOV-style *sui generis* laws (Robinson, 2009).

Sources: the Economist Intelligence Unit, Country Commerce 2012, interview at the DGIPR during the OECD mission to Indonesia (26-30 November 2012), JETRO business news (13 November 2012, Bangkok) and UNCTAD (2011).

Governmental stakeholders and co-ordination mechanisms

At least 10 ministries are responsible for various dimensions of IP policy making in their respective fields, such as science and technology, education, agriculture, creative industries, trade, industry, law and human rights, and finance. The co-ordination mechanisms bridging between ministries and bodies involved in IP policy for innovation are, similarly to those for innovation policy, rather weak.

The only formal instance of inter-ministerial co-ordination is the Task Force for IP Enforcement (established by Presidential Decree No. 4/2006, 27 March 2006). The Co-ordinating Minister of Political, Legal and Security Affairs acts as head, the Minister of Trade serves as vice-coordinator, and DGIPR serves as the general secretariat. The Task Force meets once every quarter and reports twice a year on its activities. These focus on a narrow dimension of relevant IP policies related to enforcement and to raising awareness about IP. They do not focus on IP for innovation. As a result, individual ministries often

lack knowledge about other IP policies enacted by their counterparts. This weakens the potential impact of institutional IP policy projects, as those of individual institutions tend to be relatively small, and result in only limited learning from policy experiments. Better co-operation could bring higher payoffs.

Several external stakeholders are also involved in governance of the Indonesian IP system, including the Association of Indonesian Intellectual Property Rights Consultants Association (Asosiasi Konsultan Hak Kekayaan Intelektual Indonesia). The DGIPR participates in IP policy making by providing input and feedback about general IP practice in universities, public institutions and companies; explaining IP user needs to governmental officials; and participating in the IP legislative process. After a law is drafted it is opened for public comments. During this consultation phase the Association gives feedback to DGIPR. In addition, RISTEK's privileged contacts with seven major public research institutes allows it to elicit first-hand feedback from these on challenges they face regarding IP. The concerns of private companies are less well sought by RISTEK, reflecting its strong focus on supporting research institutes and agencies to which RISTEK allocates the bulk of its funding.

IP operations and procedures

Directorate General of Intellectual Property Rights: Functions

The main institution in charge of granting IP in Indonesia is DGIPR. DGIPR is the national office for industrial property rights including patents, utility models, trademarks, designs and also copyrights. This differs from the practice in many developing countries, where national IP offices are typically divided between an industrial property office and a copyright office (Deere, 2009). It falls under the Ministry of Law and Human Rights and not, as is frequently the case for industrial property, under the Ministry of Trade or Industry, or for copyright, the Ministry of Culture, Media, and/or Information and Communication Technologies.

The Directorate's threefold mandate is: to administer the IP system by granting protection, rewards and recognitions to intellectual assets; to encourage an innovative and inventive culture; and to promote technology and knowledge-based investment and economic growth. Its policy tools go beyond administration and processing. It also aims to promote IP awareness among researchers at universities, research institutions, SMEs and even school children, by providing, for example, seminars. DGIPR also drafts IP laws and serves as the IP Task Force secretariat. Moreover, DGIPR has, often in co-operation with corresponding ministries, introduced fee-reduction schemes for certain users, including SMEs and research organisations, and conducts training for patent examiners and users.

Divided into seven divisions, DGIPR employed 575 staff in 2012. About 25% worked in the divisions of patents (82 examiners) and trademarks (49 examiners); 13% in the division of copyright, industrial design, layout design of IC and trade secrets; 6% in co-operation and promotion; and the remainder worked in the divisions of information technology, investigation and the secretariat (DGIPR, 2011). The allocation of staff reflects a strong emphasis on processing and operations with only a few staff in charge of promotion activities.

DGIPR generates revenue from two major sources: IP application fees from the registration of patents, trademarks and design; and other fees such as certification, substantive examination, trademark renewal, patent maintenance, IP consultant registration and searching fees. Of these, the revenue from trademark registration increased 13% between 2010 and 2011, while the remainder remained stable. However, DGIPR is not self-funded, and the resources it generates are transferred to the Ministry of Finance, which returns some of the revenue to the DGIPR for its operations. Thus, any variation in revenues collected from IP application fees does not influence the operating budget, ensuring that DGIPR's own incentives do not distort services provided by the office. However, in consequence it suffers somewhat from a lack of autonomy with respect to staffing decisions, since these are taken by the Ministry of Finance.

DGIPR faces the following challenges with respect to the processing of IP:

- It needs to gain public trust in its integrity, principally by emphasising that no surcharges or illegal charges are permitted during the registration process. In its annual report, DGIPR also acknowledged the distrust of public officials and administrative processes among many users (DGIPR, 2011). Some national users believed that their applications were not treated equally to those of foreign applicants, and that having a patent granted abroad supported quicker processing. Perceptions of unequal treatment of nationals are damaging for national producers' uses of IP systems. This issue has to be addressed.
- DGIPR lacks a comprehensive database. More time is thus required to conduct a prior art search and locate the results of decisions by other IP offices. DGIPR is currently working with WIPO to improve its IT system with the objective of automating processes more effectively so as to gain in efficiency. Investments involve the procurement of computer hardware, software, networking and communication equipment, Internet connectivity, training, and application and system development. This activity can make a substantial difference to the productivity of IP examination processes.
- Resources are to some extent a challenge for DGIPR. For example, the office has only a limited number of patent examiners with a background in pharmaceuticals. Since patents are examined exclusively by DGIPR, but staff decisions are taken by the Ministry of Finance, the resulting mismatch challenges the efficiency of its operations. DGIPR also has limited resources to play a more active role regarding the design of IP support policies for innovation.
- Regional coverage is a further challenge in Indonesia. Given the vast size of the country and its complex geography, the journey to DGIPR headquarters, if necessary, can be substantial and impose additional costs. IP applications have to be submitted to headquarters or one of 33 provincial governmental offices *on paper* as online procedures do not exist yet. The documents are then forwarded to headquarters where all processing takes place. Meanwhile, provincial offices provide no specific IP-related services beyond contributing to basic awareness campaigns. Requests for information from patent applications published by DGIPR can also only be submitted in person at headquarters. Better local services should be provided to inventors, especially those living in places with greater potential benefits from IP, and those having stronger innovation capacities.

Directorate General of Intellectual Property Rights: Disclosure of IP information

Disclosure of patent information through the national patent office is a key tool for users, enabling them to access the latest research trends and technology. As disclosure of such information is a key contribution of the IP system to society, IP offices should aim to facilitate access to firms and research institutions interested in the use of patent information. However, the current patent publication system and access to DGIPR's services are not very user friendly and actually impede access to IP information: The law requires a patent application to be published 18 months after initial application. However, only the first page is published by DGIPR online. To access the complete information users must visit DGIPR offices and request print copies. To remedy this situation, DGIPR with the aid of WIPO and the World Bank is working to build and maintain a reliable and accurate IP rights database, and to ensure public access to its contents throughout Indonesia (DGIPR, 2011).

Application and processing fees

Application fees for different types of IP are set by Presidential decree. Pricing differs across types of IP with utility models more affordable than regular patents. The price for filing patents via the Patent Co-operation Treaty (PCT) is nearly double that for national patent applications (Box 3.2). Special rates for SMEs are applied for industrial designs, layout and integrated circuits. These applicants pay about half the rate paid by other applicants. The Ministry of SMEs entered into a memorandum with DGIPR, through which it provides about USD 75 574 (IDN 700 million) to allow SMEs to obtain free IP rights certificates for the next three years. RISTEK also has in place programmes to cover IP application fees for research institutions and universities.

Box 3.2. Application and processing fees in Indonesia

Regular patents require an application fee of USD 61 (IDN 575 000) plus a fee of USD 213 (IDN 2 000 000) to inspect an application for a for-profit patent or USD 96 (IDN 900 000) to inspect an application for a non-profit patent.

Patents filed through the Patent Co-operation Treaty (PCT) require a fee of USD 107 (IDN 1 000 000).

Utility models require an application fee USD 13 (IDN 125 000) plus USD 37 (IDN 350 000) for substantive inspection.

Trademarks require an application fee of USD 64 (IDN 600 000) for up to three goods/services, an application fee of USD 213 (IDN 2 000 000) for extension of trademarks, and an application fee of USD 107 (IDN 1 000 000) for extension of trademarks for small and medium-sized enterprises.

Industrial design requires an application fee of USD 64 (IDN 600 000), and an application fee of USD 32 (IDN 300 000) for small and medium-sized enterprises

Source: Presidential decree (No. 38 of 2009, 28 May 2009) and the Economist Intelligence Unit, Country Commerce 2012.

Processing and duration

Patent applicants must ask DGIPR to conduct a substantial examination within 36 months of application. The normal time frame for publication is 18 months after the patent application. Any objection to the patent application should be made within six months of publication. For trademarks, after receiving the application DGIPR conducts a substantial examination and publishes the application prior to registration. Indonesian

trademark law adopts the first-to-file system and there is no requirement of actual use or intent to use.

Although no official data are available concerning speed of patent registration, the estimated average processing time from a request for examination to the first action by DGIPR is about a year. It takes two to five years from application until registration. DGIPR examiners and IP users state that patent applications for pharmaceutical products take longer because of the insufficient number of patent examiners in this field. Users from other sectors also complained about excessively slow patent granting procedures and referred to much longer time periods. Some users chose to seek international patents as a strategy to speed up processing at DGIPR.

IP enforcement system

The Patent Appeal Commission deals with appeals relating to refusals of applications. Decisions are final and binding. Patent infringement lawsuits go to the Commercial Court and final appeals go to the Supreme Court. The Trademark Appeal Commission deals with appeals relating to refusals of applications. Decisions are final and binding. Trademark lawsuits go to the Commercial Court and appeals go to the Supreme Court. The content of the lawsuit should include indemnification and/or termination of illegal practices. Parties in dispute may also choose to settle by arbitration or alternative means of dispute resolution. Industrial design lawsuits go to the Commercial Court and appeals go to the Supreme Court. Lawsuits should include indemnification and/or termination of illegal practices. Parties in dispute may choose to settle by arbitration or alternative means of dispute resolution. Copyright lawsuits go to the Commercial Court. A lawsuit should include indemnification and/or seizure.

At present, Indonesian law designates IP consultants as legal representatives who are registered at DGIPR and can draft and apply for IP at DGIPR on behalf of IP owners. The qualifications to be an IP consultant are: (i) a bachelor's degree; (ii) English language skills; (iii) successfully passing a national exam; and (iv) completion of a three-month IP consultant training programme provided by DGIPR. IP consultants can also represent trademark infringement cases at commercial courts. Since the introduction of the IP consultant system in 2005, the number of IP consultants has steadily increased. Currently, about 545 attorneys are registered. The number of IP consultants is considered sufficient both by DGIPR and Indonesia's Patent Attorney Association, AKHKI.[4]

The law contains criminal penalties for end-user piracy and gives the copyright owner the right to seek civil injunctions against pirates. Despite the government's significantly expanded efforts to improve enforcement, IP piracy remains a major concern. Enforcement of copyright, including collecting royalties and preventing copyright infringement of merchandise, are considered major challenges.

Enforcement of IP is more generally considered a challenge. One study (Park, 2008) used an index designed to measure the strength of patent regimes in 2005 in terms of coverage (inventions that are patentable), membership of international treaties, duration of protection, enforcement mechanisms and restrictions, and concluded that Indonesia lagged behind many other countries, with a score of 2.77, including Singapore (4.21), Malaysia (3.48) and Viet Nam (3.03).

Litigation

The law requires civil cases assigned to the commercial court to be settled within 90 days, extendable to 150 days with the permission of the Supreme Court. Currently, IP cases are assigned to the commercial court in Jakarta where three to four judges, who have received special IP training, hear IP dispute cases. In the early 2000s, the delegation of IP matters to specialised commercial courts helped to build expertise in the legal system and speed up the process. The resulting IP decisions have been judged to be largely sound (Antons, 2007). The Supreme Court hears appeals of decisions of the commercial courts. Recent laws concerning patents, trademarks, copyrights and industrial design also provide for harsher sanctions against infringement (WTO, 2007).

Few IP-related litigation cases arise in Indonesia, however, and international and national IP owners have expressed concerns regarding the efficiency of the judicial and prosecutorial system. A major task in patent litigation cases is to persuade and explain the technology and provide a technical interpretation of the patent description to judges. This can prove difficult if patent applications are poorly translated and judges lack the requisite scientific knowledge. For some national IP users, such as local SMEs, IP enforcement costs are a burden, particularly as no legal aid is available. The inability to enforce their rights, among other reasons, often results in many SMEs perceiving IP as of limited value to them.

