Harnessing Intellectual Property Rights for Innovation, Development and Economic Transformation in Least Developed Countries

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Foreword

In an era when knowledge and innovation are at the forefront of economic transformation, the role of intellectual property rights (IPRs) in shaping the future of least developed countries (LDCs) cannot be overstated. *Harnessing Intellectual Property Rights for Innovation, Development and Economic Transformation in Least Developed Countries* is a collaborative effort between the Commonwealth Secretariat and the United Nations Conference on Trade and Development (UNCTAD), reflecting our shared vision of empowering LDCs through the strategic use of IPRs.

This report is not just a testament to the potential of IPRs in fostering innovation and growth; it is a roadmap for LDCs to navigate the complex terrain of intellectual property (IP) and use it as a tool for sustainable development. In these pages, we delve into how IPRs can be harnessed to stimulate creativity, attract investment and promote technological advancement in LDCs, thereby contributing to their economic transformation and development.

Time is of the essence. Recent events have shown that each global crisis disproportionally affects LDCs. As the world grapples with cascading and accumulating crises, from climate change to the lingering effects of COVID-19, from war to rising debt burdens, from trade disruption to sidetracked development prospects, the need for innovation has never been greater. This report provides LDCs with insights on how to create an enabling environment for IPRs, ensuring they are not left behind in the global race for innovation and development. It highlights successful case studies, offers practical recommendations and underscores the need for a balanced approach to IPRs that best adapts to LDCs' technological absorption, level of productive capacities, competitive strengths and innovation potential.

We believe that this report will serve as a valuable resource for LDCs seeking to leverage IPRs for their economic and social advancement. It is a call to action for all stakeholders to work collaboratively towards a future where IPRs are a catalyst for sustainable development and inclusive growth in LDCs. This report fills an important gap in the policy literature on LDCs, in a context where the processes by which innovation occurs in LDCs, as well as the scope and potential for broadening innovative activities in these settings, have not been well documented.

We trust that this report will contribute valuable insights, policy perspectives and practical recommendations on how LDCs can strategically use IPRs to drive innovation and development. The Commonwealth Secretariat and UNCTAD are committed to collaborating with and supporting LDCs on this important journey.

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The report brings together key messages and insights from two in-depth papers: UNCTAD (2023c) and Pengelly (2024), prepared as part of a project on *Graduating with Momentum: IPR-related issues, Challenges and Opportunities for LDCs* managed jointly by the Commonwealth Secretariat and UNCTAD.

Note

As this report was written before Bhutan graduated from the LDC category in December 2023, it still refers to the group of 46 LDCs.

Contents

Abbreviations and Acronyms

ARIPO	African Regional Intellectual Property Organization
CORFO	Chilean economic development agency
DPoA	Doha Programme of Action for LDCs
EPO	European Patent Office
Fintech	financial technology
FDI	foreign direct investment
FTRI	Frontier Technology Readiness Index
GCI	Global Competitiveness Index
GI	geographical indication
GII	Global Innovation Index
HBTL	Himalayan Bio Trade Private Limited
IP	intellectual property
IPR	intellectual property right
IT	information technology
Lao PDR	Lao People's Democratic Republic
LBC	Lao Brewery Co. Ltd
LDC	least developed country
MSMEs	micro, small and medium enterprises
NGO	non-governmental organisation
OAPI	African Intellectual Property Organization
PCI	Productive Capacities Index
PCT	Patent Cooperation Treaty
PEPY	Promoting Education, Empowering Youth
PETRONAS	Petroleum Nasional Berhad
PPP	public–private partnership
R&D	research and development
SDG	Sustainable Development Goal
SMEs	small and medium enterprises
TONRD	Trade, Oceans and Natural Resources Directorate
TRIPS	Trade-Related Aspects of Intellectual Property Rights

UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNWTO	United Nations World Tourism Organization
UPOV	International Union for the Protection of New Varieties of Plants
US	United States
USPTO	United States Patent and Trademark Office
VSI	Vientiane Steel Industry Co. Ltd
WCT	WIPO Copyright Treaty
WEF	World Economic Forum
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

Executive Summary

The world's 46 least developed countries (LDCs) face unique and complex structural constraints that hinder their economic development and transformation. As a result, most LDCs continue to be marginalised in the global economy and in international trade, with the latter reflected in very low shares of global trade in goods and services. Their generally weak science, innovation and technological bases, the related gender divide and their primarily factor-driven economies serve as additional constraints to innovation and technological upgrading. Indeed, innovation in LDCs occurs mostly through small, gradual improvements to existing products, services or processes, mostly in small and medium enterprises (SMEs). In addition, a significant share of domestic innovation in LDCs takes place in the informal sector. As a result, there is a clear need for LDCs to shift away from their traditional development paths. To do so, more emphasis needs to be placed on enhancing their productive capacities and diversifying their economies and exports.

Innovative activity in LDCs, as proxied by data on the protection of various forms of intellectual property rights (IPRs), is limited. While applications for intellectual property (IP) protection have generally increased in LDCs in recent years, they remain very low compared with in developed countries and the global average. Even applications for trademarks, the single most widely used form of IP protection in LDCs, averaging 2,197 filings per year between 2017 and 2021, fall far below the annual averages globally (26,034) and for other developing countries (24,789). Annual applications for patents and utility models in LDCs averaged just 55 and 24, respectively, and in many LDCs fewer than five utility model applications were submitted annually during this period. The total number of geographical indications (GIs) in force in LDCs is equally small. Even in aggregate, applications for IP protection stemming from LDCs account for only a fraction of those filed globally.

To address these difficulties and deploy IPRs more effectively to stimulate innovation and economic transformation, LDCs need to strengthen their domestic IP strategies, frameworks and institutional structures in ways that align with their local needs and conditions, levels of development and economic structures, as well as their current skills bases and educational capabilities. In addition, LDCs need to build critical minimum levels of productive capacity and technological capabilities to complement these efforts and make full use of formal and informal IPRs, as well as existing flexibilities available to them through the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) and other global IP rules and systems.

This report, which combines key messages and insights from two in-depth papers, by the United Nations Conference on Trade and Development (UNCTAD) (2023) and Pengelly (2024), explores how LDCs can develop IP regimes to accelerate innovation, inclusive growth and structural transformation. It examines the economic rationale for strategic IP protection in LDCs and explores practical ways in which LDCs can unlock IP-related benefits and sequence the development of IP regimes, tailored to their local needs, structural characteristics and stages of development, to support innovation and development in both the formal and the informal economies. It explores various forms of IP protection, particularly copyrights; GIs; industrial designs; patents; trademarks; utility models; and the protection of genetic resources, traditional knowledge, cultural expressions and folklore. Using these more strategically could help businesses in LDCs develop competitive advantages, while also encouraging innovation, fostering the development of productive capacities and boosting trade and investment.

Although levels of IP activity and innovative capacity in LDCs generally remain very limited, there are instances in which different forms of IP protection have been leveraged successfully to enable firms to protect their innovations and inventions; engage in more sustainable production; grow their brands and reputations; increase sales, prices and profits; or expand into new markets. This study focuses on four sectors with significant and underutilised development potential for LDCs, mining, pharmaceuticals, tourism and financial services, providing illustrative examples of successful experiences.

Policy-makers in LDCs need to strike an appropriate balance between weaker and more stringent IP protection, while considering their inherent trade-offs in relation to wider national policy objectives. To realise their development goals, LDCs need to develop their IP regimes strategically and selectively, and in co-ordination with existing policies and programmes. This requires attention to the sequencing of reforms to their national IP systems, as well as to improving their institutional capacity for IP administration, enforcement and regulation. The protection strategic IPRs afford can incentivise local firms, inventors and artists in LDCs to invest in research and development (R&D) or new creations and to commit time and resources to developing new products and processes, thereby providing a springboard for further innovation.

Large shares of entrepreneurial activity and innovation in LDCs take place in informal settings. In this regard, due consideration must be given to the role of informal businesses, as well as more flexible legal mechanisms and less formal IP protections in strengthening IP systems. These sorts of alternative protection mechanisms, which are often embedded in the normal working practices of firms, can protect SMEs against internal risks (e.g., the departure of valuable staff) or external risks (e.g., unfair exploitation of new ideas by other firms) and can be complementary to formal IPRs.

In the face of persistent structural impediments, it is essential for LDCs to transform their economies. Greater productive capacity is key to diversifying their economies, upgrading production and export capabilities, building resilience to external shocks and, ultimately, achieving the Sustainable Development Goals and the targets agreed in the Doha Programme of Action for LDCs (DPoA). Innovation and technological advances can, and should, play key roles as part of a holistic approach to building productive capacity in LDCs. Drawing on these insights, LDCs and their development partners should give priority to five overarching considerations to unlock IP-related benefits in support of innovation, inclusive growth and structural transformation.

1. Mainstreaming strategic IP protection

Patents are not the only available option to protect and encourage innovation in LDCs. Utility models, copyrights, trademarks, industrial designs and GIs may be more appropriate tools for IP protection in specific settings within LDCs, particularly where there is limited domestic capacity to innovate, and where R&D systems remain nascent and constrained by their own structural and financial hurdles.

2. Gearing national IP systems and related frameworks to support innovation

There is a clear need to enhance awareness of IP laws nationally and increase understanding of the implications presented by the membership of LDCs in international IP treaties and conventions. National IP systems within LDCs should also be formulated to make full use of the flexibilities available to them within international IP rules. These include a range of legislative flexibilities, such as exceptions to patentability for pharmaceuticals, compulsory licensing and parallel importing; or fair-use provisions and exceptions for schools, universities, media organisations and research in the case of copyrights. The effective use of these flexibilities can help LDCs protect IP to encourage innovation and investment in R&D as well as new technologies. It would also facilitate the exchange of knowledge, resources and technologies, thereby encouraging partnerships and collaboration, and ensuring an equitable distribution of the social gains from innovation.

3. Scaling up technology transfers to LDCs

There remains significant scope for developed countries and international organisations to scale up the delivery of technology transfer and technical assistance for LDCs to upgrade their national IP and innovation systems in line with obligations in the TRIPS Agreement (Articles 66.2 and 67) and with commitments made through the DPoA.

4. Accounting for innovation in the informal economy

For some LDCs, it may be necessary to consider alternative protection mechanisms and create and implement a set of 'IPR-like' policies that are better suited to informal settings. These could include lower costs for acquiring and enforcing rights, limited or no registration requirements, reduced barriers to licensing, a lower registration threshold for utility models and a weaker set of rights.

5. Including innovation policies as part of LDC graduation strategies

On top of these considerations, graduating LDCs are likely to encounter additional layers of complexity when looking to craft appropriate IP

systems and regimes to support innovation and development, at least within the context of the formal economy. It is therefore of paramount importance that issues related to IPRs are duly accounted for in a comprehensive approach to graduation that will enable them to achieve the graduation milestone with momentum towards long-term sustainable development. Given these challenges, there is a strong case to consider national capacities for production, science, technology and innovation when assessing LDCs' readiness to graduate out of the category.

1. Introduction

The world's least developed countries (LDCs) face unique and complex structural constraints that hinder their economic development and transformation. High levels of dependence on primary commodities, underdeveloped productive capacity and low productivity levels, chronic shortages of human capital, weak digital and technological capabilities, underdeveloped private sectors and major infrastructure deficits all combine to undermine their socio-economic prospects, hampering their progress towards the Sustainable Development Goals (SDGs) and leaving them highly vulnerable to economic and environmental shocks.

