E

WIPO
WORLD
INTELLECTUAL PROPERTY
ORGANIZATION

CDIP/14/INF/13
ORIGINAL: ENGLISH
DATE: SEPTEMBER 19, 2014

Committee on Development and Intellectual Property (CDIP)

Fourteenth Session
Geneva, November 10 to 14, 2014

GLOBAL KNOWLEDGE FLOWS

commissioned by the Secretariat

1. The Annex to this document contains the report entitled “Global Knowledge Flows”, prepared by Mr. Gary Goldman, Mr. Kris Oswalt, Ms. Adriana Valdez Young, Ms. Becky Band Jain, Mr. Alexandre Toureh, Mr. John Toner, Mr. Gaurav Sharma, Ms. Irene Inouye, Ms. Haya Shaath, Mr. Jitesh Dhoot and Mr. Vikesh Ojh, Community Systems Foundation, New York, NY, USA, as one of the deliverables of the “Project on Open Collaborative Projects and IP-Based Models”.

2. The CDIP is invited to take note of the information contained in the Annex to this document.

[Annex follows]

Note: The views expressed in this study are those of the author and do not necessarily reflect those of the WIPO Secretariat or any of the Organization’s Member States.

GLOBAL KNOWLEDGE FLOWS

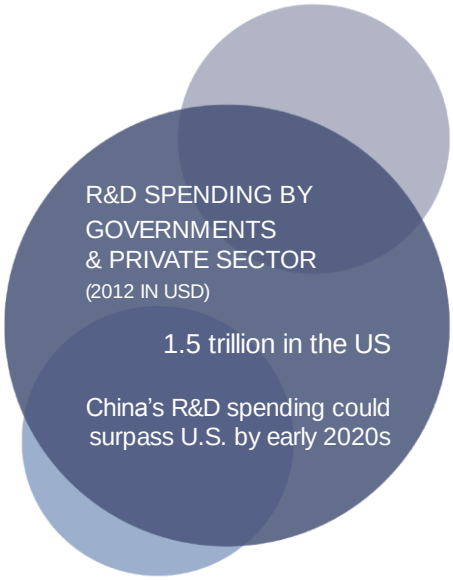
Report by Mr. Gary Goldman, Mr. Kris Oswalt, Ms. Adriana Valdez Young, Ms. Becky Band Jain, Mr. Alexandre Toureh, Mr. John Toner, Mr. Gaurav Sharma, Ms. Irene Inouye, Ms. Haya Shaath, Mr. Jitesh Dhoot and Mr. Vikesh Ojh, Community Systems Foundation, New York, NY, USA.

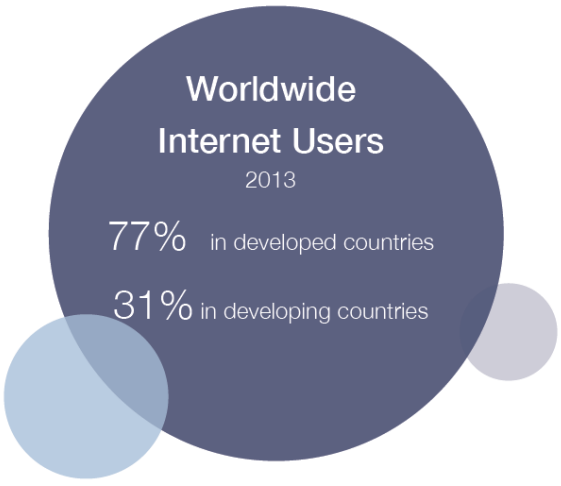
EXECUTIVE SUMMARY

1. The sharp rise in Internet access worldwide and the adoption of digital technologies have dramatically altered knowledge flows between developed and developing countries, enhanced public-private partnerships, and bolstered citizens' ability to contribute to the innovation ecosystem. Below are key findings from the various sections examined in this Report on Global Knowledge Flows. The main players in innovation (academia, governments, industry, IGOs/INGOs, and citizens), are active contributors in each of the below sections. The first chapter of the report includes a detailed description of each of these groups.

LICENSING AND PATENT POOLS

2. Knowledge transfer and innovation ecosystems are changing at a critical pace, making the field of licensing more complex and wide-ranging than ever before. For instance, the number of PCT applications filed has dramatically risen over the past five years. 194,400 international applications were filed in 2012, a considerable increase from the 110,000 filed in 2003. China and the Republic of Korea are now part of the top five countries with the most PCT applications. Globally, international receipts from IP licensing (including patents, trademarks and copyrights) increased from USD 10 billion in 1985 to USD 110 billion in 2004 with more than 90 percent of the receipts going to the European Union, Japan and the United States. Emerging economies such as China and India are gaining prominence, due to high investment in R&D and filing of patents. In 2010, the global IP royalty income was estimated to USD 350 billion, but it is well under its full potential. In this complex environment where firms increasingly collaborate with each other, patent pools have been used as an effective mechanism for sharing intellectual property assets, enabling entities to come up with new products, as well as decrease transaction and litigation costs. A well-known example is the MPEG-2 patent pool, which provides access to 27 patents from nine organizations that are essential to the MPEG-2 Video and Systems coding standards.





TRADE SECRET LICENSING

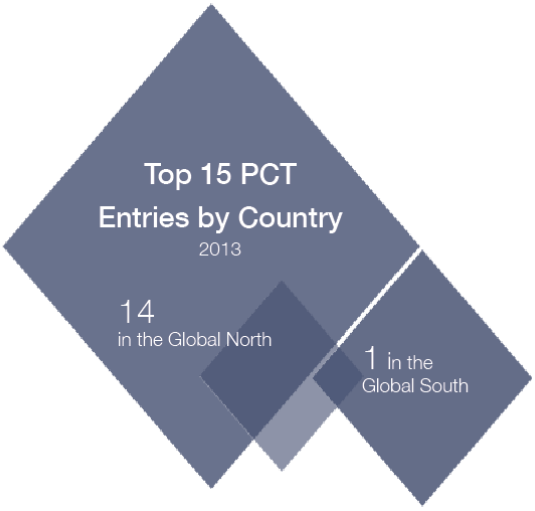
3. From 2001 to 2011, the number of trade secret decisions and combined non-compete and trade secret decisions in the United States increased by 190 percent and 142 percent respectively. This is a result of two factors: Increased workforce mobility with an Eastward-shifting innovation center of balance; and advances in technology, which have made information both more valuable and more easily accessible. As supply chains and operations expand globally, a company's ability to protect its trade secrets may be

significantly diminished by weak rule of law and ineffective or non-existent enforcement.

The licensing of trade secrets between developed and developing countries holds a great potential for new partnerships and additional sources of revenue.

FRANCHISING AND JOINT VENTURES

4. Franchising has experienced significant growth since the recession, and is expected to quadruple between 2012 and 2017, representing an increasingly large portion of GDP for emerging economies such as Brazil and India. The benefits of franchising are not limited to job and economic opportunities, but can be expanded to knowledge exchange between the franchisor(s) and the franchisee(s). International franchising has proven an efficient method of knowledge sharing – both for the franchisor to learn more about the host country, as well as for the franchisee to bolster human resource development, management methods, quality control, and established business models. A joint venture is distinct from franchising in the sense that two parties pool their resources with a common objective. Joint ventures have recently increased dramatically in key regions such as Europe, Asia Pacific, and the Middle East and North Africa.

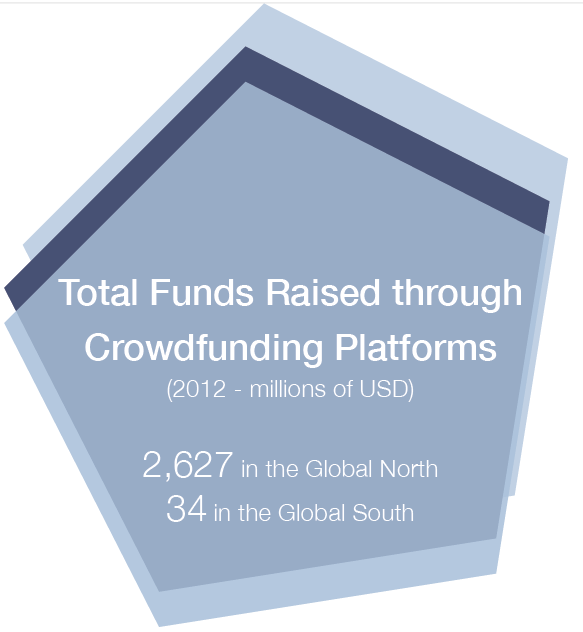


R&D COLLABORATIVE CONTRACTS

5. Overall R&D spending has increased globally over the past five years, with the fastest growth in the Global South. The top areas of research in developing countries are agriculture, health, transport, and energy. Much of the research on R&D collaboration is along a traditional North-South geographical divide in which countries in the developed North collaborate with countries in emerging markets in the developing South. In recent decades, however, there has been a substantial increase in the number of collaboration efforts between firms and institutions where all parties are located in developing countries. This type of R&D collaboration between developing countries is often referred to as South-South Collaboration.

LITIGATIONS

6. There has been a sharp increase in IP-related conflicts. From 1,100 reported global cases in 2003, there were over 2,500 reported cases in 2013. These types of IP-related conflicts are often cross-border and affect inventors and manufacturers alike, as well as entities involved in joint ventures. One of the main issues affecting international IP litigation is determining which body of law governs disputes. The 1995 TRIPS Agreement administered by the World Trade Organization remains the most comprehensive multilateral agreement on issues relating to IP. Brazil, Russia, India, China, and South Africa (BRICS) all now have specialized divisions that exclusively hear cases relating to IPR.