Two relatively recent reforms can help strengthen the quality of enforcement:

- DGIPR is involved in the fact-finding phase of the patent infringement process. During the process: (i) DGIPR receives a request from a patent owner to investigate patent infringement by third parties; (ii) DGIPR conducts a civil investigation using expert witnesses; (iii) after deliberation, DGIPR issues a report and a certificate; and (iv) the patent owner takes this certificate to a lawyer and goes to court to enforce their patent rights. In 2010-12, DGIPR issued patent infringement certificates for about 64 cases. Both local and foreign companies made use of the process.
- In April 2012, the Ministry of Law and Human Rights established the Arbitration and Mediation Agency for IP rights. The Agency aims to accommodate arbitration as an alternative dispute solution, which could offer solutions for IP disputes with less complex procedures, less time and lower costs. The mediators and arbitrators who serve with the Agency include retired judges, lecturers at universities, IP consultants and former IP examiners from DGIPR. The effectiveness of the Agency in addressing those challenges remains to be seen.

Counterfeiting and IP violations

Over the last decade, Indonesia has significantly improved its legal framework to combat counterfeiting and IP violations. A 2006 Presidential Decree established a National Task Force for IP Violation Prevention. This ministry-level task force co-ordinated the enforcement of IP rights among customs authorities and police, while increasing the number of qualified judges, prosecutors and IP lawyers (WTO, 2007). The Task Force has also conducted public campaigns to raising awareness of IP protection. Other measures included a regulation regarding temporary suspension for trademarks and copyright, and a temporary injunction on all industrial property rights in July 2012. The IP owner could request a commercial court to issue an order to the local customs office to conduct temporary suspensions (maximum 10 days) or injunctions (maximum 30 days).

As a result of the policy, 121 IP cases were processed during 2011 and 2 551 784 VCDs/DVDs/CDs/MP3 were seized. DGIPR also seized 64 954 VCDs/DVDs for two copyright infringement cases and 6 224 types of counterfeited goods, and confiscated 44 examples of industrial design infringement. The seizures and confiscations were followed by investigations.

International aspects

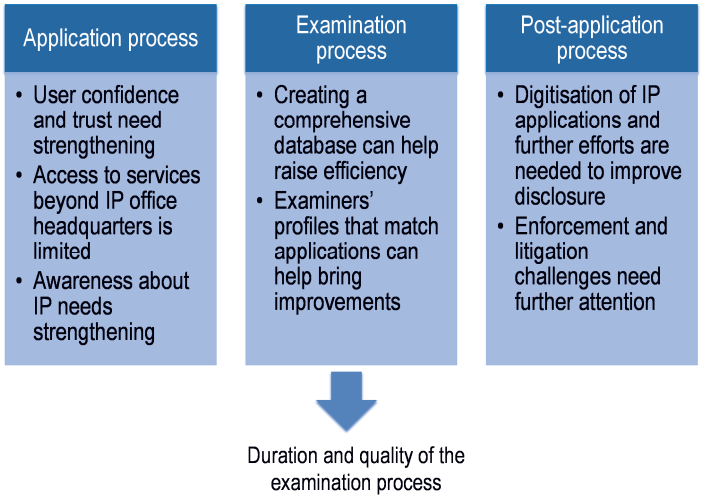
Indonesia became a member of the PCT in 1997 (Decree No. 16). To date, only a few national companies have filed patents through the PCT. Moreover, in 2011, DGIPR conducted a feasibility study for implementing the Madrid Protocol. The Madrid system offers trademark owners the possibility of having their trademarks protected in several countries by simply filing a single application directly with their own national or regional trademark offices (DGIPR, 2011).

Indonesia has engaged in many types of international co-operation in support of its IP system. In addition to WIPO, the DGIPR has received external support from India, Japan and Switzerland. The "Indonesian-Swiss Intellectual Property Project (ISIP Project)" is a four-year-old project focusing on capacity building in policy making, enabling DGIPR to better support IP users and demonstrating good practices through pilot GI cases.

Summary of challenges regarding IP operations and procedures

Figure 3.4 summarises the challenges regarding IP applications and procedures faced by Indonesia.

Figure 3.4. Summary of Indonesia's challenges regarding IP operations and procedures



IP, markets and diffusion

Licensing and markets for IP: Open innovation and open source

One of the crucial factors for strengthening licensing opportunities and markets for IP is a framework to enhance public-private partnerships. In addition to limited linkages in Indonesia's innovation system, IP laws do not promote such collaboration. IP policy for public-private partnerships should be discussed among the relevant ministries with regard to two main frameworks: legal frameworks for co-ownership of IP rights resulting from

collaboration; and legal frameworks and regulations for sharing revenues from licensed IP rights. As these frameworks are not in place, the current context of legal uncertainty hinders the development of markets for IP and in this way substantially reduces opportunities for generating new, successful cases of domestic innovation, such as the EMAS case (Box 3.3).

Box 3.3. Biofertiliser and responding to socio-economic needs through innovative R&D

Food security is a research priority for Indonesia. In this context, the Indonesian Planters Association for Research and Development (IPARD) led an R&D project on "enhancing microbial activities in the soils (EMAS)" to develop a biofertiliser. A number of public and private research institutes collaborated. In 1995, principal researcher and inventor Dr. Goenadi, a soil science expert at the Indonesian Biotechnology Research Institute, developed a prototype of EMAS biofertiliser for Estate Crops (BRIEC). In 1998, the process for producing EMAS biofertiliser was patented with DGIPR. In 2009, the management and production of the biofertiliser qualified for ISO certification.

The commercialisation strategy for EMAS biofertiliser was developed through the formation of a company called PT Bio Industri Nusantara (BioNusa), with stakeholders and state-owned plantation enterprises. The company office is in Bandung and a large-scale manufacturing plant is located in Purwakarta, West Jawa. The profits from licensing EMAS biofertiliser production were shared among the stakeholders with 10% of the total production value received as a licensing fee, of which 40% goes to the primary inventor Dr. Goenadi; 40% allocated for labour support including co-inventors; and 20% for administrative purposes.

Source: WIPO (2012a), *Responding to a Socio-economic Need through Innovative Research and a Profit-making IP Strategy*, WIPO Programme Activities.

It is essential to support and develop agencies that promote commercialisation processes, as is the case of the Indonesian Agricultural Research and Development Institute for Agricultural Technology Transfer (Box 3.6). In order to manufacture products from patented inventions, technology will need customisation. Customisation and commercialisation requires investment, and thus the quality of inventions is important. Low-quality inventions are not only a risk to the licensees' investment in commercialisation, but also block follow-on innovations based on patent information. Thus, quality control mechanisms of inventions must be implemented.

In Indonesia, an open-source software movement has been growing over the last decade. RISTEK promotes R&D and use of open-source software, in line with the recommendations of the United Nations Industrial Development Organization (UNIDO), among universities, research institutions and ministries. Currently, RISTEK co-operates with about 20 universities to develop open-source IP software for SMEs with the support of global players as Google.

IP, markets and diffusion: Competition

In Indonesia, the Commission for the Supervision of Business Competition (KPPU) is responsible for oversight of anti-competitive behaviour. To date, the Indonesian Competition Authority has not been significantly involved in the oversight of license agreements (Junaidi, Presentation at the OECD Workshop in Jakarta, 2011). The KPPU has not played a role in overseeing license agreements, which have to be registered at DGIPR, because there is no corresponding regulation.

3.5. Users of Indonesia's IP system

Types of IP used in Indonesia

The descriptions and charts below contain information on the use of different types of IP in Indonesia including national patents, utility models, trademarks, GI, design rights and international patents. Indonesian residents are relatively weak users of the patent system, compared to more developed countries and regional competitors. In comparison, trademark and design are used more, possibly (for the latter) reflecting greater dynamism among services industries (Table 3.2). Utility models, however, are only moderately used compared to neighbouring countries such as the Philippines and Thailand. Only few Indonesian companies have so far sought international IP patent applications via the PCT procedure or applied for patents or trademarks in Europe, Japan or the United States.

Importantly, this is not an indication of Indonesia's innovation performance compared to that of other countries.[5] In fact, the number of IP titles should not be seen as a core benchmark for innovation policies. The main issue is the quantity-over-quality ratio, whereby many applications add substantial costs to the system by increasing the number of IP applications patent offices need to process, although only those of sufficient potential commercial value will support innovation systems.

Patents

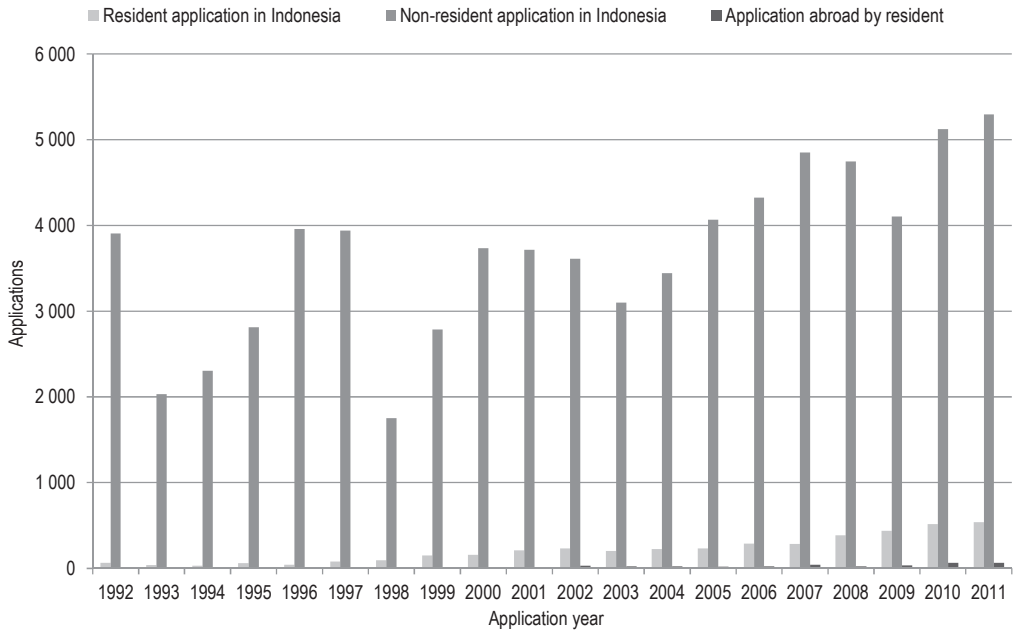
The vast majority of applications for Indonesian patents are non-residents (Figure 3.5). The share of Indonesian resident applications has, however, increased since 2005. Indonesia's performance in absolute terms is rather weak, even compared to much smaller regional competitors (Figure 3.6). At present, the country ranks 44th internationally out of 105 IP international offices (Figure 3.7).

Table 3.2. IP applications broken by resident and non-resident count by filing office, 2011

Office	Patent		Utility model		Trademark		Design	
	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident
Indonesia (2009 for design data)	**9%**	**91%**	**81%**	**19%**	**95%**	**5%**	**79%**	**21%**
Malaysia	17%	83%	56%	44%	45%	55%	40%	60%
Philippines	6%	94%	94%	6%	57%	43%	48%	52%
Thailand	24%	76%	92%	8%	60%	40%	77%	23%
China	79%	21%	99%	1%	92%	8%	97%	3%
France	87%	13%	42%	58%	92%	8%	95%	5%
Germany	79%	21%	80%	20%	88%	12%	89%	11%
Japan	84%	16%	79%	21%	78%	22%	87%	13%
United States of America	49%	51%			84%	16%	57%	43%

Source: WIPO Statistics Database.

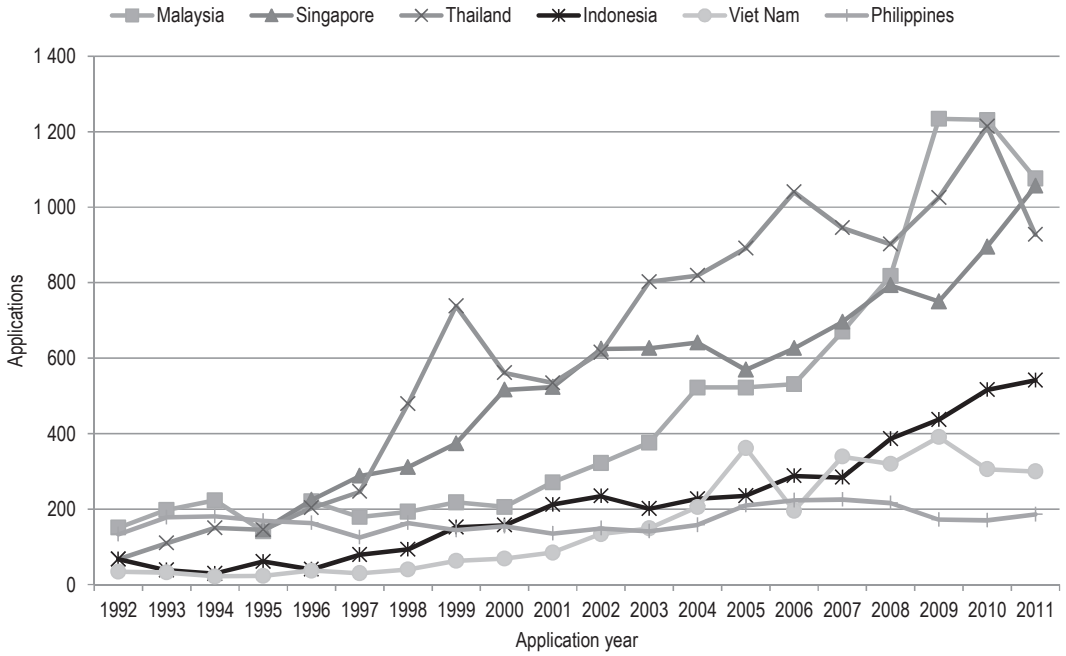
Figure 3.5. Patent applications for Indonesia



Note: A resident application is an application filed with an IP office by an applicant residing in the country/region in which that office has jurisdiction. A non-resident application is an application filed with a patent office of a given country/jurisdiction by an applicant residing in another country/jurisdiction. An application abroad is an application filed by a resident of a given country/jurisdiction with a patent office of another country/jurisdiction.