As a result, most LDCs continue to be marginalised in the global economy and in international trade, with the latter reflected in very low shares of global trade in goods and services. They also face daunting socio-economic challenges, particularly in relation to education and health. Poverty levels have been slow to decline and remain alarmingly high in many LDCs.

The debilitating impacts of the COVID-19 pandemic, intensified by the economic impacts of several ongoing conflicts, have reinforced many of these challenges and stalled, or even reversed, some of the developmental gains LDCs have already achieved. The protracted and disrupted economic recovery may roll back the advances some LDCs have made towards graduation out of the category.

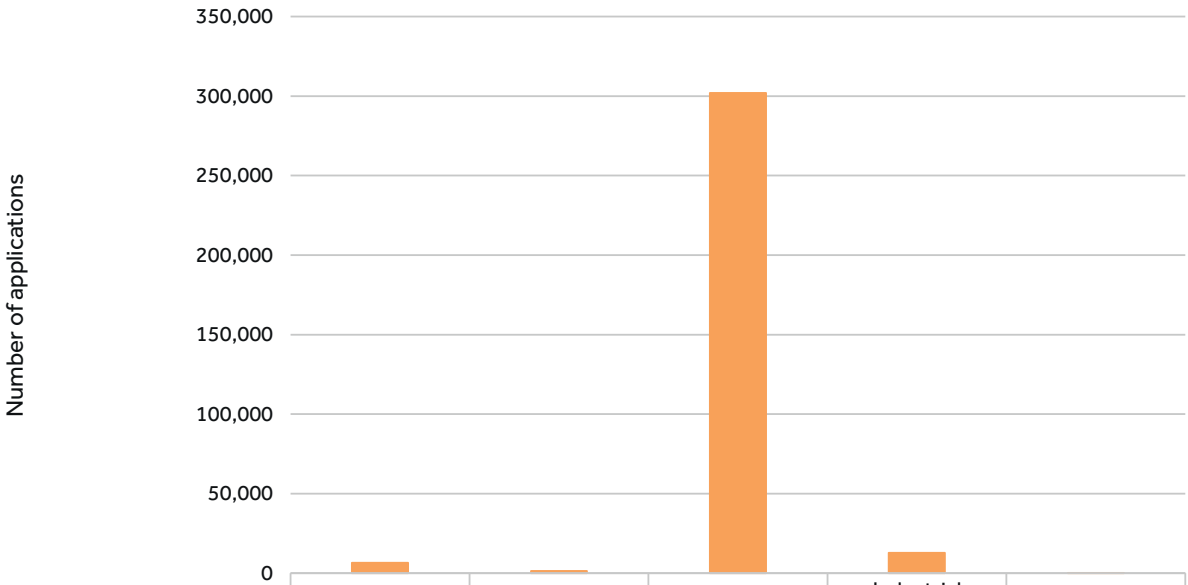
To accelerate their progress along the three dimensions of sustainable development (economic, social and environmental), there is a clear need for LDCs to shift away from their traditional development paths, which have reinforced commodity dependence. To do so, they need to place more emphasis on enhancing their productive capacities and diversifying their economies and exports. By developing capabilities in higher-productivity sectors and shifting resources from low- to higher-valued-added activities within and between sectors, LDCs can achieve the structural transformation necessary for sustainable and inclusive growth and irreversible poverty reduction.

Innovation and the development of technological capabilities can help drive these much-needed structural transformations in LDCs. However, the limited domestic markets and lack of funding in most LDCs provide few incentives to innovate. Their generally weak science, innovation and technological bases, the related gender divide and their primarily factor-driven economies serve as additional constraints to innovation and technological upgrading. Reflecting these challenges, most LDCs rank low on the World Intellectual Property Organization's (WIPO) Global Innovation Index (GII) (see Annex 1) — all but one of the 21 LDCs included in the Index fall in the bottom quartile of the rankings.

Moreover, most LDCs have yet to fully benefit from technology transfer either via informal channels (such as the acquisition of machinery and equipment, reverse engineering and subcontracting) or through formal modes including foreign direct investment (FDI). Licensing of foreign technology is mostly out of reach for firms in LDCs, which often do not possess sufficient absorptive capacity since their domestic productive capacities are either not fully exploited or too weak to enable it.

Instead, innovation in LDCs occurs mainly through small, gradual improvements to existing products, services or processes, mostly in small and medium enterprises (SMEs). Specifically, technological learning and technical change in LDCs take place primarily by means of using and improving technologies that already exist in advanced industrial countries or other developing countries, which need to be adapted to local conditions. Key technological capabilities are related to the acquisition of mature technologies, including simple assembly, product specification, production know-how, technical personnel, and components and parts; the ability to undertake incremental innovations to adapt technologies to local conditions; the capacity to develop new markets through close links with customers and strategic management of marketing functions; and the competence to develop linkages with other enterprises, public research organisations and technology transfer agencies. For most LDCs, the three most important sources of building their endogenous knowledge base are likely to be education and strengthening of the skills base; foreign technology transfer; and the mobility of experienced technical personnel (UNCTAD,

Figure 1.1: Applications for IP protection in LDCs (aggregate totals, 2017–2021)



	Patents	Utility models	Trademarks	Industrial designs	GIs
LDC total	6,622	1,342	301,896	12,854	138
LDC share of global total (%)	0.04	0.01	1.52	0.25	0.03

Note: Totals represent aggregates across all LDCs, including resident and non-resident filings.
Source: Authors' calculations using WIPO data.

2006). Importation of foreign technology, reverse engineering of existing mature foreign products and the mobility of experienced technical and managerial engineering personnel can be harnessed to bring about effective adoption, adaptation and diffusion of imported technologies into their economies. In addition, a significant share of domestic innovation in LDCs takes place in the informal sector.

As a consequence of these constraints, innovative activity in LDCs, as proxied by data on the protection of various forms of intellectual property rights (IPRs), is limited. While applications for intellectual property (IP) protection have generally increased in LDCs in recent years, they remain very low compared with in developed countries and the global average (see Annex 1). Even applications for trademarks (the single most widely used form of IP protection in LDCs, averaging 2,197 filings per year between 2017 and 2021[1]) fall far below the annual averages globally (26,034) and for other developing countries (24,789). Annual applications for patents and utility models in LDCs averaged just 55 and 24, respectively, and fewer than five utility model applications were submitted in many LDCs annually during this period. The total number of geographical indications (GIs) in force in LDCs is equally small.

Even in aggregate, applications for IP protection stemming from LDCs account for only a fraction of those filed globally. Between 2017 and 2021, LDCs collectively accounted for only 0.25 per cent of worldwide applications to protect industrial designs, and less than 0.05 per cent for patents, utility models and GIs (Figure 1.1). While applications for trademarks in LDCs were far more numerous, they still constituted just 1.5 per cent of total applications filed worldwide over this period.

Low levels of awareness, scarce use of information and communication technology, high fees, weak institutional structures, inadequate legal and regulatory frameworks, a lack of specialised skills within national IP offices and limited ability to tackle IP infringements and violations all contribute to the low number of applications for patents and other forms of IP protection in LDCs. In addition, LDCs' membership in international IP conventions and global or regional IP systems and organisations (despite increasing over time) is generally lower than in developing and developed countries

1 The LDC average is driven by comparatively higher numbers of applications in one country: Bangladesh.

(Annex 2). This largely reflects the lesser policy emphasis on IP protection and weaker institutional and administrative capabilities in LDCs.

To address these difficulties and deploy IPRs more effectively to stimulate innovation and economic transformation, LDCs need to strengthen their domestic IP strategies, frameworks and institutional structures in ways that align with their local needs and conditions, levels of development and economic structures, as well as their current skills bases and educational capabilities. In addition, LDCs need to build critical minimum levels of productive capacity and technological capabilities to complement these efforts and make full use of formal and informal IPRs as well as existing flexibilities available to them through the World Trade Organization (WTO) Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) (Box 1) and other global IP rules and systems.

With these needs in mind, this report (which combines key messages and insights from two in-depth papers, by UNCTAD (2023c) and Pengelly (2024)) explores how LDCs can develop IP regimes to accelerate innovation, inclusive growth and structural transformation. It examines the economic rationale for strategic IP protection in LDCs and explores practical ways in which LDCs can unlock IP-related benefits and sequence the development of IPR regimes, tailored to their local needs, structural characteristics and stages of development, to support innovation and development in both the formal and the informal economies. The report does not attempt to provide an exhaustive analysis of all innovative activities and IP-related protections and measures in LDCs. Instead, through a theoretical discussion of opportunities and via practical examples spread across selected sectors, it seeks to highlight the scope and potential for LDCs to use IP protection strategically to stimulate innovation and development.

The remainder of the report is structured as follows. Section 2 provides a broad overview of available opportunities for LDCs to leverage IPRs strategically to drive innovation, growth and development. Thereafter, Section 3 is organised into four parts. The first part presents practical examples of where different forms of IPRs have been used successfully to stimulate innovation and development in LDCs and other developing countries. This is followed by an examination of the application of IPRs in four sectors (mining, pharmaceuticals, tourism and financial services), which highlights important issues and lessons for LDCs. The third part of Section 3 considers options for sequencing the development of IP regimes to take account of varying innovation capabilities, stages of development and industrialisation, and

Box 1: IPR-related TRIPS flexibilities and support for LDCs

The TRIPS Agreement sets out minimum standards and a basic framework of measures and legal remedies for the protection, enforcement and administration of IPRs in WTO member countries. However, in having their special needs and circumstances recognised, LDCs that are members of the WTO currently enjoy extensive special treatment provisions that give them flexibilities in the application and implementation of the TRIPS Agreement domestically.

Through a waiver under Article 66.1, LDCs are exempt from complying with most elements of the Agreement other than Articles 3 (national treatment), 4 (most-favoured nation treatment) and 5 (precedence of WIPO procedures) for a transitional period that has been extended three times (in 2005, 2013 and 2021) and currently runs until 1 July 2034, or until the date when a country ceases to be a LDC, whichever is earlier. In addition, a special transition period, currently running to 1 January 2033, has been granted with respect to IP protection in the pharmaceutical industry, which exempts LDCs from protecting patents and undisclosed information for pharmaceutical products.

Article 66.2 of the TRIPS Agreement outlines provisions requiring developed countries to provide special incentives to their enterprises and institutions to transfer technology to LDCs. It also contains formal obligations, under Article 67, for developed countries that are members of the WTO to provide technical and financial assistance to developing countries and LDCs to facilitate the implementation of the Agreement and to strengthen their national capacities for IP policy-making, administration and enforcement.

economic structures across LDCs. The final part of Section 3 assesses the nature of innovation and the scope for IP protection in the informal economy in LDCs. The report concludes by situating the analysis within the broader LDC development agenda and providing practical recommendations to assist LDCs to develop IP regimes and systems that foster inclusive growth, encourage innovation, support the development of productive capacities, boost trade and investment, accelerate economic transformation and, ultimately, ensure they graduate with momentum.

2. The Economic Rationale for Strategic IP Protection in LDCs

A variety of different forms of formal IP protection enable artists, innovators, entrepreneurs and businesses to protect their inventions, designs, artistic creations, products, processes and services, and other intangible assets, and control if, when and how they can be used (Table 2.1). These instruments thus help individuals and businesses reap commercial benefit and recognition from their innovative products, processes, services and creative works.