CROWDSOURCING

7. Crowdsourcing innovation is a win-win strategy: it provides an opportunity for businesses and public agencies to come up with new ideas at a low cost. Participants from the "crowd" become invested in the initiative – whether that is a product in the marketplace or promoting democracy. Additionally, many crowdfunding platforms have been created over the past five years, raising a total of $2.7 billion in 2012. While a large discrepancy between participants from the Global North and the Global South remains, crowdsourcing is now being used as a way to further the international development agenda. One can even say that crowdfunding has become the new way to show approval of a project; the new "like."

INNOVATION-INDUCEMENT PRIZES

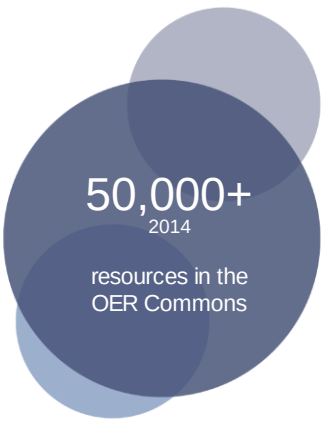
8. Innovation-inducement prizes serve as an effective means of cultivating global brand awareness and loyalty, as well as talent recruitment. Many sectors are resorting to innovation-inducement prizes: the private sector (e.g. Microsoft Imagine Cup, rewarding leading youth innovators), the philanthropy sector (e.g. Innovation Prize for Africa, an initiative of the African Innovation Foundation that rewards the best African innovators to develop market-oriented solutions), INGOs (e.g. World Bank Youth Summit, inaugurated in 2013), and more. Innovation-inducement prizes are cost-effective ways to crowdsource innovation and solve major challenges in sectors ranging from education to the environment. Yet one challenge is that limited Internet access prevents individuals in developing countries from participating at the level of their peers in developed countries.

OPEN COLLABORATIVE PROJECTS

9. In 2003, the Human Genome Project became the single largest collaborative biological project to be completed. Since then, open collaborative projects that are cross-sectorial and engage multiple actors from the private and public sphere have dramatically increased. Initiatives such as idea competitions and innovation networks have leveraged the expertise of end-users and researchers from the field to accelerate innovation solutions. Examples are varied and include co-innovation spaces like the Open Living Labs project, as well as innovation marketplaces connecting seekers and solvers like Innocentive. Nowadays, most forms of open innovation in the era of Big Data depend on robust IP regimes for the protection and diffusion of innovations that are produced through global collaborations, and community-based efforts.

OPEN EDUCATION RESOURCES

10. Open Educational Resources (OER) are educational materials that are made available either offline or online and that are free to use and modify without any fees. Over the past five years, more and more educators have been sharing their content as OER and licensing it for free. New platforms such as OER Africa provide material that caters specifically to regional contexts and learners, and are able to support universities and networks at no cost. Massive



Open Online Courses, or MOOCs, have emerged from the OER movement and provide courses on the Internet at no cost from many institutions, including Harvard University. Digital encyclopedias have almost fully replaced print encyclopedias. However, the geographical divide between Wikipedia contributors living in developed and developing countries is still dramatically wide: 70 percent living in the Global North, and 27.7 percent living in the Global South.

INNOVATION IN RENEWABLE ENERGY

11. If innovation and knowledge flows in the 21st century are defined by the multiplicity of actors involved, the field of renewable energy might very well serve as a model for such trends. The Renewables 2014 Global Status Report highlights that developing countries will account for over two-thirds of the overall rise in renewables, led by China. The most notable public-private partnership projects are in the Global South, specifically in Argentina, Bangladesh, China, India, Indonesia, Mongolia, and Vietnam. The Renewable Energy Network for the 21st Century (REN21) is an example of a global public-private multi-stakeholder network connecting international organizations, governments, industry associations, science institutes, academia, and NGOs working in the field of renewable energy. In the private sector of developing economies, commercial or quasi-commercial renewable energy efforts are growing in Latin America, Africa, and India while large renewable energy companies located in the Global North are looking at developing countries as an investment opportunity.

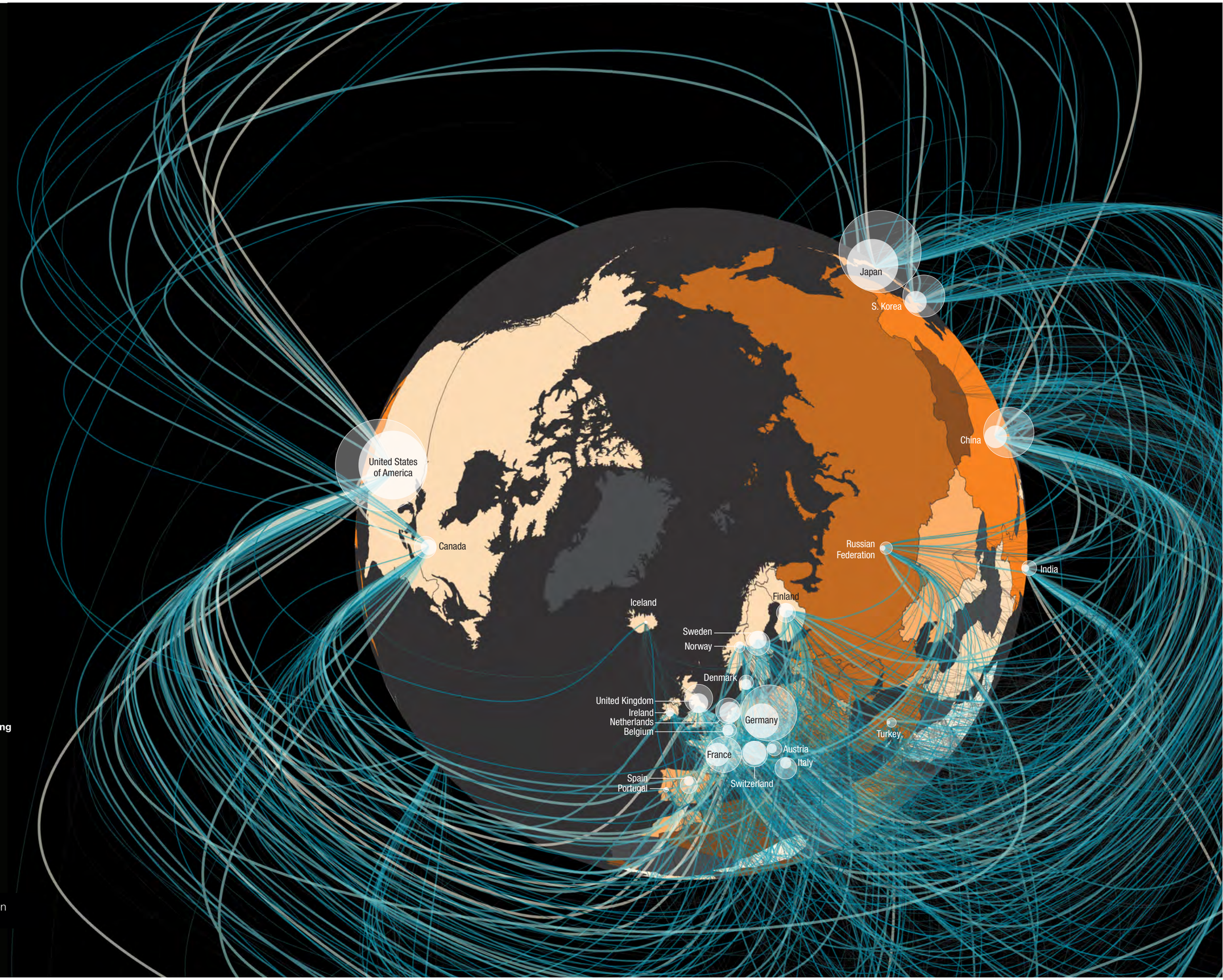
REPORT ON GLOBAL KNOWLEDGE FLOWS

12. The full report on Global Knowledge Flows is set out in the following Appendix. For technical reasons, none of the pages of the Appendix bear the WIPO document code (“CDIP/14/INF/13”).

[Appendix follows]

Summary Findings

Using aggregated data from 2011 to 2013, this map highlights the density of PCT activity in the Global North. For the past five years, the percentage of PCT applications with a foreign co-author has increased dramatically worldwide, indicating the rise of cross-border innovation. An example of this is the US, in which 56 percent of all patent applications are filed with a foreign co-author from an increasingly diverse range of countries (China and India being the top two). While the number of inventions patented in developing countries has increased, the majority of cross-border PCT filings still occurs predominantly between countries in the North. In fact, out of the top 15 countries with the most PCT filings, only one is from the Global South: China, ranked at number four behind the US, Japan, and Germany.