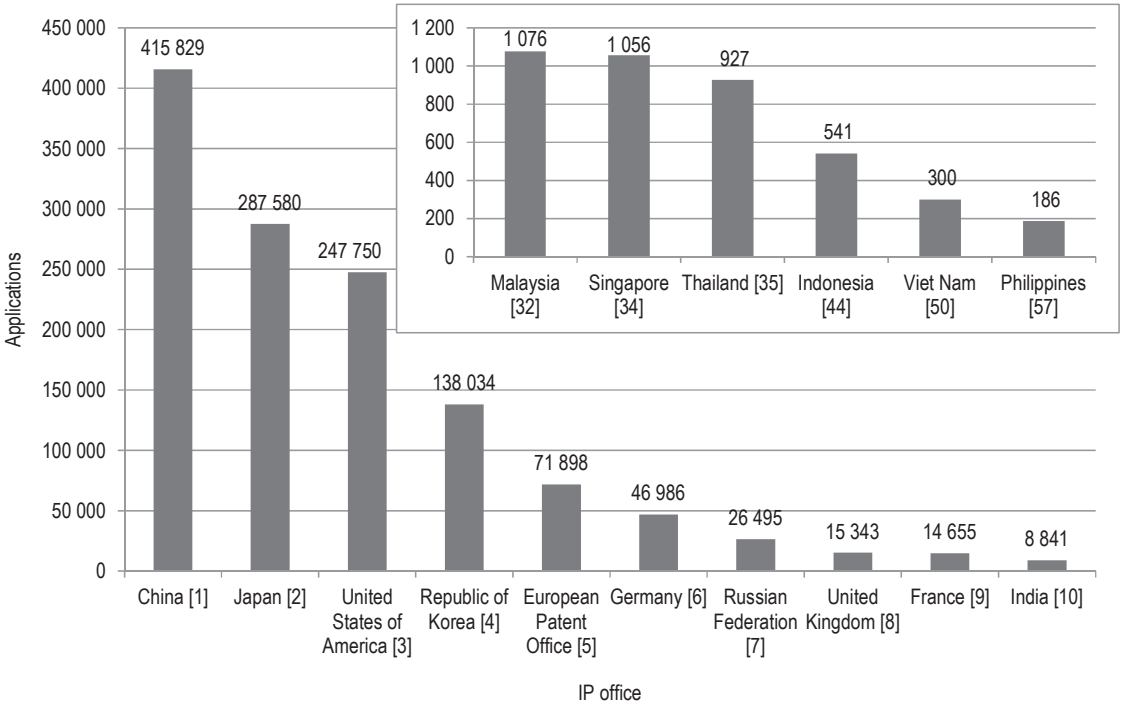
Sources: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch; JETRO, www.jetro.go.jp/theme/ip/data/pdf/stats_idn01.pdf.

Figure 3.6. Resident patent applications for selected ASEAN IP offices



Sources: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch; JETRO, www.jetro.go.jp/theme/ip/data/pdf/stats_idn01.pdf.

Figure 3.7. Resident patent applications for selected IP offices, 2011



Note: The number displayed in square brackets represents a ranking of the number of applications out of 105 offices for which data are available.

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

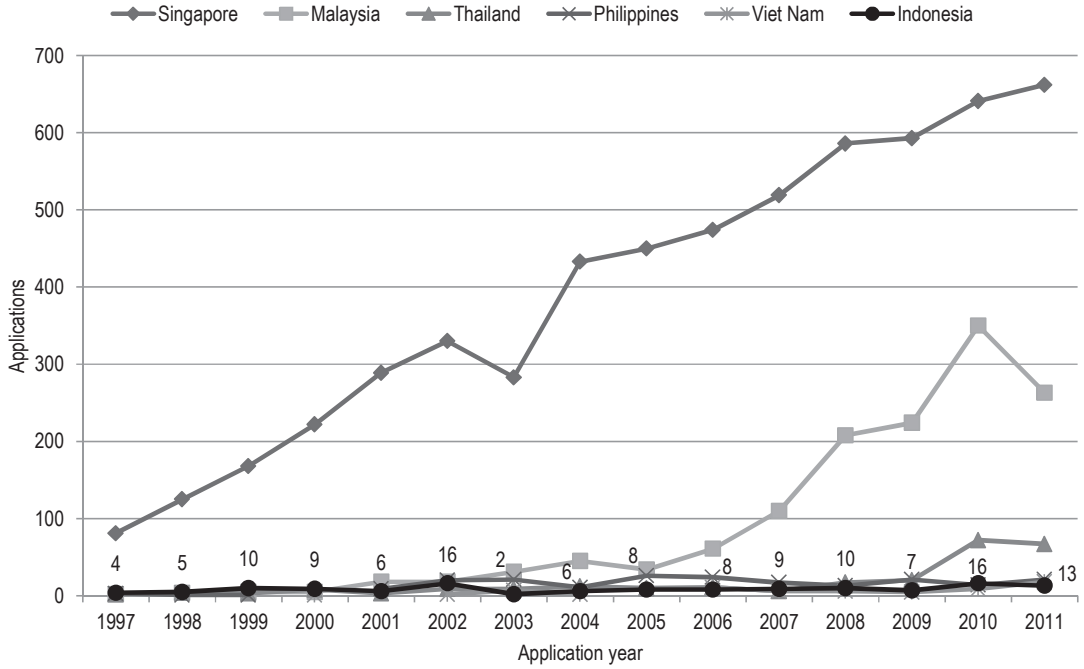
Box 3.4. Dexa Medica

Established in 1969, Dexa Medica supplies medicinal products, both modern and traditional, throughout Indonesia and abroad. The company is privately owned and engages in substantial in-house R&D. In-house scientists develop most of the company's products, although some collaboration takes place with local universities and scientists. Dexa's R&D involves not only modern medicine, but also the development of medicines based on the country's natural resources and traditional medicines. Currently, the company conducts research on about 10 specific herbs for their potential application to medicines. Dexa's scientists have so far isolated one medically effective herb, which is currently in the clinical trial phase.

Dexa developed their IP to capitalise better on their research. Dexa's IP team of four pharmacists is lead by a legal counsellor with foreign US-based training and expertise. They draft patent applications, file applications at the DGIPR, manage IP assets and respond to day-to-day operational questions. Over the last 10 years they have filed seven PCT applications. To date, they have not been involved in any IP litigation. The challenge for them is speeding up patent registration at the national patent office. In addition, they undertake research on international patents to ascertain the areas in which their R&D investments could have the highest payoffs on international markets.

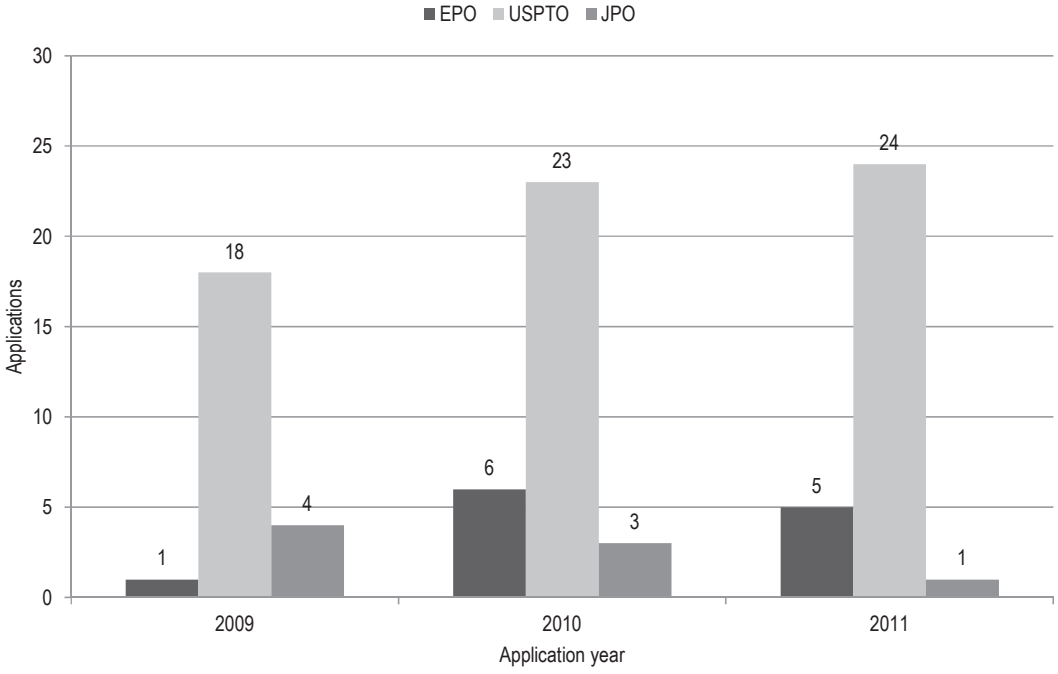
Source: OECD mission to Indonesia and the Dexa website: www.dexa-medica.com.

Figure 3.8. PCT applications for selected applicant's country of residence



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

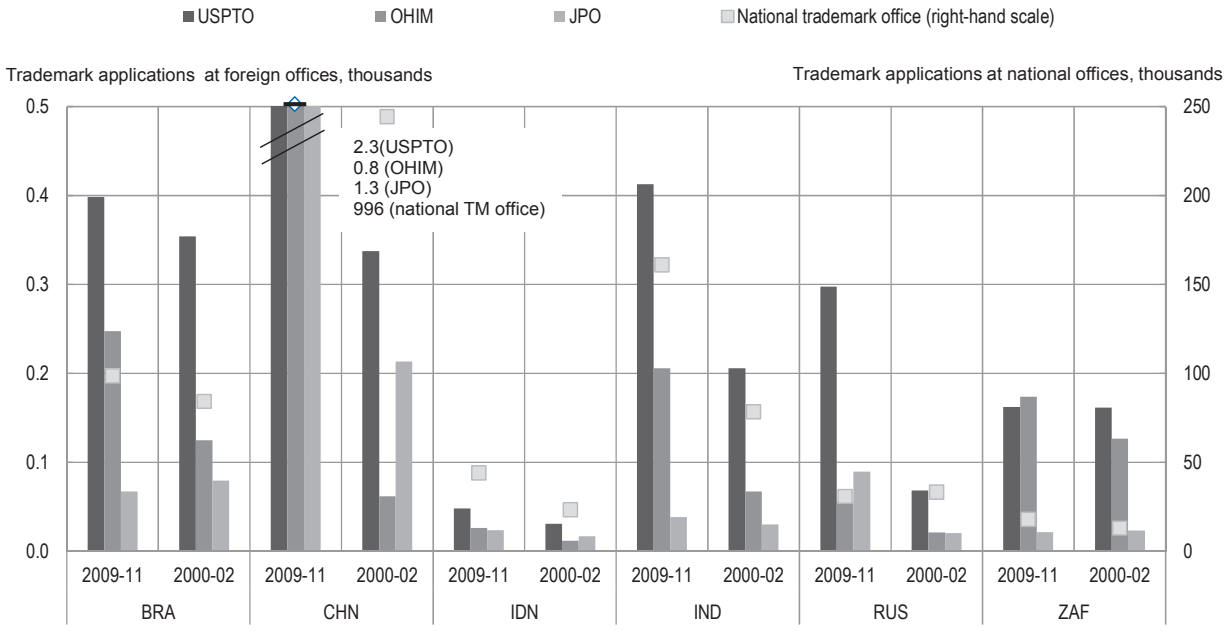
Figure 3.9. Patent applications by an applicant residing in Indonesia at EPO, USPTO and JPO



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Regarding international patent applications only a handful of Indonesian firms have applied for PCT patents internationally, including Tjiwi Kimia, a paper-producer that applied for 10 PCT patents in 1996-2011; Pasifik Satelit Nusanara (PSN), a satellite engineering firm involved in GPS and mapping technology that applied for three PCT patents in 1996-2011; Dexa Medica, a pharmaceutical production company that applied for three PCT patents (Box 3.4). Figure 3.8 shows that these firms are among the few users of PCT patents in Indonesia. Similarly very few Indonesian residents have applied for patents at the three major IP offices, UPSTO, EPO and JPO (Figure 3.9). Regarding trademark applications abroad, Figure 3.10 shows Indonesia's international performance is behind that of other BRIICS countries (Brazil, Russia, India, Indonesia, China, South Africa).