Using these tools more strategically could help businesses in LDCs develop competitive advantages, while also encouraging innovation, fostering the development of productive capacities and boosting trade and investment. The presence of appropriately tailored IP protection can encourage domestic product innovation and technological development. In turn, a lack of IP protection may slow technological advances even in countries with low levels of economic development, as product innovation and invention are often aimed at domestic markets. IP protection can create incentives for entrepreneurs and businesses to take risks and reward creativity. In addition, the protection provided through IPRs such as GIs and trademarks could help firms in LDCs capture more value from their exports.

Table 2.1: Understanding different forms of selected IP protection

Form of IP protection	Definition and function
Copyrights	Offer protection for artists, creators and authors by granting exclusive economic rights to prohibit or authorise the reproduction, public performance, distribution, recording, broadcasting, translation and adaptation of their creative works.
Geographical indications	Signs used on products that have a specific geographical origin and possess characteristics or qualities or a reputation that essentially owe to that place of origin. A GI prohibits the designation or presentation of a good in a manner that indicates or suggests it originates in a geographical area other than its true place of origin.
Industrial designs	Protect the ornamental, physical or aesthetic features of a useful article by providing exclusive rights and protection against unauthorised use by third parties.
Patents	Grant exclusive rights through registration for an invention (which can be either a product or a process) to prevent others from commercially making, using, distributing, importing or selling the invention for a limited time period (generally 20 years).
Trademarks	Provide legal recourse against unauthorised use or imitation of words, names, symbols, devices (logos), designs or any other distinctive sign or mark that helps identify and distinguish specific goods or services produced by an individual or company from others.
Utility models	Provide protection for minor inventions and small, incremental and cumulative innovations or improvements to existing products by granting an exclusive right that prevents others from commercially using the protected invention, without authorisation, for a limited period of time.

Source: Authors drawing on UNCTAD (2023c) and Pengelly (2024).

Strategic IP regimes could also enable LDCs to attract FDI[2] and new technologies. Although other factors are also at play, it needs to be highlighted that the strength of IP protection and the ability to enforce contracts have important effects on decisions by multinational firms on where to invest and whether to transfer advanced technologies. Improvements to IP protection in LDCs can help make the investment climates of these countries more attractive for multinational firms and enhance LDCs' prospects as potential locations for knowledge-based industries.

IPRs could also attract FDI as investment options in their own right. For example, investment funds are creating products for investors who want to earn profits from music royalties. Micro, small and medium enterprises (MSMEs) in LDCs, whose operations are often severely constrained by a lack of access to finance, could also use newly acquired IPRs as collateral to secure loans. In early 2023, the Government of Bangladesh introduced this option as part of its Secured Transactions (Immovable Property) Act 2023 (The Business Standard, 2023).

The decision as to the kind of IP to adopt depends on an individual country's capacity for technological absorption, its level of productive capacities, its competitiveness and its innovation potential. Patents are generally used to protect inventions and innovations in high-tech manufacturing industries that tend to be dominant in developed, innovation-driven economies with advanced productive capacities. In contrast, trademarks, utility models, GIs and industrial designs are used most widely in the agri-business; food and beverages; ceramics; electronics; fashion, textiles and clothing industries, which are often key sectors in factor-driven and/or developing economies. Copyrights are critical for protecting artistic creations and works emanating from the creative or cultural industries (such as music, film and publishing). IP protection for computer software industries and other information technologies is equally important but can take various forms, from patents to trademarks and/or copyrights.

2 For instance, an earlier study, by Park and Lippoldt (2008), found that a 1 per cent increase in the strength of patent rights — as reflected in a patent rights index measuring the extent of coverage, membership in international treaties, duration of protection, absence of restrictions on rights and statutory enforcement provisions — is associated with a more than 2 per cent increase in the stock of inward FDI.

The remainder of this section provides a broad overview of specific channels through which it is possible to strategically leverage a selection of different forms of IP protection in LDCs to support inclusive growth, encourage innovation, foster the development of productive capacities, boost trade and investment, and enable economic transformation. Opportunities for IPRs to protect genetic resources as well as traditional knowledge, cultural expressions and folklore in LDCs are also briefly discussed.

2.1 Patents

Patents enable innovators to commercialise their ideas and inventions. While often reserved for advanced inventions, patent protection can provide a foundation upon which to promote innovation in LDCs and encourage much-needed investment in research and development (R&D). The promise of exclusive rights to creations and inventions for a limited period may encourage inventors and innovators to invest time and resources (both financial and other) and commit effort and expertise to developing new technologies, products and processes, safe in the knowledge that competitors cannot easily replicate their patented products or processes.

Patents may also benefit the wider innovation ecosystem in LDCs. By analysing existing patents to find areas of opportunity and prevent infringement, firms and researchers can more successfully direct their R&D efforts towards future innovations. There is also scope to license patents to other companies for use or development, providing inventors with a source of income while also helping create partnerships between innovators and firms and encouraging sharing of knowledge and ideas. In some circumstances, patent holders in LDCs may opt to invest the revenue their patents generate into R&D, in the process stimulating further rounds of innovation.

The possession of patent protection for specific inventions or innovations may also make firms in LDCs more attractive propositions for investors and venture capitalists, thus helping boost investment inflows. This may also encourage the development of existing and/or new industries in LDCs, if holders of patents are better able to attract capital and investment to develop products for local and export markets.

More generally, patents can help local businesses acquire technology and knowledge internationally through licensing agreements and by encouraging commercial transfer of technology between firms. This is especially important for LDCs, where innovation is often constrained by limited resources to invest in knowledge-based or idea-generating industries and activities as well as lack of access to new technologies. Patents create a protected market advantage but they also require the patent holder to disclose the details of their invention to the public via their initial application for patent protection. Once the exclusive rights the patent provide have elapsed, such information becomes available in the public domain, thereby helping grow the overall body of public knowledge. This could help enable broader access to ideas and technologies in LDCs.

2.2 Utility models

Utility models play an important role in protecting minor innovations and improvements to the functional aspects of products that do not fulfil patentability requirements. They offer comparatively cheap and fast protection for domestic innovators creating minor inventions or engaging in technological adaptation (Suthersanen, 2006). With generally less stringent compliance requirements compared with patents or industrial designs (discussed below), simpler application procedures and shorter terms of protection, they present a more accessible form of IP protection that can enhance technological learning in LDCs with less advanced technologies.

Without second-tier IP protection systems like utility models, there are fewer incentives for domestic firms and foreign investors to invest in the development of local product innovations. Since innovation is crucial for production and to develop a local knowledge base, the absence of protection for minor inventions could affect the ability of LDCs to convert knowledge and new ideas into wealth and social benefits (Mashelkar, 2001). At present, 23 out of the 46 LDCs do not have legislation on utility models.

2.3 Trademarks

Trademarks can, and in many cases already do, play a crucial role in supporting innovation in LDCs. They promote healthy competition and generate incentives for firms to invest in R&D and marketing to create and improve unique, innovative and valuable products, services and brands in the knowledge that their trademarks are legally protected from unauthorised use by third parties.

Individuals, entrepreneurs and businesses can attain financial rewards from their trademarks through royalty payments in exchange for authorised use by third parties. Established trademarks are thus significant assets for firms and can be licensed or franchised to other businesses. This creates opportunities to exchange knowledge, resources and technologies in ways that may encourage innovation within and across industries in LDCs.

Alongside GIs (discussed below), exporting firms in LDCs can use trademarks as part of a branding strategy to increase product recognition and loyalty from consumers in their export markets. They can also use them to support licensing or franchising in overseas markets.

2.4 Geographical indications

GIs allow raw materials, typically agri-food products, to gain more commercial value through association with a particular geographical area. This can be a key factor enabling businesses in LDCs to differentiate their products in both domestic and export markets and to develop unique brands.

Beyond these market-related benefits, the promotion and protection of products through GIs may result in significant gains for local communities and the environment in LDCs (UNCTAD, 2015), many of which rely heavily on agricultural products and handicrafts that are typically the types subject to GI protection. These gains arise primarily from the defining characteristics of GIs, wherein the origin of the protected product is intrinsically linked to its quality and features. This creates natural incentives for producers of products protected by GIs to effectively manage and maintain the natural environment from which they are sourced.

Consequently, GIs can be very effective tools to preserve biodiversity and support sustainable natural resource management, as well as to conserve traditional knowledge and cultural expression in LDCs (Bramley, 2011). They may also bring important benefits for local communities, especially in rural areas and through economic empowerment of women and youths.

2.5 Industrial designs

Protecting industrial designs, which constitute the ornamental aspect of an article, incentivises creativity in the artisanal manufacturing and light industrial sectors and can thus be an important driver of economic development in those LDCs with some nascent manufacturing capacity. Industrial design protection can also play a crucial role in fostering innovation. The provision of legal safeguards against the unlawful use of original designs allows producers, designers and creatives to commit resources towards new, original and inventive designs. It can also generate opportunities for businesses and designers to license their designs to other organisations. This may result in partnerships, collaborations and knowledge exchange that spur innovation within and across industries.

Industrial design protection may also help boost business revenues and competition in LDC markets. The encouragement it provides to businesses to invest in design innovation can help improve brand awareness and reputation and increase customer loyalty and sales, while also preventing markets from being overrun by copies of popular designs.

Depending on its application, industrial design protection may also produce wider benefits for LDCs. It can help promote and preserve cultural and artistic heritage by encouraging the protection and recognition of traditional designs and craftsmanship. It may also provide environmental benefits if, for example, it protects the design of environmentally friendly products.

2.6 Copyrights

Copyrights are used to describe the rights that authors and creators have over their literary and artistic work. They provide incentives for creators, performers, designers and other innovators, including actors, computer programmers and software developers, journalists, musicians, producers, broadcasting organisations and film-makers, in the form of protection and economic returns for their work (WIPO, 2004). By granting exclusive rights over literary or artistic works and enabling financial rewards from licensing or selling these rights, copyrights motivate individuals and businesses to expend resources to produce original and inventive creations. Copyright protection also encourages creators to make their original work available to the public by eliminating the risk that it might be misused without their permission. As a result, knowledge and information spread more widely, potentially stimulating additional invention and creativity.

By providing a framework for the licensing, distribution and monetisation of creative works, copyrights help protect the viability of businesses in the creative sectors. This can be especially valuable for LDCs, whose creative goods exports collectively increased more than 17-fold between 2002 and 2020 (UNCTAD, 2022c).

2.7 Protecting genetic resources, traditional knowledge, cultural expressions and folklore

Provisions within national copyright laws as well as national *sui generis* laws can help protect traditional knowledge, cultural expressions and folklore from misuse or appropriation. These include music, dance, storytelling, myths, traditional designs, symbols, artworks and handicrafts, typically passed on over generations in communities through oral traditions and collectively held. They are often important drivers of innovation in the informal economy in LDCs (see Section 3.4). Protecting them effectively through appropriate legal instruments is key to their ongoing preservation and may enhance opportunities for benefit-sharing and commercialisation of these assets within LDCs.

Similarly, many LDCs, particularly in Africa, would benefit greatly from stronger IP protection to control access to their genetic resources such as plants, animals and micro-organisms. These resources provide valuable inputs in the life sciences, and traditional knowledge associated with them is scientifically valuable and integral to the economic and cultural well-being of indigenous peoples and local communities.