MAP LEGEND

Lines

PCT applications with coauthor located abroad, 2011–2013

- 1-9
- 10-24
- 25-99
- 100-249
- 250-999
- 1,000-1,999
- 2,000-2,999
- 3,000 or more

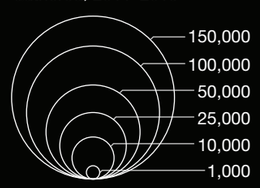
Country color

Percentage of PCT applications with co-author located abroad

- N./A.
- 0%–9%
- 10%–19%
- 20%–29%
- 30%–49%
- 50%–74%
- 75%–100%

Bubble size

Number of PCT applications authored, 2011–2013



Bubble Shading

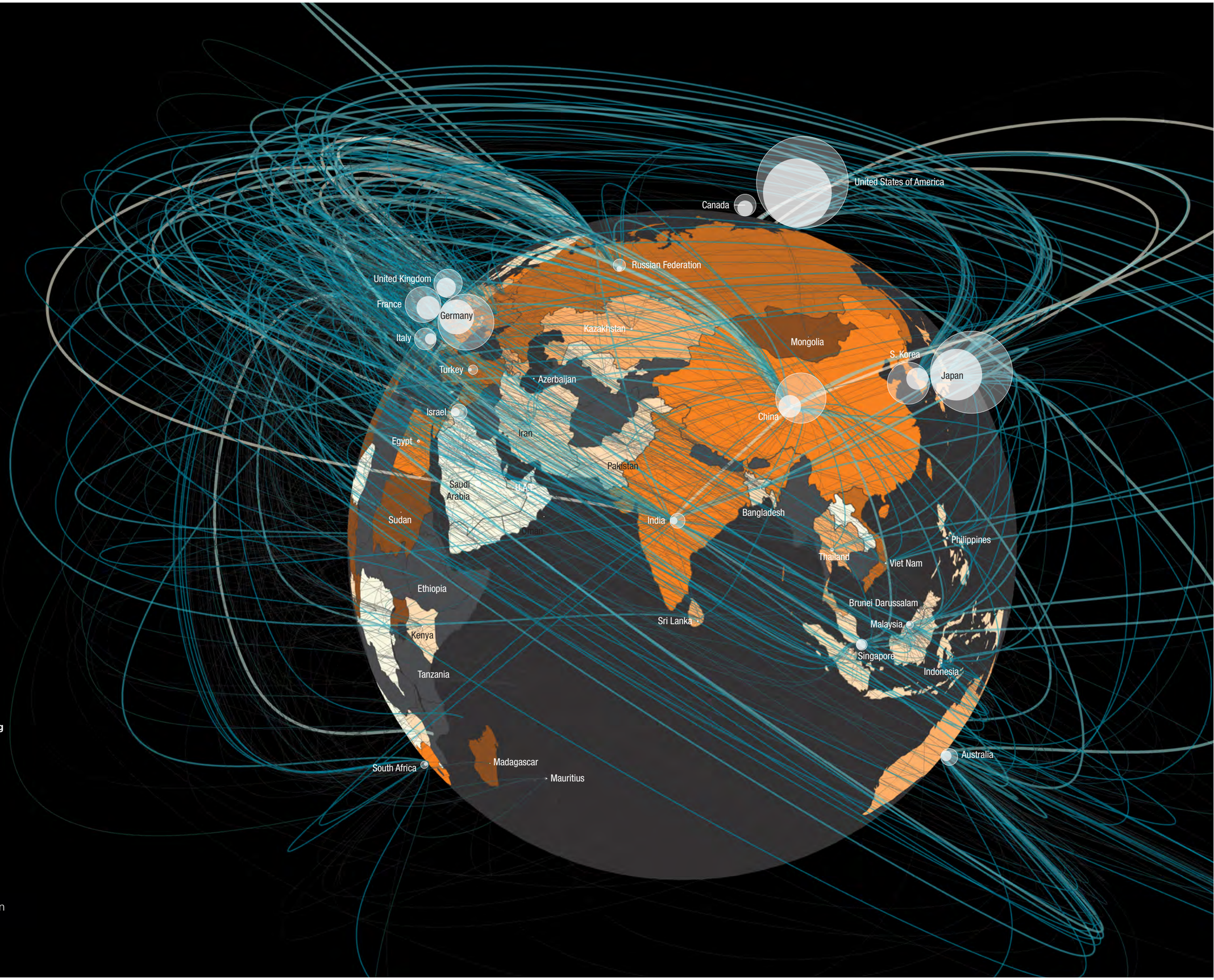
Total patents

Patents with a foreign co-author

Source: World Intellectual Property Organization Statistics Database 2014

Summary Findings

East Asia has had the highest number of PCT filings since 2010. The growth rate of PCT applications between 2012 and 2013 was over 5 percent across 150 participating countries. The changing landscape of the PCT system is led by China and neighboring Asian countries. While China is the only country from the Global South to make the top ten PCT filings list, other emerging economies such as India, Brazil, Turkey, South Africa, and Malaysia are seeing their numbers increase. The BRICS nations – Brazil, Russia, India, China, and South Africa – all have around 20 percent of patents filed with foreign co-inventors. This rate is higher in Western Europe and the United States.



MAP LEGEND

Lines

PCT applications with coauthor located abroad, 2011–2013

- 1-9
- 10-24
- 25-99
- 100-249
- 250-999
- 1,000-1,999
- 2,000-2,999
- 3,000 or more

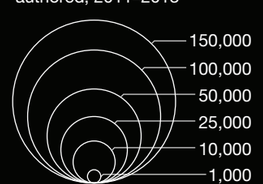
Country color

Percentage of PCT applications with co-author located abroad

- N./A.
- 0%–9%
- 10%–19%
- 20%–29%
- 30%–49%
- 50%–74%
- 75%–100%

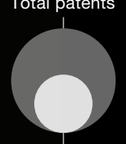
Bubble size

Number of PCT applications authored, 2011–2013



Bubble Shading

Total patents

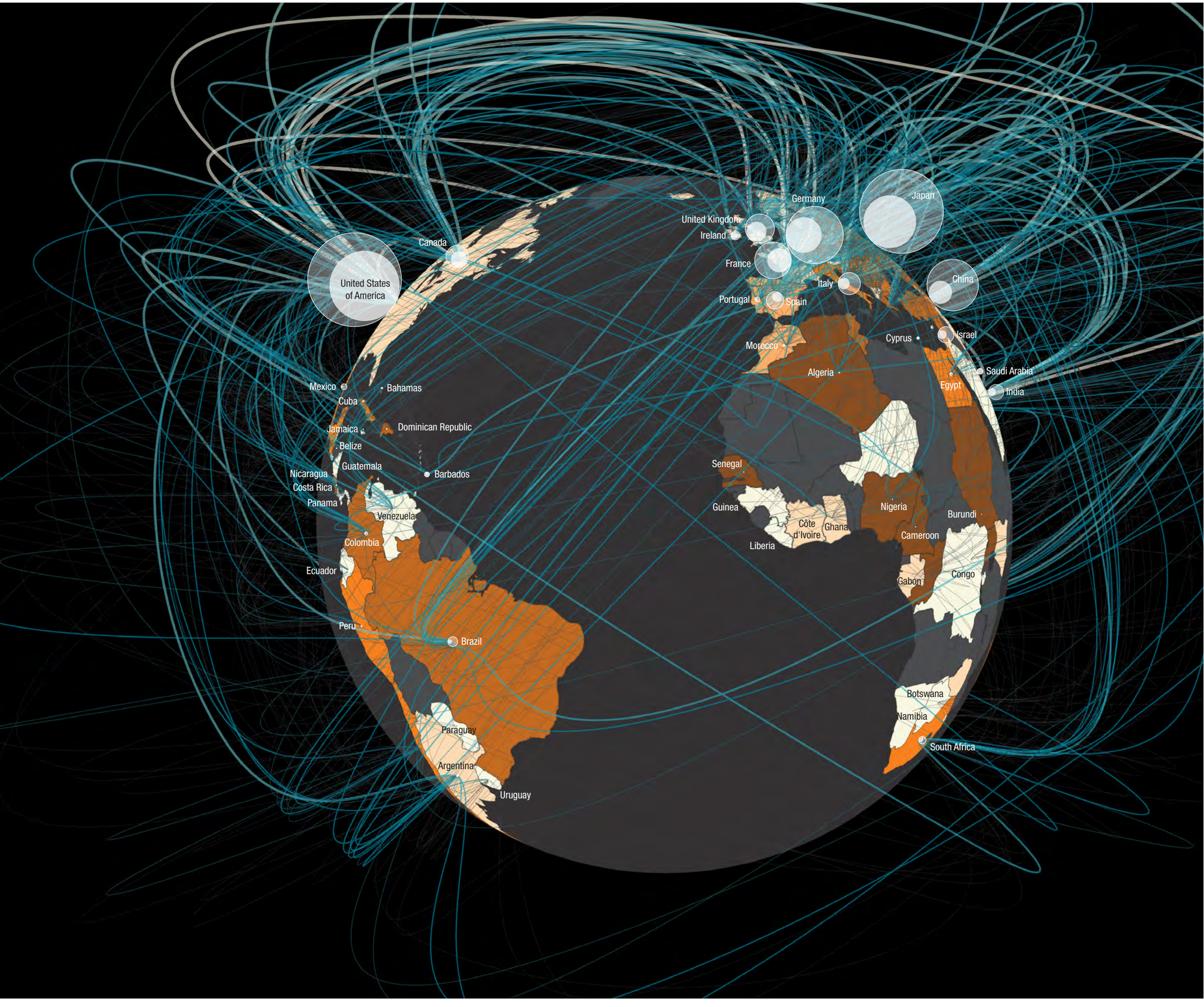


Patents with a foreign co-author

Source: World Intellectual Property Organization Statistics Database 2014

Summary Findings

This map highlights the level of PCT activity in the Americas, as well as in Western and Central Africa. These regions have the lowest total number of applications, with Brazil and South Africa the only countries in the top 30 globally. This map also shows that PCT activity can be an indication of a country's infrastructure and economic development, as the nations with low Human Development Index (HDI, a tool created by the United Nations to measure economic and social development) in the region also have few (or nonexistent) PCT applications. Many countries in Africa and South America have under 10 PCT applications each, mostly filed with foreign co-authors.