Figure 3.10. Trademark applications by BRIICS countries at national IP offices, USPTO, OHIM and JPO, ratio to GDP, 2007-09 average

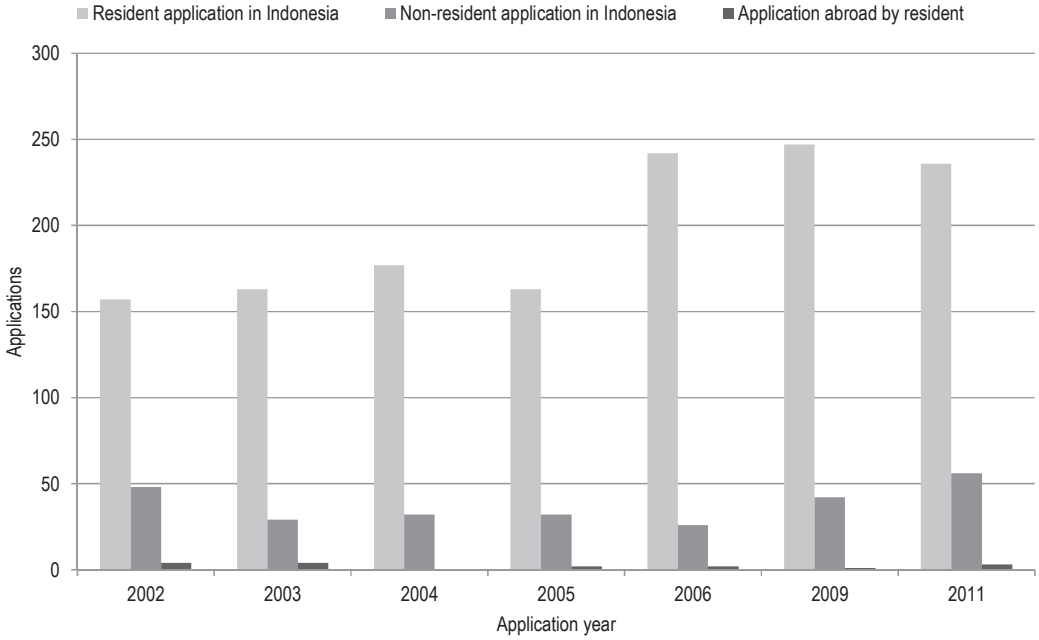


Source: OECD (2013a), *OECD Science, Technology and Industry Scoreboard 2013: Innovation for Growth*, OECD Publishing. doi: 10.1787/sti_scoreboard-2013-en.

Utility models

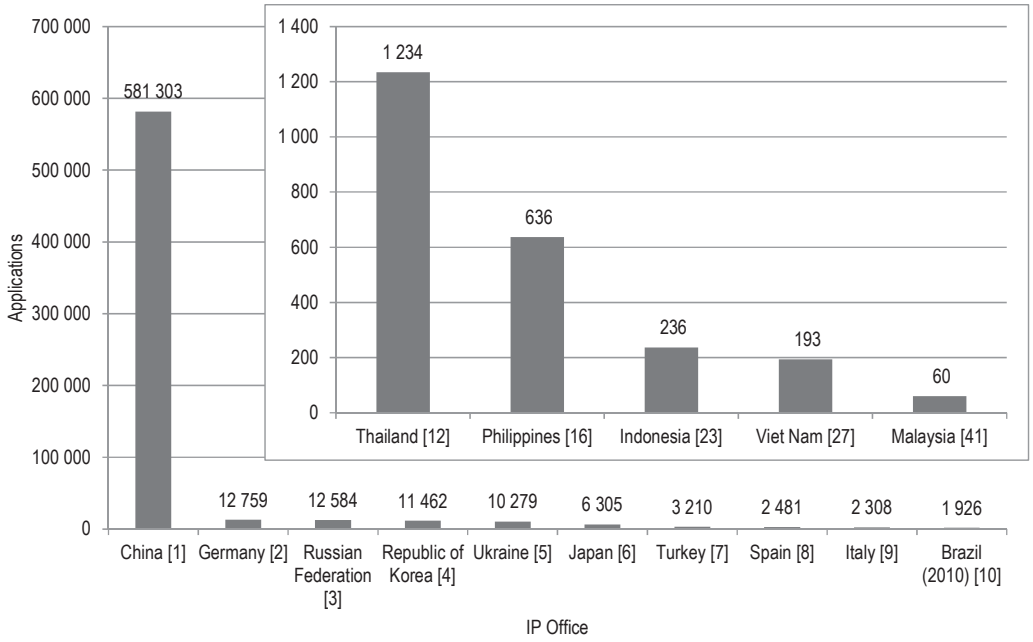
The use of utility models by domestic residents in Indonesia is relatively moderate, but increased somewhat from 2005 onwards (Figure 3.11). It is in mid-position among countries with utility model systems worldwide (Figure 3.12).

Figure 3.11. Utility model applications for Indonesia



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 3.12. Resident utility model applications for selected IP offices, 2011*



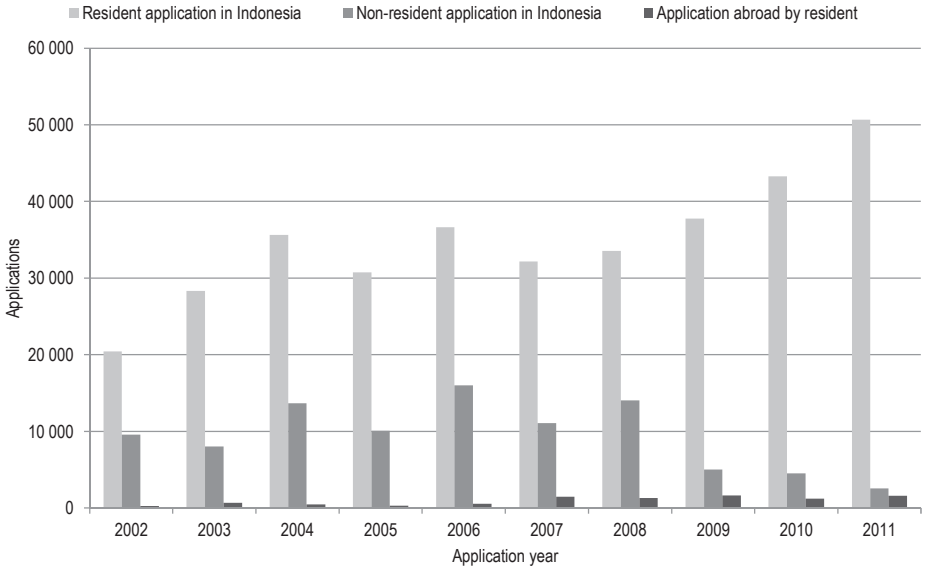
Note: *Or most recent available year. Latest available year is displayed in parentheses when different from 2011. The number displayed in square brackets represents a ranking of the number of applications out of 55 offices for which data are available.

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Trademarks

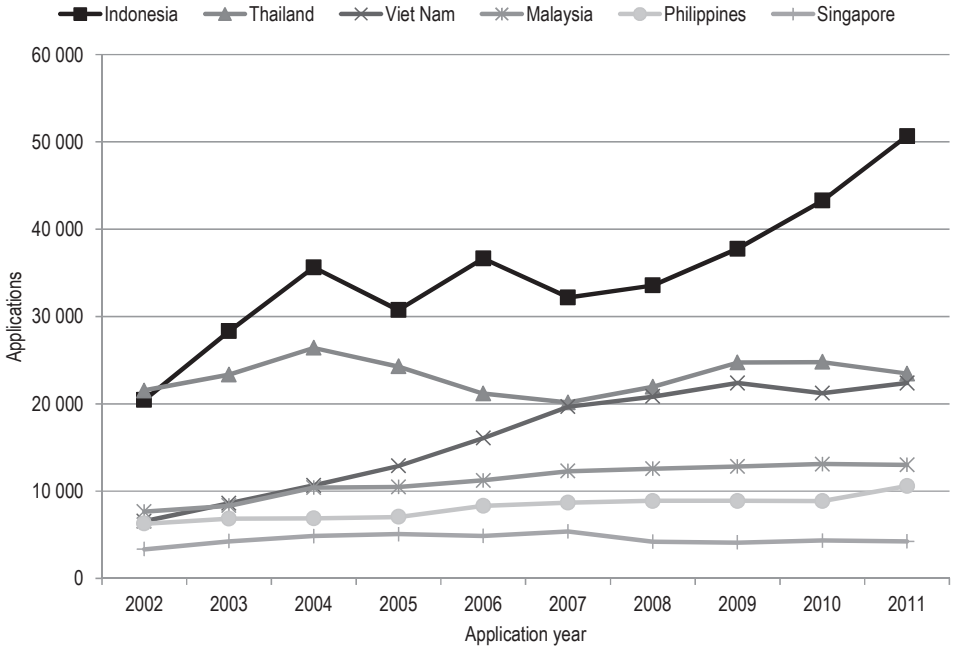
Trademark applications by Indonesian residents far outnumber those of non-residents and have increased since 2008 (Figure 3.13). In absolute terms Indonesia is a strong user of trademarks compared to other countries in the region and globally (Figures 3.14 and 3.15). Interestingly, it is the only country in the region with an upward trend in trademark applications.

Figure 3.13. Trademark applications for Indonesia



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

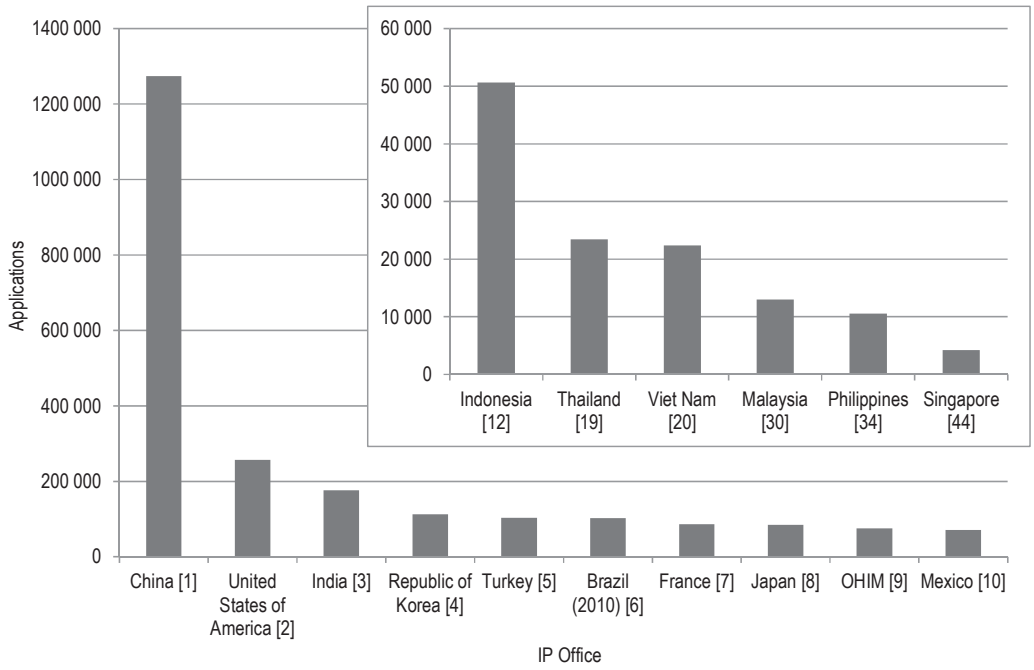
Figure 3.14. Resident trademark applications for selected ASEAN IP offices



Note: National offices figures are not directly comparable as some countries have single-class systems (Brazil, China, Colombia, South Africa), whereas others have adopted a multi-class system (many European offices, India, Japan, Korea, Russian Federation and the United States).

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 3.15. Resident trademark applications for selected IP offices, 2011*



Notes: *Or most recent available year. Latest available year is displayed in parentheses when different from 2011. National offices figures are not directly comparable as some countries have single-class systems (Brazil, Colombia, China, South Africa), whereas others have adopted a multi-class system (many European offices, India, Japan, the Republic of Korea, Russian Federation and the United States). The number displayed in square brackets represents a ranking of the number of applications out of 97 offices for which data are available. OHIM = Office for Harmonisation in the Internal Market.