3. Unlocking IPR-related Opportunities to Support Innovation and Development in LDCs

The previous section highlighted a number of theoretical and/or conceptual opportunities available through the strategic use of various forms of IP protection in LDCs. In many cases, the challenge for LDCs is to build suitable capacity and identify the appropriate policy and regulatory and institutional interventions necessary to bring these opportunities to fruition. This section draws on practical examples, across selected forms of IP protection and in individual sectors as well as in formal and informal settings, to highlight ways in which LDCs can unlock IPR-related benefits to support innovation and accelerate their development and structural transformation.

3.1 Practical examples

Although levels of IP activity and innovative capacity in LDCs generally remain very limited, there are instances in which businesses or entrepreneurs in these countries have successfully leveraged different forms of IP protection to protect their innovations and inventions; engage in more sustainable production; grow their brands and reputations; increase sales, prices and profits; or expand into new markets. Table 3.1 presents a selection of examples of how copyrights, GIs, industrial designs, patents, trademarks and utility models are used in LDCs and in a small number of other developing countries (Ghana, Indonesia, Nigeria and Oman). These examples illustrate how the IPRs listed above can potentially be applied to different sectors across LDCs.

3.2 Sectoral applications and sector-specific approaches

The successful uses of different forms of IP protection in the examples highlighted above span several sectors of varying importance to LDCs depending on their prevailing economic structures, productive capacities and overall levels of development. This sub-section focuses on innovation and IP protection in four sectors, mining, pharmaceuticals, tourism and financial services, that are arguably areas with significant and underutilised development potential for LDCs. It examines the importance of innovation in these sectors and considers examples from LDCs and other developing countries to highlight the scope and opportunities for various forms of IP protection, and their potential implications.

3.2.1 Mining

Mining has traditionally been earmarked as a key sector to reduce poverty and improve living standards in LDCs (Belem, 2009). More than three-quarters of LDCs were classified as commodity-dependent between 2018 and 2020, with more than 60 per cent of their exports comprising primary products. In most cases, the majority of these exports are ores, metals and fuels derived from mining activities. Some LDCs have large deposits of energy transition minerals, including cobalt in Democratic Republic of Congo, copper in Lao PDR and Bhutan, graphite in Mozambique and bauxite in Guinea (UNCTAD, 2022a).

Innovation can play a critical role in helping overcome major efficiency, productivity and sustainability challenges faced by firms operating in the mining sector, including those located in LDCs and/or engaged in small-scale mining activities (Ortega and Elton, 2019). Innovations that support on-site value addition through the transformation of minerals domestically or through regional value chains could help LDCs diversify their economies.

IP protection can be important to ensure the advantages acquired through such innovations are secure. In recognition of this importance, IP

Table 3.1: Examples of the successful use of IP protection in LDCs and other developing countries

Form of IPR	Originating country	Sector	Innovation and IP protection	Successes
Copyrights	Ghana	IT	Leveraging copyright protection, theSOFTtribe gained authorisation through licensing to use Microsoft Dynamics NAV, making it possible to add layers of functionality and optimise products based on Microsoft's existing platform	• theSOFTtribe has grown from a small startup with limited infrastructure to a world-class software development company with global clientele and partners. • It retains copyrights over the software and the revenue from the licensing.
Geographical indications	Senegal	Agriculture	Registration of Madd de Casamance as a GI for a local berry with renowned flavour and medicinal properties harvested in the Casamance region of southern Senegal	• This helped ensure harvesting and processing activities are governed by sustainability considerations to maintain the original forest ecosystem in the region. • Support from civil society has helped implement a quality assurance scheme, aided new market development and supported local women to add value to goods derived from the berries.
	Cambodia	Agriculture	Registration of Kampot pepper (a fine variety of pepper cultivated in Kampot province) as a GI in 2010, both in Cambodia and the European Union via the Lisbon System	• Registration boosted the production and export of Kampot pepper, raising prices and incomes for farmers and farm workers in producing regions. • The average purchase price (at the farm gate) tripled, from US$7.5 before registration to $22.7 10 years later (WIPO, 2021). • The value of production in 2019 reached more than $1 million, up from $70,000 in 2009 (WIPO, 2021) • Farms producing Kampot pepper have grown in numbers and became a main destination for tourists in Cambodia (UNWTO & WIPO, 2021)
Industrial designs	Myanmar	Pharmaceuticals	Packaging design, using special anti-counterfeiting technology, to protect traditional medicine produced by FAME, a pharmaceutical company; registered as an industrial design with Myanmar's IP office	• This effectively protects FAME's medicine from imitation and infringement. • It enables consumers to quickly identify FAME's products.
	Nigeria	Clothing	Registration as an industrial design of Komole Kandids fabric, which combines lace and Aso-Oke (a hand-woven cloth created and worn by West Africa's Yoruba people)	• The fabric's style and pattern is protected from imitation. • The uniqueness of Komole fabric has helped the House of Deola become one of the most recognisable brands from Nigeria and Africa.
	Indonesia	Food	Kebab Turki Baba Rafi's, the world's largest kebab chain, invention of and registration as an industrial design a cardboard container with a special tab that makes it easier to consume kebabs without mess and avoid accidental consumption of foil wrapping	• The registration helps protect innovations and ultimately enhance the company's reputation and brand image.
	Oman	Luxury goods	Unique and recognisable House of Amouage perfume bottles protected by industrial designs registered in key markets	• Amouage has become one of Oman's most recognised brands creating and selling some of the most prized perfumes in the world.

(Continued)

Form of IPR	Originating country	Sector	Innovation and IP protection	Successes
Patents	Senegal	Agriculture	Invention of a machine to de-husk fonio grains, making them faster and easier to process. An application for patent protection with the African Intellectual Property Organization (OAPI) attracted interest and investment from foreign organisations. In 1995, the African Development Foundation funded the construction of five next-generation prototype fonio husking machines, in tandem with a yearlong study of the machines' use and effectiveness.	• The machine can now process 5 kg of fonio in only eight minutes, removing over 99 per cent of the husk from the grains. • The invention has encouraged greater cultivation and use of fonio, helping bring it back into mainstream production.
Trademarks	Myanmar	Electronics	Electrical adaptors and other products (voltage transformers, uninterrupted power supplies, generators, inverters, battery chargers and television antennas) marketed under the Nibban brand name. Nibban Electric and Electronics have registered the Nibban and Paho Nibban brand names as trademarks with the IP Registration Office of Myanmar.	• The Nibban brand name is associated with quality and affordability and has helped build trust and confidence in the company's domestically produced products.
	Lao PDR	Beverages	Beerlao-branded beers with a unique taste created by an indigenous brewery company, Lao Brewery Co. Ltd (LBC). LBC has registered trademarks in Lao PDR since 1994 and currently produces and markets lager, light and dark beers under the Beerlao brand, one specially brewed beer under the LaneXang brand, a locally brewed Carlsberg and premium quality drinking water under the Tigerhead brand.	• Trademarks play an important role in LBC's marketing and sales processes. • The Beerlao brand has strengthened LBC's sales and consolidated its market share, which it claims spans 99 per cent of the national beer market in Lao PDR. • Beerlao has become one of the most successful export products from Lao PDR and is currently sold through distributors in more than 10 countries including China, Germany and Thailand.
	Nepal	Clothing	Himalayan Bio Trade Private Limited's (HBTL) use of flora and fauna from forests to produce sustainable fabrics and materials for manufacturing clothes and paper	• HBTL has sought to diversify and distinguish its brands in international markets and signal adherence to international standards in its production processes. • This has been backed by a strong marketing strategy that includes participation in well-known industry trade fairs and commercialisation partnerships with major manufacturers, including Aveda (a producer of skincare and hair products). • Aveda has trademarked brands for foot and hand creams that use external packaging made from paper supplied by HBTL. In turn, HBTL has benefited financially from the goodwill and product awareness achieved by Aveda's IP-protected assets.
	Uganda	Manufacturing	The Musana Cart for food vendors contains an in-built solar panel to power an eco-friendly stove and a small refrigerator. By eliminating the need to burn charcoal, it produces far less smoke than other food vendor carts, ensuring a cleaner and safer experience for both workers and customers. Other innovations include light bulbs to allow vendors to work at night, and phone chargers so they can offer mobile money services. Musana Carts Ltd has filed a trademark application in Uganda to protect the brand name.	• Musana Carts Ltd has open sourced its IP so that vendors across Africa can freely use, modify and share the innovation. • The company has also worked with the Kampala Capital City Authority to ensure the formal legal registration of Musana Carts, enabling vendors to formalise their businesses.

(Continued)

Form of IPR	Originating country	Sector	Innovation and IP protection	Successes
Trademarks	Mozambique	Textiles	Registration by Gringo Limited of the Gringo and GNG trademarks in Eswatini, India, Lesotho, Mozambique, Namibia, South Africa and Zambia to protect its business from usurpers and counterfeiters	• Gringo has successfully exploited IP systems in Mozambique and other countries to establish a strong brand identity. • By filing trademark applications through the Madrid System in Australia, Botswana, China, Democratic People's Republic of Korea, the European Trademark Office, Kenya, Republic of Korea, Singapore, the US and Vietnam, Gringo has managed to extend its brand recognition into new markets. • Gringo benefited from the WIPO LDC policy regarding international registration and paid only 10 per cent of the registration fees for the trademarks filed through the Madrid System.
	Ethiopia	Footwear	Use by the SoleRebels company, which successfully registered the SoleRebels trademark in the US in 2010 and the European Union in 2013, of traditional craftsmen and women to produce handmade footwear from local raw materials (cotton, leather) and recycled used materials (tires, rubber tubes)	• SoleRebels created a modern R&D production facility in Addis Ababa in 2012. • The company employs locals (mainly women) and has created over 600 jobs outside of Africa through its subsidiaries, notably in Japan.
	Ethiopia	Beverages	Ethiopia's filing of trademark registrations globally in the early 2000s to take control of its fine coffee brands. Using a trademark owners' power to restrain trade, Ethiopia licensed distributors across major markets.	• Trademark registration and licensing of fine coffee in export markets successfully increased the value of Ethiopia's coffee exports. • Once 25 coffee buying and importing companies had signed licences, the negotiating power tipped in Ethiopia's favour and the export price increased by 275 per cent, resulting in a more than US$100 million increase in export income, net of commodity price changes (Light Years IP, 2008).
Utility models	Ethiopia	Multiple	Utility model application submitted in 2022 for a method using ecohydrological green-(semi) grey infrastructure to restore degraded landscapes in both urban and rural settings as well as in water-limited and water-surplus ecosystems	• This innovative system has been applied to Hawassa and Chamo Rift Valley in Ethiopia.

Source: Authors compiled from Pengelly (2024) and UNCTAD (2023c).

protection in the mining sector globally has grown exponentially in the past decade. For example, the number of patent applications in the sector between 2014 and 2019 exceeded the number of applications accumulated over the 30-year period from 1970 to 2000, albeit with major disparities across regions of the world (Daly et al., 2019). The ability to register and enforce patents already owned by multinational mining enterprises can provide a critical link between mining activity, FDI and technological development in host countries.

In addition to patents, utility models are also used widely in the mining sector. Their use has increased significantly since 2004 and accounted for 42 per cent of all IPRs in the sector globally in 2015 (Daly et al., 2019). As with patents, there are, however, wide disparities in the use of utility models for mining across different regions globally.