MAP LEGEND

Lines

PCT applications with coauthor located abroad, 2011–2013

- 1-9
- 10-24
- 25-99
- 100-249
- 250-999
- 1,000-1,999
- 2,000-2,999
- 3,000 or more

Country color

Percentage of PCT applications with co-author located abroad

- N./A.
- 0%–9%
- 10%–19%
- 20%–29%
- 30%–49%
- 50%–74%
- 75%–100%

Bubble size

Number of PCT applications authored, 2011–2013

150,000
100,000
50,000
25,000
10,000
1,000

Bubble Shading

Total patents

Patents with a foreign co-author

Source: World Intellectual Property Organization Statistics Database 2014

Table of Contents

General Report Sections
Traditional Approaches
Internet-Enabled Approaches
Sustainable Development

The Report is divided into more traditional approaches of knowledge transfer and internet-enabled approaches for convenience purposes. It should however be noted that the digitalization of information as well as new IP trends described in this Report are making these types of distinctions increasingly blurry.

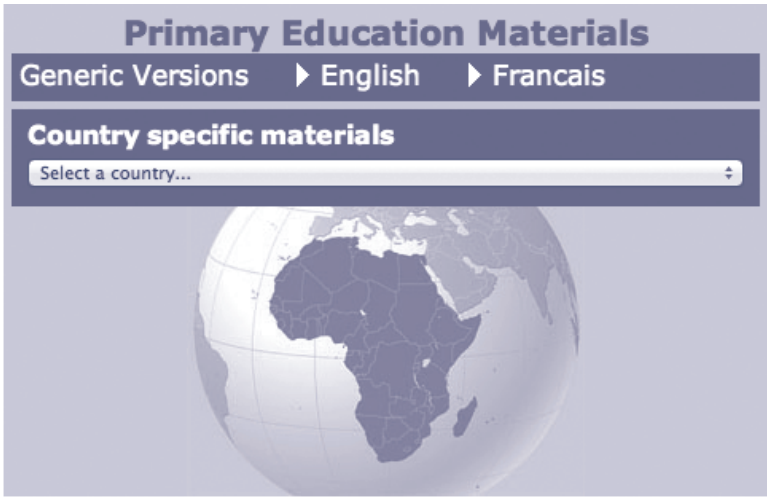
Main Players in Innovation

Chapter 0: Main Players in Innovation

As this Report will underline, innovation capabilities have increased throughout the world: from record-breaking PCT applications per year to the development of incubators and technology transfer platforms in the Global South, the number of new groundbreaking ideas is growing at a fast rate. In this section, we will provide a brief overview of the main groups that are responsible for innovation and knowledge transfer, as well as general trends in each of these groups.

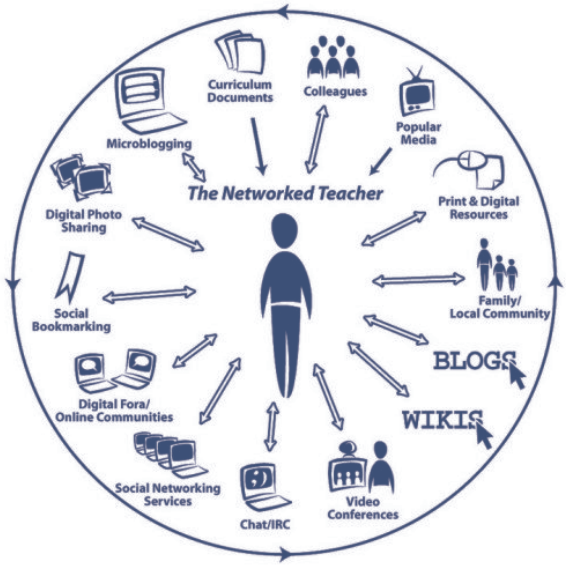
The "quadruple helix innovation model" serves as a basis for understanding how the dynamics of innovation and economic development stem from four interdependent groups: government, academia, industry and citizens. These actors collaborate and innovate to drive structural changes beyond the scope of what any one organization or community can achieve on its own. To build upon this concept, we have included International Non-Governmental Organizations (INGOs) and Intergovernmental Organizations (IGOs) to the list.

Figure 0.1 - OER Platform TESSA in Sub-Saharan Africa



Source: TESSA (2014)

Figure 0.2 - The Networked Teacher



Source: Alec Couros (2014)

Academia

Knowledge transfer is rooted within the very foundation of academia, making it an obvious player in the development of innovations around the globe. Trends such as the rise of open educational resources (OER), defined as online and offline free and openly licensed learning materials, have continued over the past five years. OER are contributing to the disruption of traditional publishing by making resources available via a Creative Commons (CC) license. Most print encyclopedias have also been replaced by digital versions, and the most widely visited encyclopedia is Wikipedia, with nearly two million monthly page edits from over 120 countries.[1]

Individuals are shifting their learning online, benefiting them both financially and educationally. Indeed, the organization Khan Academy offers free tutorials on a broad range of topics and was founded on the belief that online learning allows students to grasp concepts at their own pace. The number of students enrolled in online courses has grown continuously, as have the number of free online resources available. This rise in educational resources is necessary, as statistics show that four new major universities would have to be built every week to accommodate the number of children who will reach enrolment age by 2025.[2] In addition to the myriad ways in which students can now learn, the idea of accreditation is also changing.

Furthermore, knowledge transfer in the academic world has been bolstered by a rise in global student mobility, with the number of internationally mobile students surpassing four million in 2013.[3] This has spurred a debate on the "brain drain" phenomenon, whereby students and skilled workers from developing nations move away from their country of origin, reducing the retention of top talent in the countries that might need it the most.

Government

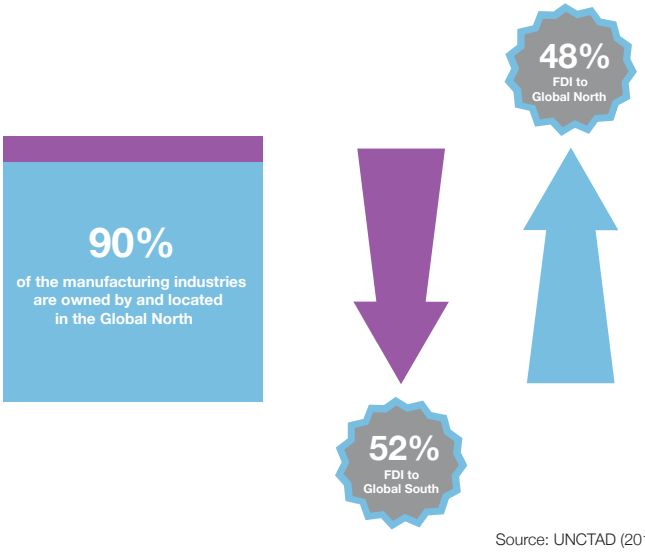
Transparency and accountability are at the forefront of discussions about the role of the government in knowledge transfer. Government agencies are stimulating innovation through many initiatives mentioned below, from R&D to prize competitions. Some governments have

1 See http://stats.wikimedia.org/wikimedia/squids/SquidReportPageEditsPerCountryOverview.htm

2 See http://www.col.org/resources/speeches/2011presentation/Pages/2011-05-16.aspx

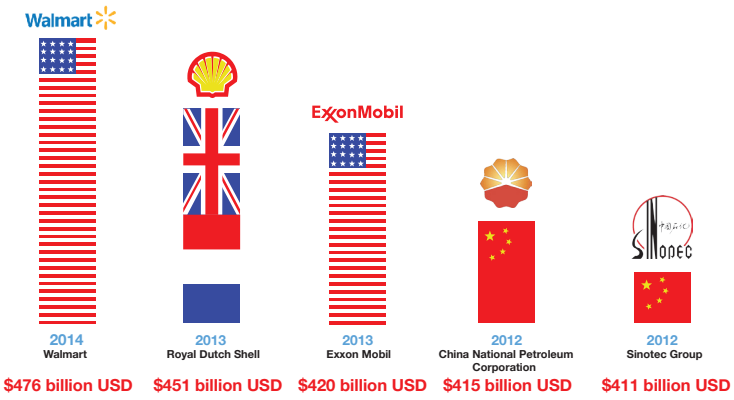
3 See http://www.uis.unesco.org/Education/Pages/international-student-flow-viz.aspx

Figure 0.3 - Global Foreign Investments (2013)



Source: UNCTAD (2014)

Figure 0.4 - Top 5 Richest Companies by Annual Revenue as of May 2014



Source: Royal Dutch Shell (2013), Sinopec (2012) & Wal-Mart Stores (2013)

embraced the notion "open data," or making data freely available. For example, the US Government's open data initiative, Data.gov, serves as a repository of over 100,000 datasets, and Brazil's Transparency Portal of the Federal Government publishes information ranging from expenditures of federal agencies to the charges of elected officials on government-issued credit cards.[4] However, according to the OECD, even though many governments have recently made political commitments and launched online portals, "the majority have yet to demonstrate the benefits of open government data, let alone prepare plans for realizing those benefits."[5]

The World Wide Web Foundation is helping governments in low- and middle-income countries adopt open government data initiatives as a way to increase inclusion and provide new opportunities for citizens. Their Open Data Lab in Jakarta and the Ghana Open Data Initiative both engage policy-makers and government officials to experiment with open data and publish socio-economic information in a timely manner.[6] It is notable that these efforts to bolster knowledge transfer by the government are spurred by a foundation while also engaging civil society actors and researchers, highlighting a trend of cross-sectorial innovation that will be discussed below.