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Geographic indications

GI is relatively new to Indonesia (since 2008). By the end of 2011, only 12 GIs had been registered at the DGIPR, covering coffee beans, tobacco, horse milk, honey and white pepper for Indonesian products, in addition to foreign registrations of champagne, *parmagiano reggiano* and *Pisco* (DGIPR, 2011; Table 3.3).

Table 3.3. Registered Geographical Indication applications at the DGIPR

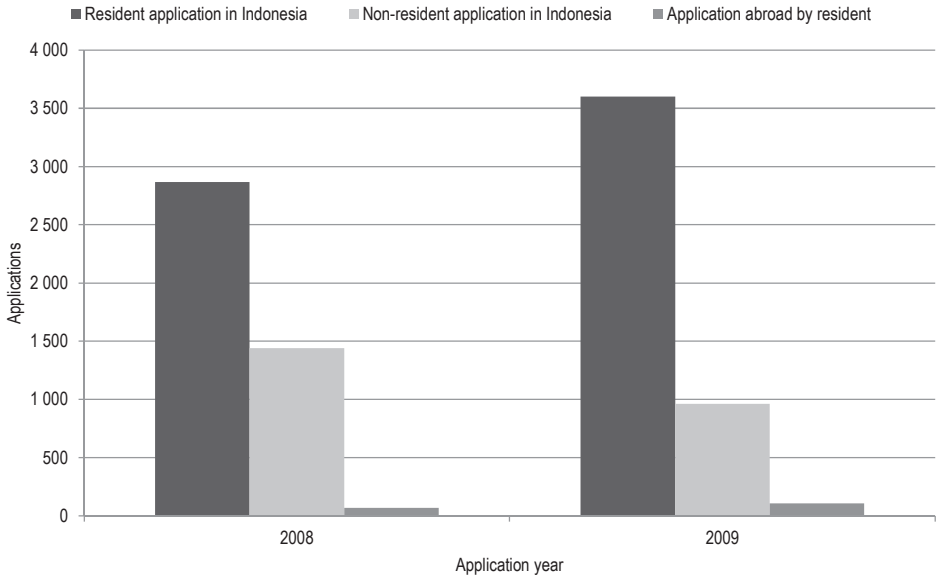
Name of product	2007	2008	2009	2010	2011
Kopi Arabika Kintamani Bali (coffee)		X			
Champagne			X		
Mebel Ukir Jepara (furniture)				X	
Ladal Putih Muntok(white pepper)				X	
Kopi Arabika Gayo (coffee)				X	
Pisco				X	
Tembakau Hitam Sumedang (tobacco)					X
Tembaku Mole Sumedang (tobacco)					X
Parmagiano Reggiano					X
Susu Kuda Sumbawa (horse milk)					X
Kangkung Lombok (watercress)					X
Madu Sumbawa (honey)					X
Total number	0	1	1	4	6

Source: DGIPR (2011) *Annual Report*, Directorate General of Intellectual Property Rights Ministry of Law and Human Rights, Indonesia Republic.

Industrial design

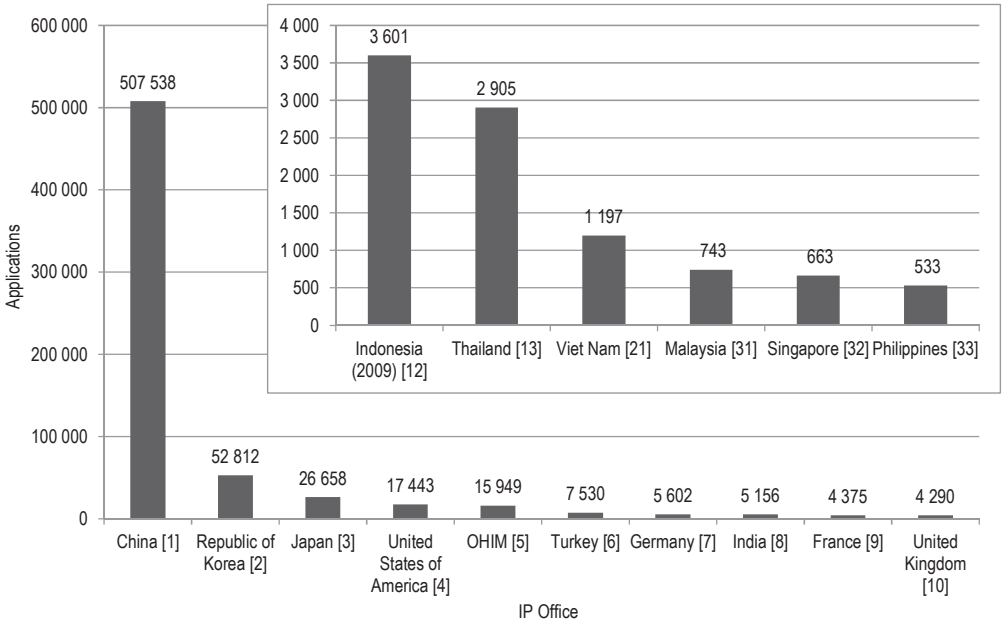
Industrial design protection under industrial design law (No. 31 of 2000) is widely obtained by Indonesian national stakeholders (Figure 3.16). The number of industrial design applications in Indonesia is remarkable compared to other types of IP, except for trademarks. Industrial design applications at DGIPR ranked 12th compared to all 93 IP offices with available data on design (Figure 3.17).

Figure 3.16. Design applications for Indonesia



Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

Figure 3.17. Resident design applications for selected IP offices, 2011*



Notes: *Or most recent available year. Latest available year is displayed in parentheses when different from 2011. The number displayed in square brackets represents a ranking of the number of applications out of 93 offices for which data are available.

Source: WIPO Statistics Database, http://ipstatsdb.wipo.org/ipstats/patentsSearch.

IP opportunities and challenges faced by different users

Innovators in traditional and informal sectors

Traditional industries

Local and inclusive innovation in Indonesia is notable for several reasons, including the country's substantial informal sector, diversified cultural heritage, natural diversity and traditional industries. It can also provide potentially large economic returns. Traditional *bhatik* textiles and traditional furniture have export potential (UNCTAD, 2012). However, few furniture manufacturers or *bhatik* factories have developed successful branding strategies, as most producers tend to produce similar goods rather than offer new designs, patterns and materials or improve the quality of their products. Traditional producers are often not aware of business opportunities based on product differentiation and branding. Moreover, the widespread perception of limited enforcement of trademarks, trade secrets and industrial design rights weakens incentives. Industry associations should also be more actively involved, as firms are small, have limited resources and lack sufficient skills to develop and implement these strategies on their own.

Coffee and GIs/trademarks

A major coffee producer and exporter, Indonesia is taking advantage of IP in the form of GIs (Table 3.3) or trademarks. A bill concerning the management of GI is pending legislative process (DGIPR, 2011). An additional attractive feature of GI is the potential benefits they can create for local communities. Success stories such as Café de Colombia (Box 2.2) or Rooibos Tea in South Africa illustrate their potential (El Benni and Reviron, 2009). In most cases, however, opportunities still need to be exploited, and an effective administration is needed for GI management and benefit sharing. However, increasing the number of GI is not a useful approach; instead, it is better to focus on a few selected products with high potential and invest in the institutions necessary for ensuring the quality, marketing and promotion of GI.

Traditional knowledge

Indonesia is richly endowed with natural resources and enormous diversity. In addition, the country benefits from a vast reserve of traditional knowledge, closely associated with unique, endemic plant life and biological resources, including rare medical plants, traditional agricultural crops and animal breeds. The example of Dexa Medica (Box 3.4) illustrates the potential economic contribution of such knowledge and associated resources. Similar initiatives should be promoted with a view to supporting local groups who own the traditional knowledge in question.

A joint database on traditional knowledge is now being developed across several ministries and organisations, including RISTEK, LIPI, the Ministry of Agriculture (for genetic resources) and the Ministry of Education (for traditional knowledge and traditional cultural expressions). The project, which started in 2012, is a useful step in the safeguarding of traditional knowledge, but also enables domestic inventors to identify new formulas for success. The Indonesian joint database would help create a system of benefit sharing to clarify how different stakeholders, including indigenous communities, are rewarded. It will also facilitate the use of traditional assets in support of innovation.

A useful requirement for such a database and benefit-sharing system is disclosure, whereby patent applicants must indicate the source or origins of any genetic materials and traditional knowledge used for the invention. Current Indonesian patent law does not require the disclosure of source or origin of genetic resources. However, a draft amendment of the patent law, which requires the disclosure of source of origin, is awaiting parliamentary approval, and if approved is expected to be in force by 2013 or 2014.

Folklore and artistic creations

Article 10 of Indonesian copyright law says that the state holds the copyright for folklore and works of popular culture that are commonly owned, such as stories, legends, folk tales, and so on. It holds such copyright with respect to the outside world, and the government has the right to take measures against the unethical and commercial exploitation of their cultural products (Kutty, 2002). Further steps are necessary, however, to implement and regulate this provision. A draft implementing the new regulation is awaiting parliamentary approval, and, if approved, is expected to be in force by 2014.

However, more needs to be done in support of the use of folklore for economic purposes. Copyright management organisations (CMOs), for example, can facilitate folklore and artistic creations by providing access to copyright materials at competitive prices and offering adequate rewards to those owning the copyright, both of which constitute incentives for innovative businesses. Indonesia has two such organisations, one for music and one for books, both of which were created in 2002. While some consider them success stories, their role as facilitators of innovations has still to be demonstrated.

Equity and IP

In Indonesia a third party can apply for compulsory licensing of a patent by the Commercial Court if a patentee does not implement the patent in the country within 36 months after filing (Art. 75 (2)). The government can also delay the granting of a patent for five years for social or national development reasons. With the limitation of a "non-working" requirement, the government of Indonesia issues governmental use licenses over three antiretroviral drugs. The Ministry of Health can appoint Indonesian local pharmaceutical manufacturers to produce the medicines, and the patent owners of the medicines would receive compensation, which amounts to 0.5% of the sales price. Indonesia also has both an experimental use and a scientific research use exception for patents.

"Catching-up" businesses and leading "pioneer" businesses

In Indonesia, as is the case in other developing countries, firm size is positively correlated with the probability of holding quality certifications and/or patents. A higher share of skilled workers and the use of foreign technology are similarly positively correlated with IP ownership. This is likely in part a reflection of the fact that larger businesses benefit more from IP, given some of the sunk costs involved in enforcing IP (see Chapter 1).

Table 3.4. Ownership of IP and firm characteristics in Indonesia

	Quality certification	Domestic patents	Patents abroad
Firm size	+	+	+
Firm age	0	0	0
Exporter status of the firm	0	0	+
Importer status of the firm	0	0	0
Firm has its own website	+	0	0
Firm has access to financial services	0	0	0
Firm provides formal training	+	+	0
Share of skilled workers	0	+	+
Firm uses of foreign technology	+	0	+

Notes: Results are based on probit regressions and include controls for size-of-locality, sector and country-year fixed effects, as well as investment in fixed assets, and foreign and government ownership. The share of skilled workers is defined as the share of permanent full-time, non-production workers over total full-time workers. Size is defined as the logarithm of employment, and access to finance indicates whether the firm has an overdraft facility or not. Results for quality certification regressions are based on 1 027 firm observations and those for domestic and foreign patents include 1 026 and 1 021 firm observations.

Source: Paunov (forthcoming), "Democratising Intellectual Property Systems: How Corruption Reduces Opportunities" [working title], based on World Bank Enterprise Surveys.

Addressing needs for SMEs

Special measures have been taken to meet the needs of SMEs, to raise their IP awareness, to diffuse knowledge about the variety of IP instruments, lower the cost and time for application, and encourage SMEs to develop IP strategies. Nevertheless, IP awareness among SMEs is low. In response the Ministry of SMEs has engaged in an awareness-raising campaign, which has focused on regional initiatives to reach more SMEs across the territory; and the DGIPR, which also ensures fees are reduced for SMEs at the registration phase. Specifically targeted services that take into account the needs and challenges of individual firms have greater chances for successfully supporting the use of IP for innovation. This would help them develop IP strategies emulating the success of businesses such as Es Teler 77 (Box 3.5).

Box 3.5. "Es Teler 77": Trademarks as a driver of improved product and service quality

Created in 1982, Es Teler 77 is a family-owned Indonesian fast-food restaurant. The owners registered their brand name as Es Teler 77 and their service marks as Juara Indonesia and Mie Tek Tek. They invested heavily in advertising, and sponsored competitions and events that received high attention in the media. Their marketing strategy paid off as widespread recognition of the brand attracted more customers. The strategy has had international success with Es Teler 77 restaurants opening in Australia and Singapore. The company maintains its brand value by placing strong emphasis on providing quality food and beverages. Their business model is based on franchising with all franchisees receiving business strategy support from a team of experts

Source: WIPO (2012b), *Branding Success for a Champion Drink*, WIPO Programme Activities.