Trademarks are also often deployed to protect products derived from mining and related brands. In Lao PDR, for instance, the Vientiane Steel Industry Co. Ltd registered its VSI acronym as a trademark nationally soon after the company was formed in 1994. The 'VSI' mark is embedded in every steel product the company produces. In addition, the roofing tiles the company produces bear the logo 'Lao Tile VTP Twin Elephants,' which is registered with the Lao Division of Intellectual Property. The VSI trademark has become a successful brand name in the domestic market in Lao PDR. VSI steel products are renowned for their quality and also more price-competitive than imported products.

Looking beyond LDCs, in Malaysia a wider array of IP protection has been used to spur the growth and development of Petroleum Nasional Berhad (PETRONAS), a major oil and gas conglomerate. The company has a separate IP division within its legal department, which aims to protect corporate interests against potential competitors as well as prevent IP infringement. PETRONAS also views IP as a potential revenue stream that can be leveraged by selling or licensing IP assets; and as a means to attract investment. It utilises a number of IP protections, registered both domestically and abroad. These include more than 200 trademarks spread over 65 countries, as well as 110 trademark applications registered domestically in 45 classes with the Malaysia Intellectual Property Office. The company has successfully protected its IP against infringements originating in the US and Switzerland through the use of arbitration and mediation services provided by the WIPO Arbitration and Mediation Center.

Aside from these successful firm-level examples, LDCs can also learn much from a policy perspective from the support provided through public–private partnerships (PPPs) aimed at enhancing innovation and technological capabilities among mining suppliers in Chile. In the late 2000s, the Chilean government launched a World Class Suppliers programme to promote the development of Knowledge-Intensive Mining Suppliers as innovative and technologically specialised firms working to develop solutions at the technological frontier of the mining sector. This led to a surge in the number of patent applications emanating from the sector (Stubrin, 2018; Iizuka et al., 2022). In addition, funding for innovation in the mining sector is provided through programmes administered by the Chilean economic development agency (CORFO). Beneficiaries of this funding are required to have IP management strategies, and to protect the available technologies using IP instruments. This approach was initiated in response to a perceived lack of awareness of IP protection mechanisms and concerns about their cost and complexity, which meant many technologies used in the mining sector in Chile were not protected by IPRs (Ortega and Elton, 2019).

The approach in Chile demonstrates the value of strengthening the domestic system that produces advanced knowledge for mining operations (Iizuka et al., 2022). This is critical to positioning mining as a driver of growth in LDCs and other developing countries. Moreover, the experience in Chile highlights the contribution that effectively administered funding through PPPs can make to providing technological solutions to pressing problems faced by mining companies.

3.2.2 Pharmaceuticals

As the pharmaceutical sector relies heavily on technology, it needs to be mentioned that technology transfer is ineffective in the absence of intra-industry productivity spillovers, support for R&D, and the capacity to absorb and utilise the technology (UNCTAD, 2014). Although technology transfer is heavily constrained in sectors with high value intellectual property, such as pharmaceuticals,

innovative policies could diminish the distortion caused by patent misuse and practices that impede trade (UNCTAD, 2018).

The shortcomings in capacity to produce pharmaceuticals and access associated technologies, and their consequences, were exposed during the COVID-19 pandemic, specifically in relation to the production of and access to vaccines in LDCs. After much debate and contention over proposals to waive IP protection for COVID-19 vaccines, the WTO eventually adopted a partial waiver of IPRs during its 12th Ministerial Conference in June 2022.[3] The WTO decision waived patent rights on vaccines and allowed the use of protected clinical trial data for regulatory approval of vaccines. Despite this, and a compulsory licensing provision to override IP during emergencies, most LDCs are still prevented from accessing COVID-19 vaccines, owing to their generally (i) limited access to other types of IP, such as trade secrets, (ii) underdeveloped manufacturing capacity and infrastructure deficiencies and (iii) weak purchasing capacity.

Bangladesh, which has developed strong domestic pharmaceutical manufacturing capabilities,[4] is a notable exception. In stark contrast with other LDCs, Bangladesh meets nearly 98 per cent of its domestic demand for pharmaceutical products via local production, with a market size of approximately US$3 billion. Bangladesh is also a major exporter of pharmaceuticals. In the 2020/21 fiscal year, Bangladesh exported pharmaceutical products to approximately 150 countries, generating $169 million in export revenue (US International Trade Administration, 2022). According to the Bangladesh Association of Pharmaceutical Industries, more than 1,200 pharmaceutical products have been registered for export in Bangladesh in the past two years.[5]

The flexibilities that Bangladesh enjoys as a LDC have contributed to the success of its domestic pharmaceutical industry and the growth in its pharmaceutical exports. A special transition period for pharmaceuticals under the TRIPS Waiver (currently running until 1 January 2033), which exempts LDCs from protecting patents and undisclosed information for pharmaceutical products (see Box 1), means Bangladesh can produce generic versions of patented pharmaceuticals. Manufacturers in the country mostly produce (off-patent) generic drugs (about 80 per cent) and a portion of on-patent medicines (but patented elsewhere), mostly in the form of over-the-counter products (Begum, 2022). The TRIPS flexibilities enable Bangladesh to serve the pharmaceutical needs of poorer countries with no or limited manufacturing capacity by supplying cheap generic versions of patented drugs (St Martin, 2006). The majority of the country's pharmaceutical exports (around 60 per cent) are directed to developing (and less regulated) markets in Africa and Asia, including Afghanistan, Kenya, Myanmar, Philippines, Sri Lanka and Vietnam.

The special transition period provided under the TRIPS Waiver has helped keep medicine prices in Bangladesh among the lowest in the world. It has enabled domestic pharmaceutical companies in Bangladesh to produce highly competitive generic drugs without having to pay royalties to innovators for producing patented medicines. Pharmaceutical patents (both product and process) are prohibited in Bangladesh until the expiration of the pharmaceutical patent waivers under the TRIPS Agreement. This prohibition, coupled with the introduction of restrictions on the import and production of locally produced drugs by multinational corporations, has played a key role in promoting domestic production.

However, Bangladesh will lose some of these advantages when it graduates from the LDC category, upon which it will be required to fully adopt all provisions in the TRIPS Agreement for pharmaceuticals. To comply with these provisions upon graduation, Bangladesh will be required to introduce patents for pharmaceuticals (Azam, 2017). It will also need to extend the duration of patent protection in the country. At present, Bangladesh's patent law provides protection for only 16 years; this will need to be extended to 20 years to be TRIPS-compliant (ibid.). The changes

3 As of May 2023, the COVID-19 Vaccine Patent Waiver is no longer applicable as the World Health Organization no longer considers COVID-19 to be a public health emergency of international concern, the highest level of alarm that mandates countries to act under international health regulations.

4 The domestic pharmaceutical industry in Bangladesh is highly competitive and characterised by low levels of market concentration, with more than 300 small, medium and large enterprises producing pharmaceuticals, although the top 10 producers make up approximately two-thirds of the market (US International Trade Administration, 2022).

5 https://bida.gov.bd/pharma-api#section1

to existing pharmaceutical regulations and patent law may have negative effects on the pricing of medicines in the country.

3.2.3 Tourism

Tourism can be a major driver of development and structural economic transformation in LDCs, especially in rural areas. The development of the sector can create employment; generate complementary sources of income; build human resources; enable economic empowerment and integration of excluded, vulnerable or marginalised groups; provide much-needed infrastructure upgrades; and support other activities and industries via backward and forward linkages along tourism supply chains (UNWTO, 2023).

There is great scope for various forms of IPRs to support tourism development by helping promote and protect tourism brands and assets in specific locations. For example, certification marks can be used to distinguish quality services, unique tangible and intangible aspects of tourism experiences and exceptional cultural and social heritage, often derived from the traditional knowledge and culture of a particular tourism destination. They may also provide a competitive edge and strengthen a destination's reputation in a specific tourism market segment (WIPO and UNWTO, 2021).

Trademarks have been used to good effect for these purposes, including in industries with forward linkages to the tourism sector. For example, Malée Cosmetics Pty Ltd, a manufacturer and retailer of premium cosmetics products for the hospitality industry in South Africa, registered a trademark for Malée Cosmetics in 2009 via the Companies and Intellectual Property Commission, South Africa's IP office. This IP protection has helped distinguish Malée's brand in the skincare and hospitality industries' niche eco-luxury market, and provides a secure base from which to explore opportunities for future expansion.

Similarly, BioBhutan, a privately owned enterprise specialising in organic and natural products, has targeted a niche market for nature-oriented goods and eco-conscious consumers. Its products include natural handmade bar soaps, essential oils, herbal teas, spices and honey. These are sold domestically (primarily in high-end handicraft shops, supermarkets and hotels, which cater mostly to tourists and expatriates) and exported, mostly to Germany. The company has registered the BioBhutan logo, as well as a trademark logo developed specifically for the Japanese market, at the Department of Intellectual Property in Bhutan.

In Cambodia, Promoting Education, Empowering Youth (PEPY), formally known as 'Protect the Earth. Protect Yourself.' was established as a non-governmental organisation (NGO) in 2005 to improve access to education and other community services and to help people become more self-reliant. The organisation's tour company, PEPY Tours, offers educational trips, including visits to NGOs, and opportunities for debate and discussion on issues relating to international development. PEPY Tours' cycling and tour guide services cater to foreign tourists and aim to expose them to local culture, while also offering opportunities to participate in community development projects. In 2008, the NGO registered PEPY as a trademark and word via the United States Patent and Trademark Office (USPTO). In addition, PEPY registered the phrase 'Adventurous Living. Responsible Giving.' as a trademark via the USPTO. The use of trademarked branding allowed PEPY and PEPY Tours to gain important exposure and visibility in the niche market for educational and experiential community-based tourism.

Collective marks, a form of trademark owned and used by members of a collective entity or a community, have also been used to develop the tourism sector. They help stimulate collaboration by providing incentives for local firms to improve the quality of collective goods and services, promote shared cultural heritage and enhance their marketing capabilities. They can also help generate positive clustering effects by encouraging firms to locate themselves within local tourist cultural districts where they are protected against unfair competition and imitation and enjoy reputational benefits (Ghafele, 2008).

Lastly, GIs can play an integral role in promoting tourism in rural and remote areas. For example, the registration of Kampot pepper as a GI in Cambodia (see Table 3.1) has led to significant growth in the number of farms producing this pepper, and the farms have become key destinations for tourists visiting the country (UNWTO and WIPO, 2021).

3.2.4 Financial sector

While levels of financial sector development in LDCs typically lag behind those of developed countries, they are improving over time. These

improvements have been driven, in part, by the spread of financial technology (Fintech) in LDCs. However, Fintech generally remains underdeveloped in these countries and has yet to reach the stage at which it can be leveraged effectively to support the financing of value-added productive activities. Mobile money, the most commonly used financial technology in Africa and in African LDCs, is being utilised only to advance short-term microloans (UNCTAD, 2022b). Typically, the Fintech industry in LDCs is dominated by payments and remittances, marketplace lending and wealth technology.

As the technologies used in the financial sector evolve, so does the use of IPRs in the sector. This is evident from the rapid evolution in patenting of payment processing systems. These are increasingly reliant on new and innovative digital infrastructure and technologies, and the licensing of technology and software to run the associated payment platforms represents an important component of the overall business of payment processing enterprises. There appears to be considerable scope to enhance IP protection for payment processing systems and platforms in LDCs, particularly in Africa, where e-payments and mobile payment systems are expanding rapidly. According to McKinsey (2022), annual revenues in Africa's domestic e-payments market are expected to grow by approximately 20 per cent, reaching around US$40 billion by 2025.