Government agencies are also responsible for conducting innovation-inducement prize competitions to solve issues aligned with their objectives. Challenges help governments innovate by tapping into a wide pool of innovators with a fresh perspective on domestic and international issues, thereby identifying novel solutions with a lower cost, since these type of challenges require fewer funds than an innovation department within a government agency. For instance, in 2014 the Governments of Sweden, the US and the UK conducted the Making All Voices Count Global Innovation Competition to crowdsource and reward ideas meant to bolster government transparency and accountability.[7] For example, Challenge.gov is a US-based competition run by Federal agencies to collect and reward solutions from the public.

In addition to innovation-inducement prizes, governments also subsidize a large portion of global R&D around the world. Government-funded programs are at the origin of many knowledge transfer partnership and innovation platforms. The rise of the digital age is shifting global expectations for government accountability, with e-governance and data transparency becoming paramount in an increasingly interconnected world.

Industry

Commercial enterprises rely on innovation as a way to boost their efficiency. The presence of innovators within a company is essential in order to maintain a competitive advantage in the market. In the 21st century, faster innovation cycles, technological changes, increased competition, and rapidly changing customer demands have created a need for a stronger focus on innovation in the R&D process.

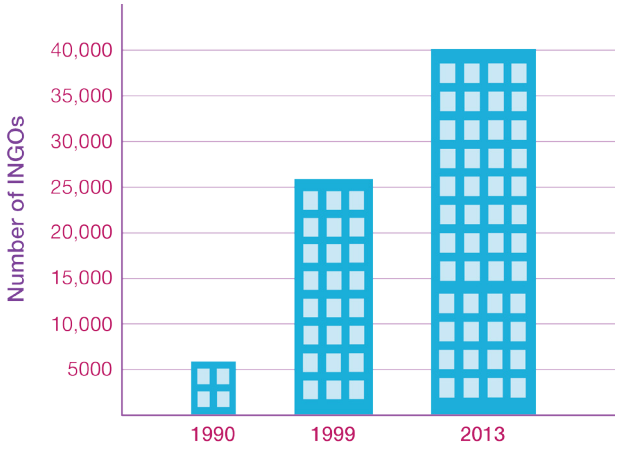
The foreign direct investment (FDI) flowing to developing countries reached a new high in 2013, accounting for USD 759 billion (HSBC 2014). Multinational organizations from the Global North often invest overseas via joint ventures with local organizations that are more cognizant of the domestic market and possess internal advantages, be it in regards to production or licensing. The sharp rise in FDI is correlated to the level of innovation in developing countries as it enables technology transfer and capacity-building for employees in the host country.

From multinational corporations to startups, private entities are becoming increasingly aware of their responsibility toward society. For organizations specializing in technology and innovation, such as IBM and HP, this has meant an increase in the development of innovations that benefit society. To this end, IBM has made some of their patents public.

As a result of greater social innovation, there has been a rise in collaborations with civil society groups, governments, and NGOs/INGOs. Public-private partnerships (PPP) are effective for economic growth, as they leverage the private sector's expertise in innovation with the public sector's expertise in fields like health and educational services. PPPs enable the optimization of knowledge, and are also likely to be the catalyst for new R&D activities.

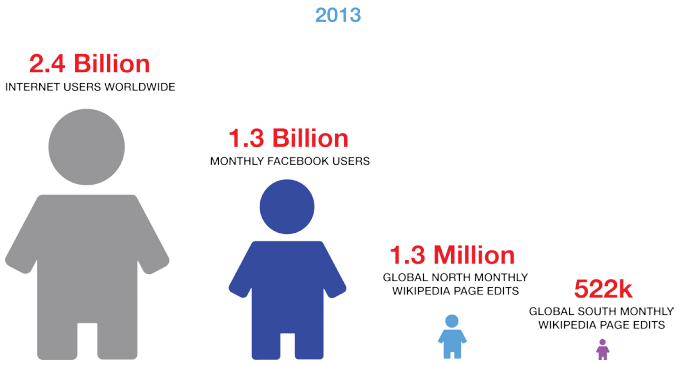
4 See http://www.portaldatransparencia.gov.br/ (Portuguese) and http://www.cgu.gov.br/english/AreaPrevencaoCorrupcao/AreasAtuacao/IncrementoPortal.asp (English)
5 See http://www.oecd.org/gov/public-innovation/opengovernmentdata.htm
6 See http://www.webfoundation.org/projects/open-government-data/
7 See http://www.oecd.org/gov/public-innovation/opengovernmentdata.htm

Figure 0.5 - Number of Active INGOs Worldwide



Source: JCPA (2013)

Figure 0.6 - Active Internet, Facebook & Wikipedia Users



Source: Wikipedia, TechCrunch & Internet World Stats.

IGOs and INGOs

Intergovernmental organizations (IGOs) such as the United Nations and the World Bank consist of sovereign, or member states. International Non-Governmental Organizations (INGOs) are private entities whose activities promote the interests of the disadvantaged on an international level. These global organizations are critical resources for knowledge transfer, as the ability to collect and disseminate information is at the core of their missions.

Both of these types of organizations have been main contributors to some of the most exciting innovations of the last few years. For instance, the World Bank partnered with UNICEF and the Medicines Transparency Alliance in 2013 to crowdsource real-time information from citizens and health providers via the SMS-based tools U-report and mTrac (Asfaw 2014). They have also championed free and open access to data since 2010, and encourage users to access and share the information. UNICEF and other IGOs such as UNDP and UNHCR now have Innovation units, driving the ability to innovate both inside and outside of their organizations. Oxfam publishes its data in compliance with the International Aid Transparency Initiative (IATI) and provides open educational resources about topics such as clean water.

IGOs have played a major part in setting up frameworks surrounding innovation and publishing key information on knowledge transfer cross-countries. For instance, WIPO enables PPPs for end-to-end service delivery, and recommends the development of innovation platforms that identify and connect users in the search for creative and meaningful solutions that are mutually beneficial. The WIPO Green platform connects green technology and service providers with those seeking innovative solutions. WIPO Re:Search is another platform that facilitates new partnerships to support organizations that conduct research on treatments for neglected tropical diseases. It had led to over 50 collaborations as of April 2014 (WIPO 2014). The database goes beyond simply providing a listing of assets by matching owners of IP and other resources – such as pharmaceutical compounds, data and discovery techniques – with relevant researchers.

Citizens

With over one third of the world population using the Internet, the possibility for citizens to get involved in the innovation process is greater than ever. Individuals are using digital platforms to connect with each other (e.g. social media sites) and with their governments (e.g. open data initiatives), to solve issues (e.g. innovation marketplaces such as InnoCentive), and to support projects they care about (e.g. crowdsourcing platforms such as Kickstarter). Anyone with access to the web can create content and contribute to shaping existing content. According to a report by the IBM Center for the Business of Government (Kannan & Chang 2013), the nature of citizens' relationships and engagement in the problem-solving ecosystem stem from three key factors:

1. The interdependency and complexity of issues faced by the world;
2. Fiscal austerity, which has led governments to consider more collaborative and less resource-intensive approaches;
3.The rise of new information technologies that make it easier to connect citizens with each other.

New technologies such as social media have also dramatically lowered the communication barrier between citizens and their governments. For instance, the platform Change.org has garnered over 72 million individuals starting and signing petitions globally. The other actors involved in innovation mentioned above are increasingly relying on citizens to offer novel solutions to the issues they are facing. Crowdsourcing is also an efficient channel for large institutions to directly connect with citizens.

References

Asfaw, K. (2014). Crowdsourcing Feedback to Improve Healthcare Systems. World Bank Blog. Retrieved from http://blogs.worldbank.org/ic4d/crowdsourcing-feedback-improve-healthcare-systems

Ben-Ari, R. (2013) International Nongovernmental Organizations: "Global Conscience" or Powerful Political Actors?. Jeresulam Center for Public Affairs. July 15, 2013. Retrieved from: http://jcpa.org/article/international-nongovernmental-organizations-global-conscience-or-powerful-political-actors/

Couros, A (2014). The Networked Teacher. Retrieved from https://www.flickr.com/photos/courosa/2922421696/sizes/l/in/set-72157603986790944/

HSBC (2014). Growth beyond borders: Capitalising on the rise of South-South trade and investment. Retrieved from http://www.hsbcnet.com/gbm/attachments/standalone/growth-beyond-borders.pdf

Internet World Stats (2014). "Population and Usage Statistics" Retrieved from http://www.internetworldstats.com/stats.htm

Kannan, P.K. & Chang, A.M. (2013). Beyond Citizen Engagement: Involving the Public in Co-Delivering Government Services.