Unregistered design rights

A significant number of SMEs apply for industrial design protection. However, there is no unregistered industrial design protection in Indonesia that would provide companies with the opportunity to test their products in the market before investing in industrial design application and registration. Unregistered design is suitable for products sold for

over very short periods of time such as fashion brands. While unregistered industrial designs are difficult to enforce, the protection of unregistered industrial design under unfair competition prevention law would be beneficial to SMEs in Indonesia.

World leading innovative performance of "pioneer" firms

IP protection enables global enterprises to seek IP protection at home and abroad. Currently, Indonesia is a member of the PCT, and therefore national companies can apply for patents abroad through the PCT system. However, Indonesia is not yet a member country of the Madrid system, so local companies have to file for trademark registration in every country. Joining the Madrid system is under consideration and could be attractive. Statistics indicate that more needs to be done, however, to stimulate the use of international IP protection for groups of users with adequate research capacities.

Research institutions and universities

Incentives

Although some research institutions have rules specifying the percentage of royalty income that researchers can receive, they cannot implement them because of a lack of implementation regulations concerning licenses and royalties. All income generated from publicly funded projects has to be returned to the Ministry of Finance. This system has undermined incentives, as it denies researchers any potential monetary returns from commercialisation of their inventions. In a few cases, it has affected research institutions, which have seen top researchers leave the public sector to commercialise their inventions independently. Many bodies involved in supporting IP of public research institutions recognise the importance of progress on this issue.

Some public schemes aim at providing incentives to researchers to file for IP and patents, in particular. For example, researchers can receive additional research grants from the Ministry of Education, the Ministry of Science and Technology or DGIPR. In addition, the number of patent applications can help researchers to advance their career indirectly through better evaluations. However, some well-intentioned simple support schemes for researchers to file patent applications have led some to file low-quality patents to receive support without incurring overly high costs. This is a consequence of a system where filing the application itself is rewarded regardless of the granting, because researchers have neither the incentives nor the opportunity to seek commercialisation. The returns for the innovation system of these grant schemes are, consequently, relatively low. Low-quality IP is also one of the causes of the low average rate of IP exploitation by license or by sales.

Additional challenges include relatively high fees for patents and patent maintenance, which research institutions often do not make available to researchers from their short-term budgets. Short-term budgetary allocations are also hindering potential commercialisation, as funding for projects is likewise limited to short time periods, and does not extend over the full product development life cycle. In addition, constraints on research budgets act as major disincentives to researchers. These include the need to return all unspent allocations at the end of every fiscal year, and strict limits on the accumulation of additional funds, whereby all income generated from industry projects must revert to the Ministry of Finance. For this reason, several possible projects for commercialisation, some of which have obtained IP, have been abandoned *en route* without lead researchers to exploit them.

Finally, for certain institutions quality of research is not sufficiently high to obtain IP. This is not an issue IP policy can address and efforts must aim at supporting research infrastructures and increasing the number of skilled researchers. In some cases, however, research lacks sufficient quality because researchers do not take sufficient account of the existing state of the art. In this case, IP is not being exploited properly to optimise research. Only a few institutions, such as LIPI, provide technology-screening services to help researchers make use of information provided in patent application documents.

Technology transfer offices (TTOs) and commercialisation

In Indonesia, universities and public institutions could benefit far more from the innovation system if they enabled researchers to commercialise their inventions. This issue has occupied public authorities for more than a decade. Law 18/2002 states that public research institutions should establish TTOs in accordance with their capacities and abilities. Some leading governmental research institutes and universities, including the National Nuclear Energy Agency of Indonesia (BATAN), the Agency for the Assessment and Application of Technology (BPPT), the Bogor Agricultural Institute (IPB), LIPI and the Ministry of Agriculture, have set up TTOs, which have also played a role in supporting the successful IP track records. The Indonesian Agricultural Research and Development Institute for Agricultural Technology Transfer is an example of an institution that successfully handles commercialisation by providing services up to the actual innovation phase (Box 3.6).

Box 3.6. Indonesian Agricultural Research and Development Institute for Agricultural Technology Transfer

The Agricultural Research and Development Institute for Agricultural Technology Transfer, an agency under the Ministry of Agriculture, has gathered experience in licensing their research results and generating revenue for the government via the Ministry of Finance. Since 2007, the agency has produced 683 licenses including 68 licenses in 2012. The majority of licensees are national industries, but some are foreign licensees, and some products produced under the license are exported.

The Agricultural Research and Development Institute operates 64 units across the country with more than 3 000 researchers. The main IP handled by the Agency for Technology Transfer are process patents, plant variety patents, and simple patents in the area of agriculture such as fertilisers and pesticides. The Agency has 43 staff divided into small groups of three to four staff. Each group undertakes the following four activities: (i) evaluation of technology produced by their researchers; (ii) drafting and registering the invention at the DGIPR or, for animal and plant varieties, the Ministry of Agriculture; (iii) promotion of technology for outside users (i.e. potential licensees); and (iv) licensing out of technology. The Agency has fully incorporated the steps needed to support IP for innovation in its operations. In order to foster the commercialisation of technologies, the Agency has created a database of technologies, which is available to the public. The Agency also publishes a yearbook of new technology and organises regular meetings. Moreover, it conducts impact analyses of its innovations, some of which were commercially exploited while others were introduced for non-commercial purposes.

One challenge for the Agency is uncertainty regarding commercialisation. Some technologies are unstable and not yet suitable for manufacturing. The licensees have to make modifications before these technologies can be commercially exploited. They also have to undertake testing while customising the technology, often leading to a heavy financial burden. As a result, some go out of business due to the failure of customisation. Beginning next year, the TTO plans to create a "customisation" phase before licensing out technology inside the Agency. This approach is modelled on successful applications carried out by Brazilian Embrapa, which incorporates a customisation phase into its processes.

Source: OECD based on interview phase in Indonesia and Indonesian Agency for Agricultural Research and Development Institute for Agricultural Technology Transfer, Ministry of Agriculture.

The organisational structures in most research organisations in Indonesia do not yet meet up to the standards set by leading institutions and stipulated by Law 18/2002. Results from a RISTEK survey of 132 public and private universities and public research institutes in 2010 and 2011 show the following:

- Only about half of the interviewed institutions had a TTO. Not all of these were fully institutionalised within the organisational structure, and a substantial share, especially from the public sector, were *ad hoc* in nature.
- The majority of IP centres supported socialisation (i.e. awareness) and registration activities. Only a few were engaged in commercialisation activities. Most private sector centres were only involved in socialisation activities. In the case of the public sector, about one in four institutions interviewed affirmed that their TTO conducted socialisation and registration activities, and a slightly lower share only supported socialisation, while nine institutions said they were also supporting commercialisation.
- IP centres had not developed independent sources of funding and relied on tight and varying budgets received from their institutions. This had an impact on their operations. TTOs typically had few staff who did not necessarily have the skills required for the job. Furthermore, the available infrastructure was often insufficient in terms of available workspace and ICT infrastructure.
- Practices regarding ownership of IP varied across institutions, both within and across private and public institutions.

Notes

1. The composition of the interviews which were held from 26-30 November was as follows: 30% of respondents were from the Indonesian Ministry of Science and Technology (RISTEK), 17% were from other ministries and governmental institutions (including the Ministry of Information and Communication, the Ministry of Agriculture, the Investment Coordinating Board, the Coordinating Ministry of Economic Affairs, the Ministry for Cooperative & SME, and the Ministry of Trade), 13% of respondents were from the Indonesian Directorate General of Intellectual Property Rights (DGIPR), 34% were from research universities and institutesand 6% were from companies and other agencies.

2. This section draws on Chapter 6 of OECD (2013).

3. In the late 1970s, Indonesia designed an ambitious R&D programme to develop the country's technological capabilities (Hill and Thee, 1998). It consisted of a set of large-scale projects to develop certain industries from low to high-technological manufacturing. The largest project under this programme sought to build a world-class factory of small jet aircrafts. But the perceived importance of S&T subsequently faded and support dwindled. Indonesia's economic growth to middle-income status was trade-driven rather than science and technology-driven, and industrial and related policies did not, until recently, attempt to nurture innovative capacity.

4. An interview with the oldest patent law firm in Jakarta and with university lecturers in IP law revealed that the main work of patent attorneys involves significant translation work at the application stage and also at court to prove infringements based on foreign prior art documents. This is because of the substantial use of the Indonesian IP system by foreigners.

5. If IP measures are used as indicators of innovation performance, comparisons of IP applications from different countries to different IP offices are difficult as they reflect different examination standards applied by different IP offices. For this reason, international comparisons commonly compare IP applications from different countries to a single IP office, such as the United States Patent and Trademark Office (USPTO), the Japan Patent Office (JPO) and the European Patent Office (EPO), or to Patent Co-operation Treaty (PCT) applications (see OECD, 2009). These patent applications are, however, less informative in the context of emerging countries, where the number of IP applications tends to be fairly low.

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Annex 3.A1

List of Indonesian intellectual property (IP) laws

- Law of the Republic of Indonesia No. 7 of 1994 regarding Ratification of Agreement Establishing the World Intellectual Property Organization
- Law of the Republic of Indonesia No. 30 of 2000 regarding Trade Secrets
- Law of the Republic of Indonesia No. 31 of 2000 regarding Industrial Design
- Law of the Republic of Indonesia No. 32 of 2000 regarding Layout Design of Integrated Circuits
- Law of the Republic of Indonesia No. 14 of 2001 regarding Patent (and Law No. 7 of 1994)
- Law of the Republic of Indonesia No. 5 of 2001 regarding Trademarks (on amendment of Law No. 19 of1992)
- Law of the Republic of Indonesia No. 19 of 2002 regarding Copyright (on amendment No. 12 of 1997 on amendment of Law No. 6 of 1982 as amended by Law No. 8 of 1987)
- Government Regulation No. 51 of 2007 regarding Geographical Indications
- Law of the Republic of Indonesia No. 11 of 2008 regarding Information and Electronic Transfers (Cyberlaw)
- Law of the Republic of Indonesia No. 13 of 2010 regarding Horticulture
- Minister of Agriculture Regulation No. 38 of 2011 (implementing rule of Law on Horticulture) allows the registration of horticultural plant varieties.

Annex A

Innovation, intellectual property rights and development: Background

A.1. Innovation and intellectual property (IP)

This section summarises the relationship between innovation and IP.

The economics of knowledge and IP[1]

IP plays a particularly important role in knowledge economies where knowledge, more than physical capital and labour, is an essential factor of economic growth. To fully understand its role, it is important to emphasise that knowledge stands apart from other factors of production in the following ways:

- **Non-rivalry.** Knowledge is characterised as a non-rival factor of production, because the use of one piece of knowledge does not prevent the simultaneous use of the same piece by another party. Unlike physical goods, explicit knowledge can circulate and be kept at the same place simultaneously. This applies of course to disembodied knowledge, because of its intangible nature. Moreover, the marginal cost of implementing a piece of knowledge is close to zero, because once an invention exists there is no need to reinvent it, although there may be a need to adapt it to circumstances. This applies, for example, to information circulating on the Internet. For this reason knowledge can generate *spillovers*: once a piece of knowledge satisfies the standard economic return requested by investors, it can go on to produce additional value that accrues to competitors or customers, who can derive further benefit. In terms of the *social optimum*, as many agents as possible should make use of existing knowledge. In contrast, with respect to tangible property, the goal is to find the single best place for its use and identify which type of market or administrative mechanism will lead to its most efficient allocation. Given that knowledge can be used in several places at once, the goal is to determine all the places in which this unit of knowledge can be used efficiently, taking into account the direct or indirect costs. In view of this essential difference, the mechanisms allocating disembodied knowledge across the economy will differ deeply from those allocating tangible goods and factors.
- **Excludability and non-excludability.** When private parties produce explicit knowledge, scarce resources need to be invested in its production. Earning a return on the investment will often depend on the ability of the private parties to exclude end users who will not pay for the knowledge. Excludability is thus a key condition for earning private monetary value from explicit knowledge, and this is where IP can play a substantial role. Means used to assure excludability can be *technical*, such as protection of access by passwords; *legal*, as in the form of copyright protection, patents and other types of IP; and *organisational*, including keeping the knowledge secret. The partially non-excludable characteristics of knowledge constitute a challenge for inventors, as spillovers do not allow them to recoup the costs of producing knowledge.
- **Enhancement over time.** Unlike physical property, knowledge grows over time. New knowledge expands based on the existing stock of knowledge, new discoveries rely on the current level of science, and new ideas originate from yesterday's experiences. Knowledge is non-rival and virtually impossible to destroy. Because knowledge can accumulate over time, it gives sense to the notion of knowledge capital. Unlike physical capital, knowledge capital is not depleted when used, although its monetary value may depend on usage.