More generally, the use of IPRs in innovative financial industries needs to be evaluated on a case-by-case basis. In some countries, notably those with high technological potential, there are likely to be opportunities to protect new developments using IPRs, for both defensive and offensive purposes. In contrast, less technologically advanced countries may wish to rely on open-source technology to spur domestic innovation in the financial sector.

3.3 Sequencing the development of IPR regimes in LDCs

LDCs need to develop their IP regimes strategically and selectively in a manner consistent with their socio-economic development objectives, as opposed to simply strengthening IP protection across the board or focusing only on compliance with obligations under global trade rules. This requires attention to the sequencing of reforms with their national IP systems as well as improvements to their institutional capacity for IP administration, enforcement and regulation.

Policy-makers in LDCs also face the challenging task of needing to strike an appropriate balance between weaker and more stringent IP protection, while considering their inherent trade-offs in relation to wider national policy objectives. Weak systems of IP protection could reduce incentives for innovation and deter businesses from investing in R&D. However, they may also enhance access to the information and technology necessary for economic growth (Jain, 1996). In contrast, very stringent and overly protective IP regimes may hinder the equitable distribution of social gains from innovation and invention by lowering incentives to disseminate their benefits. Striking the right balance between the interests of innovators and the wider public is thus essential to ensure IP systems in LDCs encourage both innovation and economic development (WIPO, 2004).

To do so, individual LDCs need to tailor their national IP systems (and the strength of IP protection they afford) to suit their own context and development goals, rather than seeking simply to mirror the regimes, systems, requirements and standards regarded as appropriate for more advanced industrialised economies. This requires consideration of their stage of economic development, economic structure, export basket, levels of science and education and strength of R&D institutions. These national factors have a strong bearing on the extent to which IP protection can promote innovation, technology diffusion and the development of domestic scientific and technological capability (Commission on Intellectual Property Rights, 2002).

Such an exercise may require prioritising specific forms of IP and associated IPR systems over others. Factors such as technological capability, competitive strength and the level of priority accorded to innovation can all influence decisions regarding the kind of IPRs to adopt (Basheer and Primi, 2014). In LDCs, where patent activity and formal industrial property registrations tend to be low, there is a case to be made for focusing less on building up patent systems and placing more emphasis on strengthening other forms of IP protection such as trademarks, GIs and copyrights. It is likely to be more feasible for LDCs, given their current technological and innovative

capabilities, productive capacity and economic structures, to leverage these types of IPRs for developmental gains. For example, for those LDCs that rely heavily on primary commodities and agrarian activities as factor-driven economies (Box 2), the use of trademarks or GIs may present significant opportunities to capture more value from their exports. In contrast, for most LDCs, focusing on strengthening patent protection to encourage high-tech manufacturing or the production of pharmaceuticals and electronics is likely to be less impactful given their stage of economic development.

It is also important to be realistic about the depth and breadth of IP regimes and systems that can be implemented in LDCs, considering their financial and other domestic resource constraints. These constraints make it difficult to invest significantly in building capacity and institutions to administer or enforce IPRs or to develop extensive national IP regimes when there are multiple competing priorities for public spending. The level of expenditure required may also be difficult to justify when there is very limited uptake of IPRs by domestic firms and residents, as is the case in many LDCs.

These constraints mean trade-offs are inevitable, with LDCs needing to prioritise specific elements when upgrading their national IP systems. Many have strategic interests in focusing their efforts on upgrading national systems for administration and enforcement of some key IPRs, including trademarks, industrial designs, utility models and GIs. These types of IPRs present opportunities for firms in LDCs, including SMEs, to capture more value from their brands in domestic and export markets. Moreover, volumes of applications for protection for these forms of IP can be substantial even in LDCs, as is evident in some countries (see Annex 1). Hence, with appropriate governance of IP administration authorities, there is genuine potential for revenues from the administration of these systems to also be used to sustain and expand national innovation systems for the future.

Moreover, strategic IPRs may provide one of the most promising avenues in the short to medium term to stimulate innovation in LDCs. The protection they afford can incentivise local firms, inventors and artists in LDCs to invest in R&D or new creations and commit time and resources to developing innovative new products and processes, thereby providing a springboard for further innovation. The IPRs represent significant assets for firms, which can be licensed or franchised to other businesses, facilitating knowledge exchange and creating opportunities to share resources and technologies.

Box 2: Stages of economic development — where do LDCs fit in?

The World Economic Forum (WEF) has identified three main stages of economic development at the country level. In the first, factor-driven stage, a country is primarily endowed with unskilled labour and natural resources and competes with other countries based on these factor endowments.

As it develops and becomes more competitive, productivity increases and wages rise, and the country moves into the second, efficiency-driven stage of development. During this stage, it must develop more-efficient production processes and higher product quality to remain competitive.

Finally, as the country moves into the third, innovation-driven stage, its businesses need to develop sophisticated production processes and technological innovations in order to compete and to sustain high wages and associated living standards.

This concept of stages of economic development underpins the WEF's Global Competitiveness Index (GCI), which ranks countries in accordance with the micro- and macro-economic foundations (institutions, policies and factors) that shape their national competitiveness and, ultimately, determine their level of productivity. The 2017–2018 iteration of the GCI included 137 countries, of which 26 were LDCs. Among these, 25 of the 26 LDCs fell within the first stage of economic development (as factor-driven economies) and only one (Bhutan) was classified as being in transition to stage 2 (efficiency-driven).

Source: Authors drawing on WEF (2017).

3.4 IP and innovation in the informal economy in LDCs

Large shares of entrepreneurial activity and innovation in LDCs take place in informal settings, both in the sectors discussed in Sections 3.1 and 3.2 and elsewhere. Although the precise extent of informal activity in LDCs is difficult to measure, informal enterprises are conservatively estimated to contribute around 35 per cent to gross domestic product (UNCTAD, 2018). They range from street vending and informal garment businesses to home-based micro firms, manufacturing entities and informal service suppliers (de Beer et al., 2013).

Given the high levels of informality present in LDCs, innovation is mostly linked to survival and scarcity and is likely to take place primarily outside of the standard market-based economy. In such settings, innovations are mostly motivated by domestic needs and are incremental in nature. The systems that underpin them tend to be driven by 'collective learning experiences' made possible by low entry barriers and free flows of knowledge (Charmes et al., 2018). While information diffuses freely in these settings, particularly within clusters and communities, businesses, entrepreneurs and innovators do not have the capital, skills and resources needed to invest in technology and skills development (de Beer et al., 2013). Instead, informal firms tend to be concerned more with producing new products than with utilising technology, given the promise of an immediate return.

In these informal contexts, where there tend to be a lack of knowledge and skills, poor infrastructure, limited access to information and financing, high levels of risk and the absence of enforceability mechanisms, formal IPR protections (which often come with high costs) are generally not appropriate. Even utility models, industrial designs and trademarks, which tend to be less costly to obtain and administer, require sufficient levels of knowledge and the ability to clearly identify the owner of a specific idea, both of which are often absent in informal settings. As a result, the use of formal IP in the informal economy is limited and, in some cases, non-existent (Charmes et al., 2018).

Instead, more flexible legal mechanisms and less formal IP protections, such as trade secrets, are likely to provide simpler, easier and cheaper alternatives for securing informal sector innovations in LDCs. In the services sector, for instance, secrecy, restricted access to key information and technical protection of information through coding or a fragmented division of tasks may help protect valuable information and knowledge. These sorts of alternative protection mechanisms (which are often embedded in the normal working practices of firms) can protect SMEs against internal risks (e.g., the departure of valuable staff) or external risks (e.g., unfair exploitation of new ideas by other firms) and can be complementary to formal IPRs. They may also be applied by MSMEs and other firms operating in the formal sector.

These less formal IP protection mechanisms tend to fall into three categories — business culture, information security and human resource management— and can be segmented further on the basis of their degree of legal formality (Figure 3.1). For example, loyalty-building strategies (financial incentives, training and the like) provide an informal method of IP protection by helping retain (employees') knowledge. In turn, semi-formal approaches to IP management, such as the publication of a new idea, can prevent others from claiming a patent in the same area. This can be particularly effective in informal service sectors, where copying is widespread.

Informal IP norms can also be devised to protect informal economy innovations (Basheer, 2010). They may include lower costs for acquiring and enforcing rights, limited or no registration requirements, reduced barriers to licensing, a lower registration threshold for utility models or a weaker set of rights.

Figure 3.1: Alternative IP policies and their relevance for LDCs

"Semi-formal" protection methods

Business culture	Information security	Human resource management
• Secrecy • Restricted access to information	• Publishing • Database and network protection • Technical protection	• Trade organisation membership

Informal protection methods

Business culture	Information security	Human resource management
• Effective sharing of information • Fast innovation cycle • Customer relationship management	• Complex product design • Productised service package	• Division of duties • Circulation of staff between tasks • Cultivating commitment and loyalty

Source: UNCTAD based on Päällysaho and Kuusisto (2011).

4. Conclusion and Recommendations

In the face of persistent structural impediments, it is essential for LDCs to transform their economies if they are to achieve inclusive and sustainable development. This entails shifting away from their recurring dependence on the production and export of primary commodities and mining and towards the processing of higher-value-added and more sophisticated products and services, in the process boosting their domestic productive capacities to create more dynamic, diverse and competitive economies.

The need to accelerate structural economic transformation has long been recognised as a key priority for LDC development. It is a central element of the 2030 Agenda for Sustainable Development and key to achieving many of the SDGs, particularly SDG 8, to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all. It has also been prioritised in successive decade-long programmes of action for LDCs spearheaded by the UN. The DPoA, running from 2022 to 2031, lists supporting structural transformation as a driver of prosperity among six core priorities for LDC development.

The world's 46 LDCs need to substantially enhance their productive capacities to generate these much-needed structural transformations. Greater productive capacity is key to diversifying their economies, upgrading production and export capabilities; building resilience to external shocks; and, ultimately, achieving the SDGs.

Innovation and technological advances can, and should, play key roles in a holistic approach to building productive capacity in LDCs. Their importance is only expanding amid rapid digitalisation and the emergence of frontier technologies that are fundamentally altering the dynamics of production, trade and development across the world.

This report has argued that LDCs should consider protecting and encouraging their innovations as part of a wider development strategy that helps them build stronger productive capacities.

Further, it has shown, conceptually and via practical examples, where and how IP protection (if used strategically and in accordance with local needs and prevailing economic circumstances) may help encourage innovation in LDCs.

Drawing on these insights, LDCs and their development partners should give priority to the following five overarching considerations when looking to unlock IP-related benefits in support of innovation, inclusive growth and structural transformation.

4.1 Mainstreaming strategic IP protection

There is significant unfulfilled potential to mainstream strategic IP protection as a core part of wider efforts to promote innovation and enhance technological capabilities and productive capacities in LDCs. A nuanced and multi-pronged approach to the development of national IP systems and the use of different forms of IPRs will likely yield the greatest dividends. This should be guided by the actual level of development and need for technological change in individual LDCs, and take cognisance of their capacity for technological absorption, prevailing levels of productive capacity, competitive strength and innovation potential.