Mimiko, O. (2012). Globalization: The Politics of Global Economic Relations and International Business. p. 47

Rodriguez, A (2008). Hobbled NGOs wary of Medvedev Watchdogs are Civil Lifeline in Lawless Russia. Chicago Tribune (Chicago) 7 May. 2008

Royal Dutch Shell (2012). Annual Report. Retrieved from http://reports.shell.com/annual-report/2012/servicepages/downloads/files/entire_shell_ar12.pdf

Shukla, A (2010). First Official Estimate: An NGO for every 400 people in India. Indian Express (New Delhi) 7 July. 2010

Sinopec (2012). Annual Report. Retrieved from http://www.sinopec.com/download/reports/2012/20130324/download/2013032515.pdf

Techcrunch (2014). "Facebook passes 1 billion mobile monthly active users" Retrieved from http://techcrunch.com/2014/04/23/facebook-passes-1b-mobile-monthly-active-users-in-q1-as-mobile-ads-reach-59-of-all-ad-sales/

TESSA (2014). Homepage. Retrieved from http://www.tessafrica.net/home

UNCTAD (2014). Global Investment Trends Monitor. Retrieved from http://unctad.org/en/PublicationsLibrary/webdiaeia2014d1_en.pdf

U.S. Department of State (2012). Fact Sheet: Non-Governmental Organizations (NGOs) in the United States

Wal-Mart Stores, Inc (2013). Annual Report. Retrieved from http://services.corporate-ir.net/SEC.Enhanced/SecCapsule.aspx-?c=112761&fid=8721155

Wikipedia (2014). "Wikipedia Statistics" Retrieved from http://en.wikipedia.org/wiki/Wikipedia:Statistics

WIPO (2014). WIPO Re:Search Passes New Milestone in Fight Against Neglected Diseases. Geneva, April 24, 2014. PR/2014/757. Retrieved from http://www.wipo.int/pressroom/en/articles/2014/article_0004.html

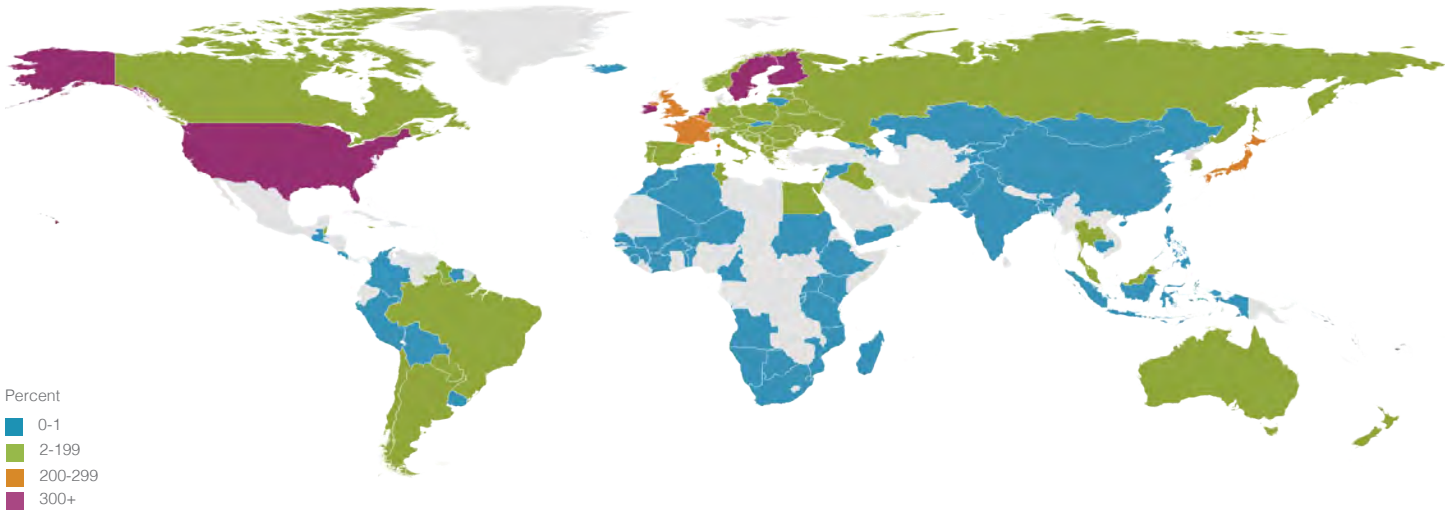
Licensing

“Licensing is innovating with partners by sharing risk and sharing reward.”
- 100%Open

Chapter 1: Licensing

Receipts from intellectual property licensing worldwide (including but not limited to patents, trademarks, and copyrights) have increased by over 1,000 percent over the past 30 years, illustrating the rise of the knowledge economy. Technology transfer and access to information are necessary components of success for both public and private sectors.

Figure 1.1 - Royalty and License Fee Receipts (Number, 2005-2011)



Source: UNDP (2014)

DEFINITION

A license is a consent by the owner (licensor) to the use of intellectual property (IP) by another party (licensee) in exchange of money or other value such as in a cross-license. Technology licensing is an IP tool enabling technology transfer. As a result, technology transfer agreements improve economic efficiency, avoid the duplication of research, spur innovation and facilitate technology diffusion. IP ownership gives a legal right to the owner of IP to exclude or prevent others from using that IP for commercial purposes. IP, whether it is registered or non-registered, is the subject matter of the licensing agreement.

Traditional Forms of Licensing

IP licensing takes many forms, ranging from set royalties paid to owners of copyrighted material, to sophisticated patent licensing agreements. The general form of a licensing agreement is to define a scope of use for the licensee, and to set a reasonable royalty or licensing fee to be paid to the licensor. By agreeing ahead of time on basic issues such as fees and dispute resolution, parties are able to further monetize their IP and minimize the risk of costly litigation.

As barriers to trade decline and the use of digital technology spreads, IP moves rapidly across borders. In order for firms and individuals to responsibly monetize their IP in this shifting landscape, they must strike a careful balance between being the first to market, and protecting their IP through robust licensing agreements. However, given the high cost of enforcing IPRs and the lack of uniformity in judicial enforcement mechanisms across the globe, new forms of IP licensing are on the rise.

The field of technology patent licensing is nascent, and there is less quantitative data available. However, key trends have emerged over the past five years such as the rise of e-commerce, which incentivizes companies to work together through licensing agreements. In this instance, a company will create the product, place it on an e-commerce site managed by another company, and user payments may be conducted through a third-party site. Another trend is the growing prevalence of open-source licensing, defined as a type of license allowing individuals to use and modify the product (often in the form of source-code) freely. That said, open-source licensing has not made it easier to track and estimate license adoption. According to the Creative Commons website, "estimating license adoption is a very inexact science. There is no authoritative source and we neither control nor have inside knowledge of the construction and volatility of the most comprehensive sources."[1]

Geography of the PCT System in the 21st Century

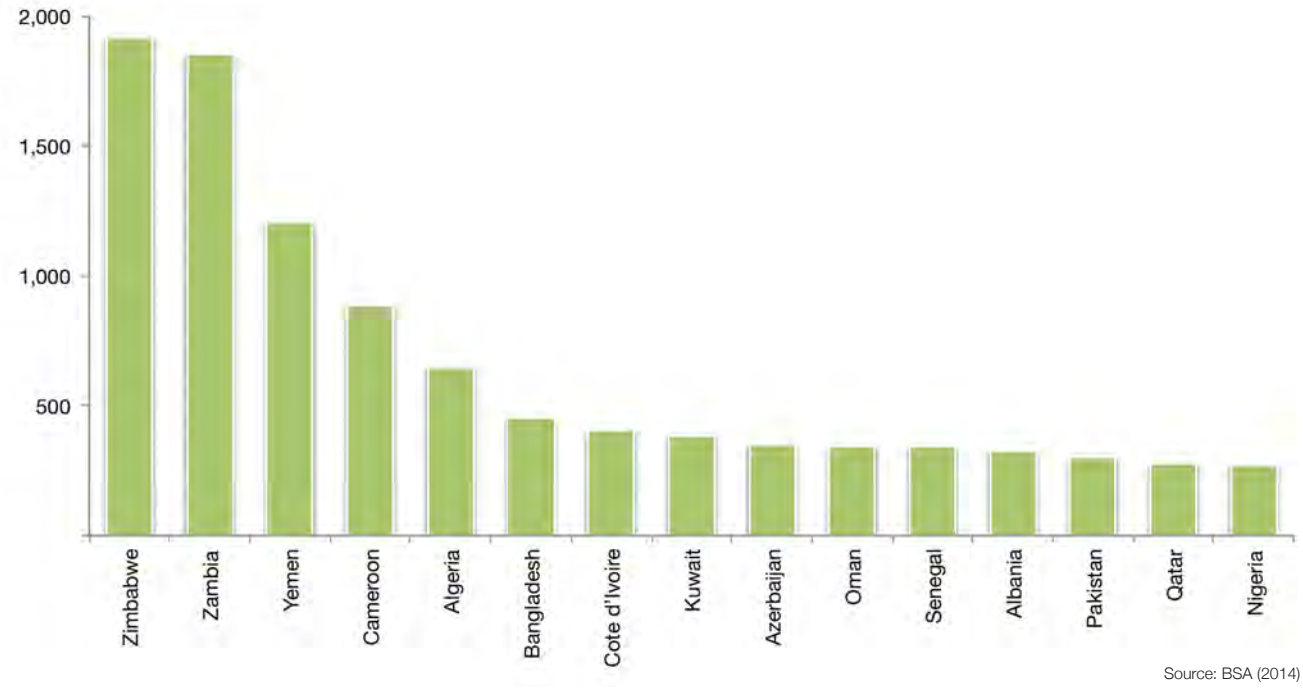
Licensing provides the ability to sell IP to another entity that wishes to use it for their own purposes (with or without a profit), and such IP can take multiple forms. One of the most common ways to license an invention is through a patenting process. The number of international Patent Cooperation Treaty (PCT) applications filed has

1 See http://wiki.creativecommons.org/Metrics/License_statistics

Summary Findings

The below bar chart shows the additional GDP that is created by spending one extra dollar on software, which is the difference between the price of a properly licensed software and its pirated version. For instance, a one dollar investment in fully licensed software will be associated with an average return of USD 1,918 for Zimbabwe. There is an average return of USD 437 for low-income countries where the value of properly licensed software has a greater marginal impact on the GDP than for high-income countries. Properly licensed software provides powerful value to national economies, while pirated software exposes users to virus and security risks.