- **Difficulties of measurement.** The real value of knowledge is difficult to assess, until it is commercialised in the form of a good or service that incorporates it. Even in this case, the particular contribution of one unit of knowledge may be difficult to disaggregate from the total value of the product, making valuation difficult. This uncertainty is a source of risk and may limit the willingness of risk-averse actors to engage in transactions in which knowledge is traded. While various methods exist for valuing knowledge, particularly those subject to IP rights, none is seen as highly reliable. These difficulties hinder IP support for innovation.

Types of IP

IP rights are legal rights protecting creations and inventions resulting from intellectual activity. IP grants the right to exclude others from using the protected piece of information without the consent of the owner. The conditions and the specific rights and obligations vary according to the type of IP, and vary according to the use of flexibilities available under the TRIPS Agreement. Article 28 regarding patents illustrates the concept of legal rights:

I. A patent shall confer on its owner the following exclusive rights:

a) where the subject matter of a patent is a product, to prevent third parties not having the owner's consent from the acts of: making, using, offering for sale, selling, or importing for these purposes that product;

b) where the subject matter of a patent is a process, to prevent third parties not having the owner's consent from the act of using the process, and from the acts of: using, offering for sale, selling, or importing for these purposes at least the product obtained directly by that process.

II. Patent owners shall also have the right to assign, or transfer by succession, the patent and to conclude licensing contracts.

Different types of IP provide ownership for different types of intellectual creations, all of which have different rights and requirements for obtaining IP. (Box 1.3 provides further detail regarding internationally agreed upon minimum standards on IP under the TRIPS agreement). They are described in Table A.1.[2]

Table A.1. Overview of different types of IP

Patents	Utility models	Trademarks	Copyright	Geographical indications	Industrial design rights	Plant variety protection	Trade secrets
Description							
Patents grant their owner a set of rights of exclusivity over an invention (a product or process that is new, involves an inventive step and is susceptible to industrial application), as defined by the "claims" (i.e. a clear and concise definition of what the patent legally protects).	Utility models provide a second-tier patent system, offering a cheap, no-examination protection regime for technical inventions (Suthersanen, 2006). Differently from patents, *inventive step* is not a requirement for receiving protection, while *novelty* is a requirement; that is, inventions need to be at a level above the "state of the art".	Trademarks provide exclusive rights of a sign, design or expression.	Copyright gives exclusive rights to authors for their artistic creations. In most countries it provides legal protection for software.	GI is a name or sign used on some products that correspond to a specific geographical location or origin.	Industrial design rights protect the visual design of objects including shape, configuration or composition of pattern or colour, or combination of pattern and colour	Plant variety protection (PVP) grants rights over new plants that are novel and distinct from available varieties, display homogeneity, and have stable traits in that the plant remains true to type after repeated cycles of propagation[1]	Trade secrets protect knowledge that is not known to the public, which confers economic benefits to its owners and is subject to reasonable efforts to maintain its secrecy. It is a weaker right in that, if it is independently duplicated by others, they can use the information for their own economic benefit.
Type of IP							
Application required	Application required	Application required	No application required, that is, granted "sui generis"	Application required	Application required and in some cases granted "sui generis"	Application required	No application required, that is, granted "sui generis".
Fields/sectors							
For technological inventions	For technological inventions	Trademarks cover manufacturing industries and services including, consumer and agricultural products (such as wine and fruits)	Copyright covers creative industries including software sector (although protection is weak) and entertainment.	GIs are mostly applied to food products such as cheese, wine, and champagne; it also applies in some countries to handicrafts.[2]	These rights cover sectors where non-technological design innovations are valuable, such as consumer products, architectural and engineering services, computer and telecommunications, fashion and crafts	PVP covers plant breeder industries.	Trade secrets broadly cover manufacturing and services sectors. They can also protect innovations that are not well covered by other types of IP (such as different types of specific business models).

Table A.1. Overview of different types of IP *(continued)*

Patents	Utility models	Trademarks	Copyright	Geographical indications	Industrial design rights	Plant variety protection	Trade secrets
Relation to innovation and relevance for development							
Patents provide IP to inventions with **industrial applicability,** as opposed to inventions designed solely around theoretical concepts and ideas. *They, therefore, cover potential future innovations.* However, technically speaking patents are not equivalent to innovation, because patents provide IP for **inventions** and these may be implemented or not, resulting in innovations. Not all patented inventions reach the commercial phase, as some turn out to have insufficient expected economic value. **Patents are an intermediate step between inputs to inventions**, such as R&D spending, **and innovations** (OECD, 2009).	Utility models follow patents in this respect. The only major differences are the lower degree of novelty and boundaries with the "state of the art". The latter has impacts on the extent to which innovation is supported. It can be useful in contexts of development (see Box 1.1).	Trademarks do not directly protect inventions, but can offer contributions to innovation if brand recognition, for example, creates incentives to upgrade the quality of services. Moreover, service firms in emerging countries often represent an important share of economic activities, even though some often have low levels of productivity and provide low-quality services. Lower threshold than patents can make this type of IP more useful for innovators in developing countries.	Copyright can play an important role to the extent that it rewards novel creations. In relation to the development of ICTs, in particular, it provides more opportunities for the diffusion of creations and arguably greater business opportunities. It is likely of importance also for development contexts, albeit with potential enforcement challenges constituting a major hindrance.	To the extent that it provides brand recognition, GIs can encourage innovation to strengthen or develop product quality. They can provide larger rewards by strengthening community involvement via IP potentially supporting traditional sectors (see section 1.5).	Industrial design rights provide IP to design that is above "state of the art". They are particularly useful for non-technological innovations in consumer products. They are possibly quite relevant for emerging economies with an advantage in traditional activities (e.g. furniture and clothing).	PVP is relevant for ensuring quality and investments in its specific field. Its relevance is linked to the importance of such sectors in development contexts.	Trade secrets are relevant to the extent that they effectively protect innovative business practices for wider groups of innovators (Lemley, 2008). They are often quicker and cheaper, as no registration is required, and thus can be useful for development contexts, although this is conditional on enforcement.

1. The International Convention of the Union for the Protection of New Varieties of Plants (UPOV) was created in 1961. Its amended 1991 convention introduced changes that strengthened private IP rights on plant varieties significantly including: (i) the extension of minimal protection for most species from 15 to 20 years, (ii) the protection of "essentially derived" varieties, and (iii) the discretionary character of the right of rural producers to save seeds.

2. Currently, GIs are protected under different concepts around the world, for example, sui generis GI law (Andean Communities, Argentina, Armenia, Brazil, Bulgaria, China, the European Union, India, Korea, Mexico, Mongolia, Romania, Russian Federation, Switzerland, Thailand, Viet Nam), trademark law in the form of collective marks or certification marks (Australia, Canada, Japan, the United States), laws against unfair competition or consumer protection laws).

It is also important to note that firms often use bundles of IP to maximise returns on their inventions. This is not only a phenomenon for large firms in developed countries (UK IPO, 2013) but also can be observed in developing countries, for example, Chile (WIPO-INAPI, 2013). Certain types of innovators and firms make exclusive but often also complementary use of other strategies than IP to secure competitive advantage from their inventions. These mechanisms include secrecy (e.g. by design complexity), rapid product launch (or lead-time advantage), short product development cycles, after-sales service and long-term contracts. These mechanisms can equally incentivise innovation as IP. Some, however, clearly lead to limited dissemination of knowledge, a critical dimension by which IP can contribute to innovation, and can, in consequence, also render access to finance more difficult (as information needs to be shared for markets to operate). The overall impact on invention is also unclear, as most firms use IP and non-IP protection methods jointly. More importantly, it is difficult to set out a counterfactual case since non-use of IP by certain firms is not necessarily related to higher returns of alternative mechanisms (but could be due to well-known costs of IP use certain users face). In any case, those combined uses or non-uses need to be similarly considered for IP system policies, as they pose additional potential challenges, notably, for balancing the incentives vs. disclosure of information challenges of IP.

Rationales of IP for innovation

This section identifies five contributions of IP to innovation. Some apply to all types of IP, notably the incentive mechanism for investments in innovations, while others apply more selectively, as is the case for disclosure of knowledge. The following sub-sections provide generic descriptions while Table A2 describes specificities for different types of IP. A more extensive discussion of the roles of patents, designs, utility models, trade-marks and copyright can be found in Greenhalgh and Rogers (2010).

IP as an incentive for investments in innovation

IP plays an important role in fostering the creation of new knowledge. All types of IP can provide incentives for investments in innovation in exchange for monopoly rights over the intangible asset created. For example, patents offer incentives that encourage inventors to invest in creating inventions and subsequent innovations that otherwise might not see the light of day. Patents can also help to encourage inventions that address social challenges such as environmental issues or healthcare problems. As described in Box A.1, the economic rationale for patents is that they improve dynamic efficiency by fostering innovation, economic growth and value creation. They can lead inventors to engage in upfront R&D and other relevant investments in view of the promise that they will be rewarded *ex post* with IP for their future inventions. This similarly holds for utility models to the extent that inventions advance beyond the "state of the art". For IP to work as an incentive mechanism, future inventors should have the opportunity to recover the costs of their upfront investments. This is possible if market commercialisation of their inventions is successful. Trademarks can provide similar incentives by allowing companies to charge higher prices than competitors for new products and services. Industrial design and PVP provide similar incentives for new plant varieties and designs respectively.

Box A.1. The economics of patents

Patents give to their holder a right to exclude third parties from using their invention. On the basis of this restricted competition, the patent holder can exercise some power on the market and charge customers a mark up on the price. In the absence of this exclusion right, competitors who have not incurred any research costs could imitate the invention and offer the good or service at a lower price than the inventor. As inventors would then be driven out of the market, this situation could deter inventions coming to the market place in the first place. Patents improve the dynamic efficiency of the economy by fostering innovation, growth and value creation. But they do so by reducing competition and increasing prices, thereby excluding some consumers. Customers willing to pay more than the marginal cost but less than the mark-up price cannot buy the good. This generates an economic inefficiency, a *deadweight loss*.

Sources: Guellec and van Pottelsberghe (2007), *The Economics of the European Patent System*, Oxford University Press, Oxford; OECD (2009), *OECD Patent Statistics Manual*, OECD Publishing, doi: 10.1787/9789264056442-en.

However, payoffs from *ex ante* investments are by no means certain. IP systems do not transform the innovation process into one that is risk-free. Inventors will continue to face technical risks, not knowing *ex ante* if they will be able to produce a successful invention. They will also continue to face market risks, not knowing if consumers will demand the product or process.

Moreover, IP can provide incentives to invest and produce commercial innovations or, alternatively, to license out inventions for their commercialisation. This, however, will depend on existing market conditions. This is an additional mechanism for IP to support innovation.

The downside is that IP protection fosters dynamic efficiency to the detriment of static efficiency. This leads to reduced competition and thus higher prices and the exclusion of some consumers. In addition, a variety of reasons prevent owners from appropriating market rewards for their inventions; these relate to the organisation of the IP system, market conditions for IP, levels of competition and fields of activity.

IP and access to finance for inventors

Many inventors, start-ups and small firms lack access to financial resources for commercialisation of their inventions. IP rights respond to two potential sources of market failure. The first is the challenge of trading knowledge that, once revealed, can be appropriated by other parties without giving returns to the inventor. This might lead to deals not being consummated because inventors do not reveal sufficient information to financers. By providing a title over the invention, IP provides a guarantee of returns facilitating disclosure of information. The second type of market failure is an information asymmetry challenge in that financial markets cannot adequately assess the value of the invention, which might be partly signalled by an IP title. However, IP addresses the challenge only in part because IP granted will not indicate the economic value of the invention, but just that it meets subject matter, novelty and industrial applicability criteria. IP can in this way support the commercial application of inventions. The challenge for middle-income countries is that such financial markets are still in their infancy.