As this report has shown, patents are not the only available option to protect and encourage innovation in LDCs. Utility models, copyrights, trademarks, industrial designs and GIs may be more appropriate tools for IP protection in specific settings within LDCs, particularly where there is limited domestic capacity to innovate, and where R&D systems remain nascent and constrained by their own structural and financial hurdles.

4.2 Gearing national IP systems and related frameworks to support innovation

Whichever forms of IPRs are prioritised, they need to be situated within an appropriate national IP system geared towards supporting innovation.

Developing IP protection and related legal frameworks in LDCs should not be viewed as an afterthought. This is true at the country level and, where relevant, should be considered as a priority for regional economic groupings and sub-regional bodies as well. For firms, IP protection should be prioritised in a context of stronger risk management, as well as part of marketing, outreach and investment efforts, specifically for those seeking to protect their innovations and attract new investments and partnerships. To ensure this, there is a clear need to enhance awareness of IP laws nationally and increase understanding of the implications presented by the membership of LDCs in international IP treaties and conventions.

National IP systems within LDCs should also be formulated to make full use of the flexibilities available to them within international IP rules. These include a range of legislative flexibilities, such as exceptions to patentability for pharmaceuticals, compulsory licensing and parallel importing; or fair-use provisions and exceptions for schools, universities, media organisations and research in the case of copyrights. The effective use of these flexibilities can help LDCs protect IP as a means to encourage innovation and investment in R&D as well as new technologies. It would also facilitate the exchange of knowledge, resources and technologies, thereby encouraging partnerships and collaboration, and ensuring an equitable distribution of the social gains from innovation. Practical technical assistance and capacity-building support for LDC governments can help them evaluate the advantages and disadvantages of various flexibilities and devise appropriate ways to capitalise on them before they graduate out of the LDC category.

At the same time, LDCs need to build capacity not only to design and administer effective IP systems suited to their local needs and circumstances but also to enforce IP protections as part of a credible IP regime. For African LDCs, the African Continental Free Trade Area presents an opportunity to strengthen enforcement mechanisms, as well as to improve co-ordination on IPR issues among the continent's various regional economic communities.

4.3 Scaling up technology transfers to LDCs

For these IP systems to be most effective in helping stimulate innovation and structural transformation, they need to be complemented by initiatives to boost technology transfers to LDCs. There remains significant scope for developed countries and international organisations to scale up the delivery of technology transfer and technical assistance for LDCs to upgrade their national IP and innovation systems in line with obligations in the TRIPS Agreement (Articles 66.2 and 67) and with commitments made through the DPoA.

There is also scope to strengthen the breadth and reach of the United Nations Technology Bank for LDCs to support access to technologies, including by facilitating technology transfer and assisting LDCs to adopt and adapt new technologies for local settings (Commonwealth Secretariat, 2022). Collaborations between universities, research centres and domestic and multinational companies should also be encouraged to facilitate technology transfers to LDCs. Moreover, public–private programmes, such as innovation funds co-sponsored by national governments, can provide much-needed seed money to fund technological discoveries and innovations.

4.4 Accounting for innovation in the informal economy

While these types of measures may be well suited to protecting IP and promoting innovation in the formal economy, in LDCs it also needs to be recognised that a considerable share of innovation takes place in informal settings. In these contexts, formal IPR protections are not appropriate because of their high costs, as well as the lack of knowledge and skills, weak infrastructure, limited access to information and financing, high levels of risk and absence of enforceability mechanisms that tend to be characteristic of informal settings.

Unfortunately, most innovation policy frameworks do not currently include targeted policies for the informal economy, as the latter is all too often not perceived as a source of innovation. For some LDCs, it may be necessary to consider alternative protection mechanisms and create and implement a set of 'IPR-like' policies that are better suited to informal settings. These could include lower costs for acquiring and enforcing rights, limited or

no registration requirements, reduced barriers to licensing, a lower registration threshold for utility models and a weaker set of rights.

4.5 Including innovation policies as part of LDC graduation strategies

On top of these considerations, it is important to stress that graduating LDCs are likely to encounter additional layers of complexity when looking to craft appropriate IP systems and regimes to support innovation and development, at least within the context of the formal economy. Policy-makers in soon-to-be graduating LDCs will need to pay close attention to the consequences of graduation from an IP perspective. Currently, the architecture of global IP rules provides significant policy space and flexibility for LDCs to tailor their national IP systems to suit their national contexts. However, once graduated, countries that are members of the WTO[6] will have to comply with the requirements and minimum standards of the WTO TRIPS Agreement. It is therefore of paramount importance that issues related to IPRs are duly accounted for in a comprehensive approach to graduation that would enable them to achieve *graduation with momentum* (UNCTAD, 2021).

In addition to the potential economic consequences of losing access to TRIPS flexibilities,[7] the obligation to comply with TRIPS requirements is likely to create considerable challenges for many graduating LDCs, where institutional capacity is limited and national IP regimes and associated administrative, judicial and enforcement systems are often outdated or underdeveloped. They are thus likely to need to undertake significant investments, training and long-term reforms to modernise their national IP regimes.[8]

Given these challenges, there is a strong case for giving greater consideration to national capacities for production, science, technology and innovation when assessing LDCs' readiness to graduate. One practical way to incorporate these considerations would be for the United Nations Economic and Social Council to include an *additional* indicator on technological and innovation capability (such as WIPO's GII[9]) in its assessment criteria for determining a country's eligibility for graduation. The GII currently covers 132 countries, including 21 LDCs, but remains unavailable for others. The country coverage of the Index would need to be expanded to all LDCs – overcoming existing data collection problems – if it were to serve as a viable indicator to consider when determining eligibility for graduation.

6 LDCs that are not members of the WTO will continue to fall outside of the obligations of the TRIPS Agreement upon graduation and will only potentially be affected if they are in the process of WTO accession or commence an accession process soon after graduation.

7 For example, the end of exemptions for patents on pharmaceutical products is likely to reduce access to medicines and raise their cost. Bangladesh, which has a well-developed pharmaceuticals industry (see Section 3.2.2), will be especially affected, along with the many LDCs who import medicines from Bangladesh. LDCs that graduate may also have reduced access to technology transfers from developed countries, as their new development status will potentially lower the incentives for these countries to transfer technologies as called for in Article 66.2 of the TRIPS Agreement.

8 The proposals made by the LDC Group at the WTO to support the smooth transition process for graduating LDCs, which include a call to extend the transition period during which LDCs are exempt from implementing most provisions of the TRIPS Agreement for a defined period of time after graduation or until the end of the final extension period granted to LDCs (currently 1 July 2034), are intended to help cushion some of the immediate impacts. At the time of writing, negotiations relating to this proposal continue at the WTO and have not reached a definitive conclusion.

9 The Index comprises input indicators on institutions, human capital and research, infrastructure, market sophistication and business sophistication; as well as output indicators on knowledge, technology and creative outputs.

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Annex 1

Summary of key indicators and recent applications for IP protection in LDCs, by filing office (2017–2021)

Economy	PCI 2022	FTRI 2022	GII 2023	Applications for IP protection in LDCs, 2017–2021 (by filing office)												
				Patents			Utility models			Trademarks			Industrial designs			GIs
	Score		Rank	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	
Afghanistan*	25.8	0.08	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Angola*	29.2	0.26	132	80.2	n.a.	n.a.	2.2	0.0	2.2	3,988.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
								0.0%	100.0%							
Bangladesh	40.7	0.28	105	386.4	324.0	62.4	n.a.	n.a.	n.a.	13,364.6	4,192.0	9,172.6	1,596.8	103.2	1,493.6	15.0
					83.9%	16.1%					31.4%	68.6%		6.5%	93.5%	
Benin*	27.6	0.19	120	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**
Bhutan	46.7	0.32	n.a.	8.8	8.4	0.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5.2	2.4	2.8	11.0
					95.5%	4.5%								46.2%	53.8%	
Burkina Faso*	23.9	0.21	124	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Burundi*	24.8	0.12	130	7.8	6.4	1.4	0.6	0.0	0.6	274.8	242.0	32.8	1.8	1.4	0.4	n.a.
					82.1%	17.9%		0.0%	100.0%		88.1%	11.9%		77.8%	22.2%	
Cambodia	35.9	0.34	101	154.8	154.6	0.2	5.0	5.0	0.0	6,760.4	n.a.	n.a.	n.a.	n.a.	n.a.	18.0
					99.9%	0.1%		100.0%	0.0%							
Central African Republic*	24.5	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**
Chad*	19.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**
Comoros	37.0	0.14	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**

(Continued)

Economy	PCI 2022	FTRI 2022	GII 2023	Applications for IP protection in LDCs, 2017–2021 (by filing office)												
				Patents			Utility models			Trademarks			Industrial designs			GIs
	Score		Rank	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	
Democratic Republic of Congo*	21.8	0.09	n.a.	93	61.4	31.6	n.a.	n.a.	n.a.	277.0	93.2	183.8	n.a.	n.a.	n.a.	n.a.
					66.0%	34.0%					33.6%	66.4%				
Djibouti	43.1	0.17	n.a.	3.6	3.0	0.6	n.a.	n.a.	n.a.	138.8	125.4	13.4	1.4	1.2	0.2	n.a.
					83.3%	16.7%					90.3%	9.7%		85.7%	14.3%	
Eritrea*	24.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Ethiopia*	30.5	0.15	125	35.0	28.4	6.6	216.4	1.2	215.2	2,340.4	963.2	1,377.2	n.a.	n.a.	n.a.	11.0
					81.1%	18.9%		0.6%	99.4%		41.2%	58.8%				
The Gambia*	33.9	0.09	n.a.	35.4	35.4	0.0	0.8	0.0	0.8	1,033.4	945.4	88.0	2.2	2.2	0.0	n.a.
					100.0%	0.0%					91.5%	8.5%		100.0%	0.0%	
Guinea*	31.8	0.14	128	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**
Guinea-Bissau*	24.8	0.04	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**
Haiti	25.2	0.15	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Kiribati*	44.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Lao PDR*	36.0	0.25	110	31.8	31.0	0.8	4.6	4.4	0.2	1,689.0	1,502.0	187.0	7.2	7.2	0.0	13.0
					97.5%	2.5%		95.7%	4.3%		88.9%	11.1%		100.0%	0.0%	
Lesotho	41.1	0.31	n.a.	1.0	0.0	1.0	n.a.	n.a.	n.a.	640.4	607.4	33.0	n.a.	n.a.	n.a.	n.a.
					0.0%	100.0%					94.8%	5.2%				
Liberia*	31.3	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Madagascar*	29.0	0.18	107	36.4	30.4	6.0	n.a.	n.a.	n.a.	2,096.8	1,263.6	833.2	270.4	9.4	261.0	n.a.
					83.5%	16.5%					60.3%	39.7%		3.5%	96.5%	
Malawi*	18.7	0.2	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Mali*	21.7	0.19	129	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	7.0
Mauritania*	36.6	0.16	127	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**
Mozambique*	29.5	0.16	126	46.0	18.6	27.4	12.8	10.2	2.6	3,520.6	2,043.2	1,477.4	73.8	43.8	30.0	9.0
					40.4%	59.6%		79.7%	20.3%		58.0%	42.0%		59.3%	40.7%	

(Continued)