Figure 1.2 - Value Difference Between Properly Licensed Software and Pirated Software (USD)



Source: BSA (2014)

nearly doubled over the past ten years: over 200,000 applications were filed in 2013, (WIPO 2014) compared to 110,000 in 2003 (WIPO 2003).

The growth rate of PCT applications between 2012 and 2013 was over 5 percent across 150 participating countries. The top ten PCT applicants from 2011 to 2013 remained the same: US, China, Republic of Korea, Japan, Netherlands, Finland, Sweden, Germany, France, and the UK. The changing landscape of the PCT system is led by China and neighboring Asian countries; East Asia has been the largest sub-region in regards to number of PCT filings since 2010.[2] The largest PCT filing companies in 2013 were Panasonic (Japan), ZTE (China), and Huawei (China) (WIPO 2014). While China is the only country from the Global South to make the top ten list, other emerging economies such as India, Brazil, Turkey, South Africa, and Malaysia are seeing their numbers increase considerably.

Innovating Beyond Licensing

Licensing enables innovators to bring products to market through one or more marketing and sales organizations. Without a license, any use or exploitation of IP by a third party may amount to copying or infringement. In this way, the ability to secure licenses and avoid potential infringement shapes the flow of knowledge, innovation and cooperation across sectors of business. Business practices such as franchising, technology transfer, publication and character merchandising flow directly from the licensing of IP.

A well-crafted licensing agreement fosters greater innovation by removing uncertainty around potential infringement claims. As central a role as licensing may play in innovation, there are significant obstacles to license adaptations. Gambardella et al. (2007) posit that the market for technology has a potential to be 70 percent larger if it were not for barriers to licensing – such as the inability to find licensing partners and prohibitive licensing costs.

To overcome this tricky IP terrain, the philosophy of "open innovation" has particular resonance for technology-based entrepreneurs seeking to bypass licensing hurdles.

Promoted by organizational theorist Henry Chesbrough (2003), open innovation advances "a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology." Or in the words of the open innovation agency 100%Open, it can be understood as "innovating with partners by sharing risk and sharing reward."[3]

The end result of open innovation is that a company's boundaries become more permeable, enabling innovations to flow both inward and outward. In a fast-paced, global innovation environment, companies cannot rely entirely on their own research, but should instead secure licenses or inventions from other companies. In this spirit of efficiency and openness, a company's under-utilized internal inventions should be externalized through licensing, joint ventures or spin-offs.

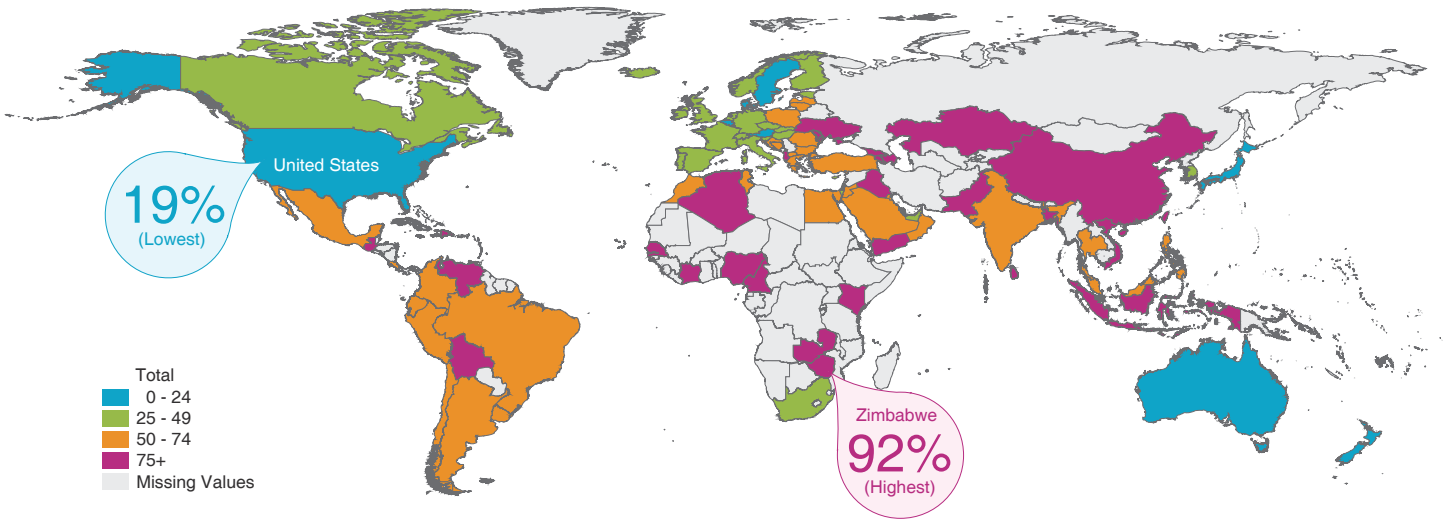
2 See http://www.wipo.int/export/sites/www/pct/en/2million/pdf/pct_geography.pdf

3 See http://www.100open.com/2011/03/open-innovation-defined/

Summary Findings

The piracy rate is the total number of units of pirated software deployed in a given year divided by the total units of software installed. As the below map shows, it is highest in Zimbabwe and lowest in the US. However, it is critical to note that the BRICS countries (Brazil, Russia, India, China, and South Africa) are a dominant group that represents nearly 30 percent of all pirated software around the world, with an average piracy rate of about 65 percent. This BSA study has involved collecting 182 discrete data inputs and assessing PC and software trends in 116 markets. According to the report, "while this study is considered to be one of the most sophisticated appraisals of global copyright infringement, BSA and its partners continually look for new ways to improve the reliability of the data."

Figure 1.3 - Piracy Rate (2011)



Source: BSA (2013)

Media Piracy and File Sharing in Developing Countries

In 2011, the Social Science Research Council published the first international comparative study on media piracy in developing economies. The Media Piracy in Emerging Economies study looked closely at the socio-economic motivations for media piracy, as well as its economic impact. The study argued that international IPR enforcement has undergone a systemic shift in the past quarter-century. "IP policy has become the subject of a proliferating array of international treaties and agreements, involving many more international actors, from the World Trade Organization (WTO), to the World Health Organization (WHO), to the European Commission, to—perhaps most prominently—the Office of the US Trade Representative (USTR), which has reshaped global IP policy through bilateral and multilateral trade agreements" (Karaganis 2011). The shift toward more international frameworks for securing and protecting IPRs abroad may create more certainty for firms licensing their IP in developing countries, as well as incentives for local entrepreneurs to build new products. On the other hand, global licensing regulations might create hurdles for developing nations that might need to implement new administrative and enforcement procedures for proper compliance.

One of the biggest barriers to traditional licensing, particularly in emerging economies, is the cost of legally licensing the material. "High prices for media goods, low incomes, and cheap digital technologies are the main ingredients of global media piracy" (ibid). While the majority of online media piracy centers on entertainment products (games, movies, music), there is also a high piracy rate of educational materials. In many developing countries, where low wages prohibit educators from paying license fees for these materials, piracy offers a quick and effective means of obtaining the materials free of any monetary charge. As access to the Internet in developing countries continues to rise, so will the prevalence of piracy.

Creative Commons

Founded in 2001, Creative Commons (CC) is a non-profit organization offering an alternative infrastructure to traditionally rigid licensing structures that can stymy innovation in the Internet era. CC provides free, publicly available infrastructure, developing different versions of licenses that allow the creator of original material to waive certain rights. This allows content to be "copied, distributed, edited, remixed, and built upon, all within the boundaries of copyright law."[4] CC licenses lets users easily change copyright terms from the default of "all rights reserved" to "some rights reserved." CC licenses are not an alternative to copyright; rather, they work alongside copyright and enable users to modify copyright terms to best suit their needs.

Millions of works — including artistic, scientific and academic work — are available to the public for free and legal use under the terms of CC copyright licenses. Prominent CC license users include Google, Wikipedia and Whitehouse.gov.

4 See https://creativecommons.org/licenses/

Copyleft

Copyleft is a means of placing a creative work in the public domain without surrendering complete control over the work. Under the traditional public domain model, when a creative work is placed in the public domain, its author surrenders all of her rights under copyright law. This means individuals are free to transform works found in the public domain into derivative propriety works. While the original work remains in the public domain, the derivative work becomes copyrighted material. Because works may be freely transformed in this way, individuals may be disincentivized from placing their work in the public domain. However, under a Copyleft licensing structure, works are placed in the public domain, but with a licensing provision requiring that all modified and extended versions of the work remain freely accessible in the public domain. Copyleft licensing is seen predominantly in software licensing, but has applicability in other creative mediums.[5]

Entrepreneurs may see great value in non-traditional forms of licensing that allow them to enter new markets and tap into new knowledge sources. Increased information in the public domain amplifies incentives for large and small players alike to nimbly contribute and adapt IP assets in an environment of open innovation.