Table A.2. Different types of IP and their impacts on innovation

Patents	Utility models	Trademarks	Copyright	Geographical indications	Industrial design rights	Plant variety protection	Trade secrets
Incentives for inventions							
Yes, by providing ownership of future returns on successful innovations	Yes, by providing ownership rights for returns on incremental innovations and potentially serving as stepping stone for future patents	Yes, by providing ownership rights over brands associated with new products	Yes, by providing ownership rights of returns on novel creations.	Yes, by providing ownership rights for brands associated with quality improvements of protected products	Yes, by providing ownership rights of such non-technological innovations	Yes, by providing ownership rights over returns on novel plant varieties.	Yes, by providing ownership rights of returns on innovative business ideas and possibly also as incentives for the firm to perfect processes that might be eligible for future patent protection
Access to finance							
Yes, given ownership status and resolution of information asymmetries	Yes, given ownership status and resolution of information asymmetries, but less than for patents given the lower value	Yes, given ownership status	Yes, given ownership status, notably for software, movies and music	Yes, collective ownership of GI can facilitate access to finance for individual producers	Yes, given ownership status and resolution of information asymmetries	Yes, given ownership status and resolution of information asymmetries	Yes, given ownership status, but weaker protection status might lower opportunities
Access to knowledge and inventions							
Yes, disclosure requirement of patent applications provides access to knowledge, and licensing and/or selling of IP provides access to inventions	Yes, given disclosure requirement of utility model applications	Not fully, applications are awarded based on uniqueness alone, and trademarks are often used as alternatives to patents or utility models to avoid disclosure of information	Not fully, protection allows more public disclosure, except for software	Not fully, application rewarded for uniqueness	Yes, given disclosure particularly of registered design rights	Yes, given disclosure requirements of application	No, based on secrecy and often used as an alternative to other types of IP, notably patents, to obtain unlimited protection

Table A.2. Different types of IP and their impacts on innovation *(continued)*

Patents	Utility models	Trademarks	Copyright	Geographical indications	Industrial design rights	Plant variety protection	Trade secrets
International competitiveness and trade							
Yes, particularly for international patents (PCTs) or patents deposited in large markets (e.g. USPTO, EPO and JPO), but also constitutes a major asset abroad	Less relevant internationally, and mostly a tool for national, minor inventions	Yes, to the extent that international brands are a major asset on global markets.	Yes, particularly with regard to global digital and software industries	To a certain extent, given differential global recognition of GI	Yes.	Yes, it is critical for global players in the industry.	To a certain extent, as trade secrets are included in TRIPS and enjoy general legal protection in privacy and non-compete agreements, but enjoy only fragile protection, particularly abroad
Address information asymmetries regarding products							
Yes, patents can signal the quality of a company or invention and product novelty	To a certain extent, as a signal of quality of company	Yes, trademarks are a strong way of signalling product quality to consumers if competition authorities ensure no abuse	No	Yes, as a signal of product quality	No	Yes, signalling plant variety quality to users	To a certain extent, given the fragile nature of protection

IP and access to knowledge and inventions

By reducing competition and increasing costs, IP effectively lowers access to knowledge and inventions. Although such inventions might not be introduced in the first place without the incentive of IP, an additional risk is that, in its absence, inventors hide information regarding inventions from others. With the exception of trade secrets, IP can arguably facilitate the disclosure of information by inventors. In particular, the disclosure of information about inventions in patent application files constitutes a significant contribution to innovation systems. Access to such knowledge benefits a much larger group, avoiding needless duplication in research efforts. Emerging countries also benefit by tapping into knowledge developed abroad, enabling them to compete internationally. Such benefits require that information be made widely available to inventors. Training might also be needed to utilise the information provided in patents in different contexts. While disclosure benefits society, it does not necessarily benefit IP owners who might prefer to reveal as little as possible to avoid losing their competitive advantage. The IP system needs to ensure that inventors reveal useful information. Advantages from disclosure of information equally apply not only to patents, but also to utility models, design rights, PVP and copyright, but not to the same extent for trademarks (see discussion below on information asymmetries).

IP systems can, however, have the reverse effect of hampering access to knowledge under the following conditions: (i) if legal provisions and practices do not ensure proper disclosure of invention; (ii) if potential beneficiaries do not have easy access to the information; (iii) if no proper exemptions are provided for socially beneficial uses of such inventions, such as exemptions for research use; and (iv) if the subject matter includes inventions that effectively block further innovations such as essential research tools. In the latter case, firms have developed some solutions, notably, patent pools and cross-licensing arrangements. If competitive access is ensured, the latter condition is less of a challenge.

Beyond access to knowledge, IP titles can aid access to inventions by facilitating licensing or sales of IP titles to others. In their absence, such transfers might not be operational as the inventor would see no financial return and, thus, would have no incentive to provide access to inventions to others. By defining the nature of the protection and the scope of protection, IP rights provide legal building blocks that enable the owner of an innovation to license the innovation to others. Wider access to inventions can in turn allow for a wider provision of innovations on markets.

IP as a tool for international competitiveness and trade

Recognition of IP can attract trade and FDI and, thus, provide a potentially more conducive context for tapping into knowledge developed abroad. Most economic studies conclude that IP protection increases imports, inward technology-intensive FDI and other forms of technology transfer (see Branstetter et al., 2006; Javorcik, 2004). This is more relevant where other countries own IP that is crucial to local sectors and businesses. In this context it is important to ensure that owners of IP do not use it anti-competitively and provide local firms with opportunities to tap into such knowledge. This requires licensing agreements that both reward the licensor and allow the licensee to develop competitiveness in the specific technology space.

By registering IP in developed country markets, emerging countries can compete internationally by integrating value chains to generate the highest return and export knowledge embodied in IP.

IP to address information asymmetries

IP can resolve information asymmetries in several ways. They can help inventors signal the value of their invention and, thus, among other advantages, facilitate access to finance and enable markets for technology. Thus, they can address information asymmetries on producer markets. IP can also provide an opportunity for innovators to signal higher product quality to consumers on product markets. In developing and emerging countries shortcomings of consumer products can be substantial and, therefore, rewarding such innovations by signalling quality is critical. Trademarks play an important role in the latter case.

A.2. Innovation and development

This section provides background information on the innovation-development relationship and, in particular, on the multiple roles that innovation can play in the development process.

Innovation matters at all stages of development[3]

Innovation matters even in countries with less developed industrial conditions. The adoption of foreign technologies by these countries will have high payoffs, because technology adoption requires adaptation to local economic, technological or environmental conditions. This requires innovation capabilities. Incremental innovations in activities beyond "knowledge-intensive" sectors can offer substantial opportunities for success. Examples include the successful exports of fish from Uganda, wine from Argentina and Chile, and medicinal plants from India. In the initial stages, technology adoption with minor innovations can be profitable and successful (Acemoglu et al., 2006). Middle-income economies often have an industrial base and core framework conditions for innovative firms, and so have addressed the initial challenges for adopting novel technologies. An emphasis on innovation policies at all stages of development also matters since governments must engage in a learning process in order to build the institutions and competences needed to play their role at the core of the emerging national innovation system.

Key contributions of innovation for development

While innovation is important at all stages of development, different types of innovation play different roles at various stages. In early stages, incremental innovation is often associated with the adoption of foreign technology, and social innovation can improve the effectiveness of business and public services. High-technology R&D-based innovation matters at later stages of development, as a factor of competitiveness and of learning, facilitating the "catch-up" process (see Table A.3). Stages in country development do not, however, imply a linear progression, as different priorities and objectives often apply to different actors in countries at the same time. Certain areas can be more advanced; in fact, in many emerging countries "islands of excellence" – very innovative world-leading businesses, sectors, regions and research institutions or universities – coexist with a large group of low-productivity firms and a substantial informal economy.

Table A.3. Why is innovating important for emerging middle-income countries?

Country category	Mechanism/objective of innovation	Type/source of innovation	Main agents involved	Evidence/example
Developing/ low-income countries and emerging and middle-income countries	**1. Adoption requires adaptation:** innovation needs to respond to specific "local" conditions for outcomes	Incremental innovation based on foreign innovations and technologies	Universities and research institutes, leading private businesses, especially those with exposure to foreign markets and businesses	New plant varieties for agriculture Efforts at developing new methods for mineral extraction in the Chilean copper industry to satisfy local needs
	2. Inclusive innovation: for/by low and middle-income households to improve welfare and access to business opportunities	Incremental innovation based on foreign technology and local, traditional knowledge generated "out of necessity" Social innovation helping to introduce technical innovations in communities	NGOs, small firms, public and private associations engaged in disseminating knowledge via networks, and private, often large businesses	India (e.g. nano cars, grassroots innovation) Mobile banking services
Mainly middle-income countries, but also some opportunities for developing / low-income countries	**3. Building up innovation capacities** is the key to reaching the world technological frontier in many industries, and is relevant to avoiding "middle-income traps"	Incremental and radical innovation capacity to compete with leading world innovators	Requires full development of innovation systems involving diasporas as a connector	Korea increased R&D in the 1990s
	4. Address environmental, health and social challenges through global and local innovation efforts	Major innovations and scientific research conducted in global partnerships, but also marginal innovations to address welfare of poor people	Public and private universities and research institutions connected to global networks Major private businesses operating in these sectors	Innovations concerning soil
	5. Build-up niche competencies by growing exports in sectors of comparative advantage	Incremental innovations based on applying foreign innovations and technologies strategically to support industrial development	Public institutions to address co-ordination challenges, private sector initiatives including foreign companies	Colombian and Ecuadorian flower industry Malaysia's palm oil sector
Mainly emerging/ middle-income countries after initial progress on aspects above	**6. Climb the value ladder in global value chains**	Incremental and radical innovation capacity to differentiate contributions	Involves private sectors with support from public agents, intermediaries; diasporas can play a central role; large firms can be important	Automotive industry in Malaysia India's software industry
	7. Keep competitiveness in pioneer industries especially when the country is positioned at the frontier	Innovation is identical to that in developed countries exposed to developments in the global market	Involves mainly the private sector in interaction with public research institutions and universities, global partnerships are often of equal relevance, large firms	Brazilian company Embraer, as well as leading R&D firms from emerging economies

Source: OECD (2012), *OECD Science, Technology and Industry Outlook 2012*, OECD Publishing, doi: 10.1787/sti_outlook-2012-en.

Potential contributions can be reaped from supporting innovation across a variety of sectors beyond "high-technology" industries. An exclusive focus on high-technology industries ("high-tech myopia") can be costly if the potential for innovation in other sectors is ignored. Countries can incur high costs without reaping any benefits if they

choose sectors requiring expertise lacking domestically but widely available internationally. Many opportunities for innovation have arisen in lower-technology sectors with high export opportunities, such as the production of palm oil and derivative products in Malaysia. Innovation in agriculture is particularly relevant for addressing socio-economic challenges and fostering growth. Evidence shows that agricultural R&D has a greater impact on poverty reduction than most other public investments (Thirtle et al., 2003). Moreover, local innovation and innovation in the informal sector are also increasingly relevant to inclusive development agendas (OECD, 2013; WIPO, 2013). Thus, informal and inclusive innovation is essential for innovation policy in emerging countries, along with research targeting social challenges.

Successful innovation performance is not restricted to developed countries

Recent experiences suggest opportunities to build on innovation for development. Several emerging economies, in particular China, have become significant actors in the global innovation system. Evidence shows that R&D has played a key role in the take-off of Asian countries such as China, India and Korea (Ang and Madsen, 2011). Several developments may offer opportunities for these and other developing and emerging economies to engage in innovation:

- As some emerging countries become more innovative, opportunities for new entrants are created. The vertical fragmentation of value chains and the consequent division of labour in East Asia seems to have increased. Known as the "flying geese" development model, countries such as Cambodia, the Philippines and Viet Nam have taken over lower value activities from China. Furthermore, investments in Africa by Chinese firms have also altered local business opportunities. The International Science, Technology and Innovation Centre for South-South Cooperation exemplifies the increase in South-South co-operation activities.[4] There are also potential challenges (e.g. growing demand for primary inputs in China's manufacturing sector impacts on innovation systems).
- Information and communication technologies (ICT) offer new opportunities to connect to global innovation networks and can function as sources of innovation (Trajtenberg, 2005).
- Global value chains offer a potentially different framework for development. Countries such as Korea industrialised early through the development of vertically integrated industries, which produced both intermediates and final products. Countries that start to industrialise today may choose a different development path and specialise in specific activities. Sequentially upgrading value chains will likely require rethinking industry policy and the role of government.
- Increasingly, service-based economies call into question manufacturing-based development strategies. "Dematerialised" innovation (e.g. product design) is more relevant today for the positioning of countries in global value chains. However, a manufacturing base is arguably still necessary for development. To date, no country has developed without one.
- Greater openness to trade and FDI in the context of international treaties necessarily creates a very different context from that of the past.

These dynamics indicate that investing in strengthening innovation performance in development contexts can bring substantial positive pay-offs and should not be discarded.

Notes

1. This is based on OECD (2010), *Knowledge Networks and Markets: A Typology of Markets in Explicit Knowledge.* The document provides a more thorough discussion of the issues.

2. It is worth noting that IP for traditional cultural expressions and folklore is a subject of international discussions. While there is not yet a formal definition as such, in general, traditional cultural expressions and folklore are considered to be IP that: (i) are handed down from one generation to another, either orally or by imitation; (ii) reflect a community's cultural and social identity; (iii) consist of characteristic elements of a community's heritage; (iv) are made by "authors unknown" or communities; (v) are not created for commercial purposes but as a vehicle for religious and cultural expression; and (vi) are constantly evolving, developing and being recreated within the community (WIPO, Booklet No. 1). In this dynamic and creative context, it is often difficult to know what constitutes independent creation from an IP perspective.

3. This section is based on a more comprehensive discussion in OECD (2012).

4. South-South triangular co-operation, new forms of public-private partnerships, and other modalities and vehicles for development have become more prominent, complementing North-South forms of co-operation. This new emphasis was very evident at the 4th High Level Forum on Aid Effectiveness in Busan, Korea, in 2011.

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WITH PERSPECTIVES ON COLOMBIA AND INDONESIA

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