Economy	PCI 2022	FTRI 2022	GII 2023	Applications for IP protection in LDCs, 2017–2021 (by filing office)												
				Patents			Utility models			Trademarks			Industrial designs			GIs
	Score		Rank	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	
Myanmar	31.8	0.26	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Nepal	40.4	0.35	108	12.6	8.6	4.0	n.a.	n.a.	n.a.	1,136.4	335.4	801.0	8.0	5.0	3.0	n.a.
					68.3%	31.7%					29.5%	70.5%		62.5%	37.5%	
Niger*	16.9	n.a.	131	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**
Rwanda*	37.1	0.22	103	5.8	1.0	4.8	7.8	1.6	6.2	1,638.0	1,288.6	349.4	34.2	29.0	5.2	n.a.
					17.2%	82.8%		20.5%	79.5%		78.7%	21.3%		84.8%	15.2%	
São Tomé & Príncipe	43.1	0.23	n.a.	5.6	5.6	0.0	1.2	1.2	0.0	666.0	654.6	11.4	24.0	24.0	0.0	n.a.
					100.0%	0.0%		100.0%	0.0%		98.3%	1.7%		100.0%	0.0%	
Senegal*	38.7	0.27	93	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	6.0**
Sierra Leone*	20.1	0.09	n.a.	21.8	21.8	0.0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	2.8	1.0	1.8	n.a.
					100.0%	0.0%								35.7%	64.3%	
Solomon Islands*	38.2	0.16	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Somalia*	21.9	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	31.6	28.0	3.6	n.a.	n.a.	n.a.	n.a.
											88.6%	11.4%				
South Sudan*	23.3	0.00	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Sudan*	25.8	0.08	n.a.	215.6	11.4	204.2	n.a.	n.a.	n.a.	2,755.0	1,475.2	1,279.8	197.8	24.4	173.4	n.a.
					5.3%	94.7%					53.5%	46.5%		12.3%	87.7%	
Timor-Leste	47.6	0.27	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Togo	36.4	0.19	114	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Tuvalu	54.1	n.a.	n.a.	7.6	7.6	0.0	n.a.	n.a.	n.a.	41.4	41.4	0.0	n.a.	n.a.	n.a.	n.a.
					100.0%	0.0%					100.0%	0.0%				
Uganda*	21.4	0.22	121	18.0	3.6	14.4	16.0	0.0	16.0	3,263.4	1,623.8	1,639.6	80.0	1.4	78.6	n.a.
								0.0%	100.0%		49.8%	50.2%		1.8%	98.3%	
United Republic of Tanzania*	31.9	0.27	113	50.2	n.a.	n.a.	1.0	0.0	1.0	2,826.4	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(Continued)

Economy	PCI 2022	FTRI 2022	GII 2023	Applications for IP protection in LDCs, 2017–2021 (by filing office)												
				Patents			Utility models			Trademarks			Industrial designs			GIs
	Score		Rank	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	Avg. no. of filings	Avg. no. of non-resident (share of total)	Avg. no. of resident (share of total)	
								0.0%	100.0%							
Yemen*	23.6	0.1	n.a.	42.6	11.6	31.0	n.a.	n.a.	n.a.	5,772.8	1,664.4	4,108.4	47.8	3.2	44.6	n.a.
					27.2%	72.8%					28.8%	71.2%		6.7%	93.3%	
Zambia*	32.2	0.18	118	24.4	13.4	11.0	n.a.	n.a.	n.a.	3,237.8	1,953.6	1,284.2	59.4	0.0	59.4	n.a.
					54.9%	45.1%					60.3%	39.7%		0.0%	100.0%	
LDC avg.	30.9	0.19	n.a.	55.2	36.7	18.0	24.4	2.1	22.3	2,197.0	1,112.7	1,084.3	115.0	12.3	102.7	n.a.
					66.5%	32.7%		8.8%	91.2%		50.6%	49.4%		10.7%	89.3%	
Global avg.	46.8	0.50	-	20,226.2	5,925.0	16,036.0	29,681.2	271.4	30,567.9	26,034.0	7,156.4	19,381.1	7,413.5	890.2	6,892.5	5,302.7
Developing country avg. (excl. LDCs)	46.8	0.47	-	20,112.9	3,646.7	16,460.7	51,718.7	250.0	51,517.7	24,788.5	6,237.9	19,019.2	11,014.7	707.2	10,819.8	1,892.2
Developing country avg. (excl. China and LDCs)	45.8	0.46	-	2,564.2	1,730.7	827.9	393.9	29.0	371.0	24,765.5	5,948.6	19,296.9	1,232.5	409.6	904.4	1,426.9

Notes: Data not available in the source databases marked as 'n.a.'.
Data for PCI (Productive Capacities Index) represents the 2022 values for the overall composite index.
Data for FTRI (Frontier Technology Readiness Index) represents values for the 2022 overall index.
Data for GII (Global Innovation Index) represents the overall 2023 rank.
* Denotes commodity dependence according to UNCTAD (2023b). A country is considered to be commodity export-dependent when more than 60 per cent of its total merchandise exports are composed of commodities.
** OAPI.
Average values for applications for IP protection are calculated as the simple average (arithmetic mean) of the filings over the time period 2011–2021. Foreign filings include those made to regional IP offices.
Data for GIs represents the total number of GIs in force by product category in the country filing office. It covers the period 2018-2021 only, based on data availability.
Developing countries defined as per the UN list for 2023.
Source: UNCTADStat (2023); UNCTAD (2023a); WIPO (2022); WIPO statistics database (2023). LDC, global and developing country averages are authors' calculations.

Annex 2

LDC membership in international IP conventions and regional and global IP systems and organisations

			Membership in international IP conventions							Membership in global IP systems and organisations					Membership in regional IP organisations		
Country	Graduation date	WTO member	Berne	Paris	Rome	Beijing	Brussels	UPOV	WCT	WIPO	PCT	Madrid	Hague	Lisbon	ARIPO	OAPI	EPO+
Afghanistan		x	x	x					x	x		x					
Angola	2024	x		x		x				x	x						
Bangladesh	2026	x	x	x						x							
Benin		x	x	x			x		x	x	x		x			x	
Bhutan	2023	In accession	x	x						x		x					
Burkina Faso		x	x	x	x	x			x	x	x			x		x	
Burundi		x	x	x		x			x	x							
Cambodia		x	x	x	x	x				x	x	x	x	x			x
Central African Republic		x	x	x		x				x	x					x	
Chad		x	x	x		x				x	x					x	
Comoros	Not yet scheduled	In accession	x	x		x			x	x	x	x				x	
Democratic Republic of Congo		x	x	x						x							
Djibouti	Not yet scheduled	x	x	x		x				x	x						
Eritrea										x							
Ethiopia										x							
The Gambia		x	x	x						x	x	x			x		
Guinea		x	x	x		x			x	x	x					x	
Guinea-Bissau		x	x	x						x	x					x	
Haiti		x	x	x		x				x				x			
Kiribati	Not yet scheduled		x	x		x			x	x							
Lao PDR	2026	x	x	x						x	x	x		x			

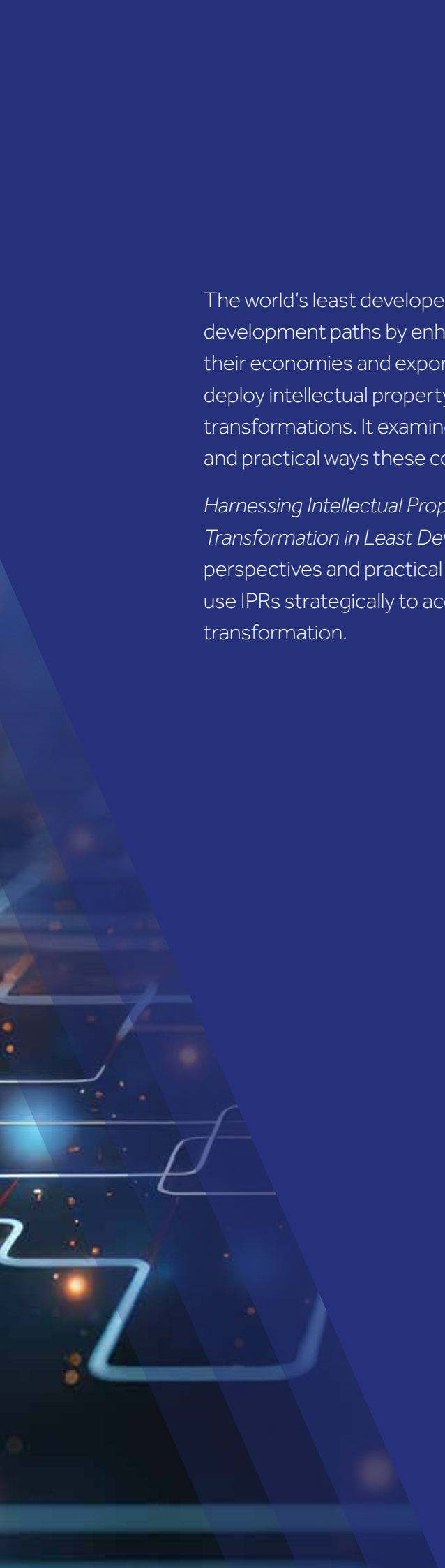
(Continued)

			Membership in international IP conventions							Membership in global IP systems and organisations					Membership in regional IP organisations		
Country	Graduation date	WTO member	Berne	Paris	Rome	Beijing	Brussels	UPOV	WCT	WIPO	PCT	Madrid	Hague	Lisbon	ARIPO	OAPI	EPO+
Lesotho		x	x	x	x					x	x	x			x		
Liberia		x	x	x	x					x	x	x			x		
Madagascar		x	x	x					x	x	x	x					
Malawi		x	x	x						x	x						
Mali		x	x	x		x			x	x	x		x			x	
Mauritania		x	x	x		x				x	x					x	
Mozambique		x	x	x						x	x	x			x		
Myanmar	Not yet scheduled	x								x							
Nepal	2026	x	x	x						x							
Niger		x	x	x	x					x	x		x			x	
Rwanda		x	x	x			x			x	x	x	x		x		
São Tomé & Príncipe	2024	In accession	x	x		x			x	x	x	x	x	x	x		
Senegal	Not yet scheduled	x	x	x		x	x		x	x	x		x	x		x	
Sierra Leone		x		x		x				x	x	x			x		
Solomon Islands	2027	x	x							x							
Somalia										x					x		
South Sudan																	
Sudan			x	x						x	x	x			x		
Timor-Leste	Not yet scheduled	In accession								x							
Togo		x	x	x	x	x	x		x	x	x			x		x	
Tuvalu	Not yet scheduled		x							x							
Uganda		x	x	x		x			x	x	x				x		
United Republic of Tanzania		x	x	x				x		x	x				x		
Yemen		x	x	x						x							
Zambia	Not yet scheduled	x	x	x		x				x	x	x			x		

Source: Authors' compilation (membership in international IP conventions, global and regional IP systems and organisations based on information available at www.wipo.int).

The world's least developed countries need to shift away from their traditional development paths by enhancing their productive capacities and diversifying their economies and exports. This report analyses the scope and potential to deploy intellectual property rights (IPRs) to help drive these necessary structural transformations. It examines the economic rationale for strategic IP protection and practical ways these countries can unlock IP-related benefits.

Harnessing Intellectual Property Rights for Innovation, Development and Economic Transformation in Least Developed Countries provides valuable insights, policy perspectives and practical recommendations on how these countries can use IPRs strategically to accelerate innovation, inclusive growth and structural transformation.



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