In the context of developing countries, which may lack formal copyright protection mechanisms to begin with, the concept of CC or "Copyleft" provides a unique means of enabling widespread distribution of creative works, all while limiting the potential for costly litigation. This democratization of licensing procedures can decrease the "brain drain" afflicting developing countries by offering free and accessible pathways to contribute to technology-based innovation within their own enterprises and home countries.

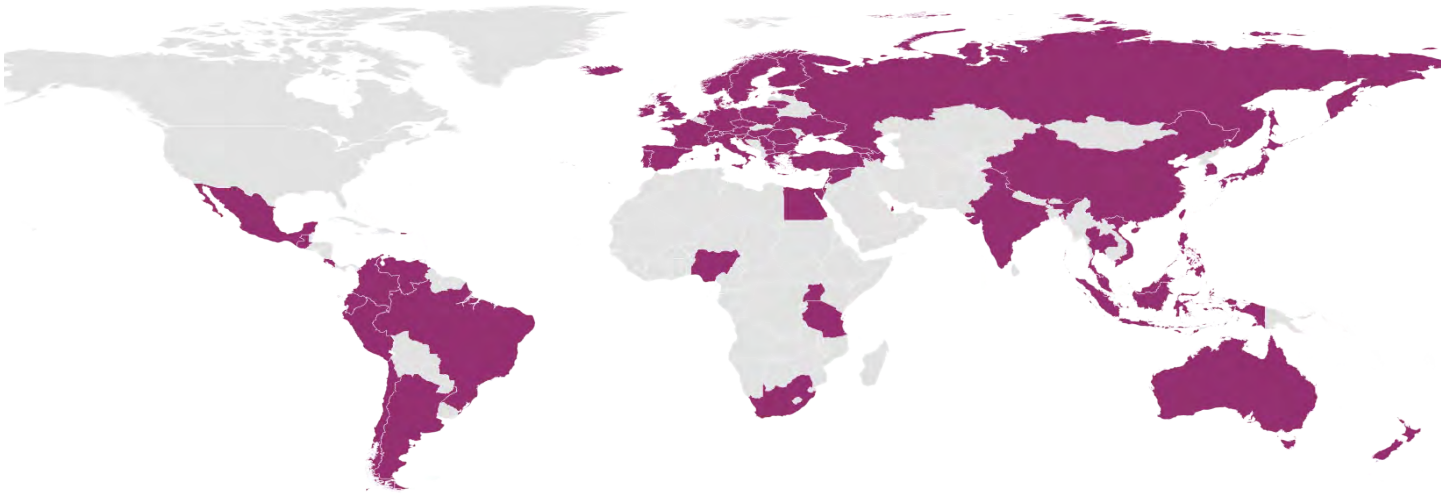
5 See https://www.gnu.org/copyleft/copyleft.html

Creative Commons *provides free, publicly available infrastructure, developing different versions of licenses that allow the creator of original material to waive certain rights.*

Case Studies in Creative Commons

A spectrum of boutique, institutional and corporate entities apply CC licensing to achieve impact in the developing world.

Figure 1.4 Creative Commons Jurisdications as of May 2014



Countries with Creative Commons Affiliates

Source: Creative Commons (2014)

Figure 1.5 World Bank Open Knowledge Repository
Top 25 Countries with Highest Download Rates / Year

United States	2,106,333
Sweden	241,764
China	262,340
India	236,215
United Kingdom	265,032
Vietnam	218,314
Germany	143,224
Indonesia	106,736
France	91,949
Philippines	71,326
Australia	82,431
Pakistan	69,386
Canada	80,373
Nigeria	62,593
South Africa	59,599
Kenya	55,799
Ethiopia	49,902
Netherlands	55,015
Russia	49,516
Malaysia	45,065
Mexico	52,081
Brazil	49,832
Ukraine	36,396
Italy	48,273
Japan	45,511

Developing Country
Developed Country

The World Bank Open Knowledge Repository

Since 2012, the World Bank adopted an open access policy, requiring that all outputs and knowledge published by the Bank be licensed under CC licenses, which allow others to use and republish the research. Since then, the World Bank's Open Knowledge Repository has released thousands of publications freely and openly and become one of the most important hubs for economic scholarship in the world. Research produced in-house is licensed under the CC Attribution (CC BY) license, and works produced by third parties are under the more restrictive Attribution-NonCommercial-NoDerivatives (CC BY-NC-ND) license. No matter which license it is under, all of the research is openly available and free to read and download. There are now over 13,200 publications available for free download in the repository.

Figure 1.6 - Prototype of the USD 25 Mozilla Smartphone

Source: Mozilla (2014)

Figure 1.7 - Ramzi Jaber, Founder of Visualizing Impact

Source: Flickr. York, J. (2012)

Mozilla

Mozilla is a global free software community best known for producing the Firefox web browser, which uses open source licensing compatible with the CC ethos and licensing structures. The Mozilla community of users develops and disseminates Mozilla software products, which abide by open standards. In early 2014, Mozilla announced it will partner with the Chinese chip maker, Spreadtrum Communications, to bring its Firefox OS to developing markets with a low-end smart phone that costs only USD 25. Not only will this increase access to smart phones, but it will do so via an open source OS that can more democratically facilitate app development and code contributions than a traditional proprietary OS.

Visualizing Impact

Visualizing Impact (VI) is an experimental design firm working at the intersection of data science, technology and social advocacy. CC licensing enabled Ramzi Jaber, VI's co-founder, to launch a thriving design practice specializing in gathering data and design visualizations about pressing social issues.

Case Study: Nollywood Upgrade Project

Nollywood UP is an initiative of the Lagos State Government to support growth in the film industry through training, capacity building, and innovation in financing and distribution.

Figure 1.9 - Nollywood Upgrade Project Workshop in a Village Close to Lagos, Nigeria

Source Nollywood UP Training Report (2013):

The Nigerian Film Industry, known as Nollywood, is booming, selling heavily with domestic audiences and reaching a diaspora audience around the world. In 2009, Nollywood surpassed Hollywood, trailing close behind India's Bollywood as the world's second largest producer of feature films. The industry is on a path to reach the next level of growth and profitability—and to become the ultimate trend-setter for African entertainment.

Lagos, the home of Nollywood, can view its film industry as an opportunity to market the city/state for increased tourism, and to become the hub for media and entertainment in Africa. In addition, a Nigerian film industry that generates USD $250 million in revenue can provide hundreds of thousands of jobs in Lagos. Aside from being the third largest employer in Lagos, Nollywood can be leveraged to achieve positive impact. While providing great entertainment and employment, Nollywood is a compelling and untapped vehicle for advertising, informational and educational content.

Despite this great potential, Nollywood films are subject to increased criticism for poor quality as filmmakers struggle to withstand current challenges presented by digital piracy. Estimates suggest that up to 80 percent of Nollywood's profits are being lost to piracy. Amidst Nollywood's enormous success on the global scale, these challenges threaten to overcome the Nigerian film industry. Nollywood Workshops is a non-profit organization based in Cambridge, MA and Lagos, Nigeria with the mission of empowering independent filmmaking through training, collaboration and innovation. Since 2005, the Nollywood Workshops team has collaborated in Nigeria on a wide range of trainings and film productions, including the award-winning feature length documentary, This Is Nollywood. Nollywood Workshops was co-founded by filmmakers Bond Emeruwa, Aimee Corrigan, Robert Caputo and Franco Sacchi. The team is committed to leveraging the power of film in emerging economies.

As a commitment towards supporting and developing innovation in Lagos, in May 2011 the Lagos State Government partnered with Living Labs Global (now Citymart) to explore an innovative solution to digital piracy in Nollywood. After an extensive review of various solutions, Nollywood Workshops was invited to Lagos for consultations with the Lagos State Government, Lagos Innovation Advisory Council and local stakeholders, to develop and present their holistic strategy for the Nollywood Upgrade Project (UP), covering production, financing and distribution.

Through Nollywood UP, the Nigerian Film Industry will have access to cutting-edge training and compelling film grants. The Nollywood UP initiative seeks to pave the way for continued investment and innovation in Nollywood, including the development of community movie theaters and a film school or training center for Nollywood professionals in Lagos State.

**-- Contribution by Aimee Corrigan,
Director, Nollywood Workshops**

References

Alexanderson, K. (2012) Flickr. Retrieved online from https://www.flickr.com/photos/kalexanderson/7176605114

BSA (2013). Competitive Advantage. Retrieved from http://portal.bsa.org/insead/assets/studies/2013softwarevaluestudy_en.pdf

BSA (2014). Table 4. Estimated National Economic Impact of Increased Use of Properly Licensed Software vs. Pirated Software. Competitive Advantage: The Economic Impact of Properly Licensed Software.

Chesbrough, H. (2003). Open Innovation: The new imperative for creating and profiting from technology. Boston: Harvard Business School Press.

Corrigan, A. & Emeruwa, B. (2013) Nollywood UP Training Report.

Creative Commons (2014). Jurisdiction Database. Retrieved from http://wiki.creativecommons.org/Jurisdiction_Database

Gambardella, A., Giuri, P. and Luzzi, A. (2007). The Market for Patents in Europe. *Research Policy 36* (8), 1163-1183.

Jazairy, A. (2012). Impact Of Collaborative Innovation On IP And Future Trends In IP. *Les Nouvelles – Journal of the Licensing Executives Society 47* (3), 224-229, Sept. 2012.

Karaganis, J. (2011). Media Piracy in Emerging Economies. Social Science Research Council.

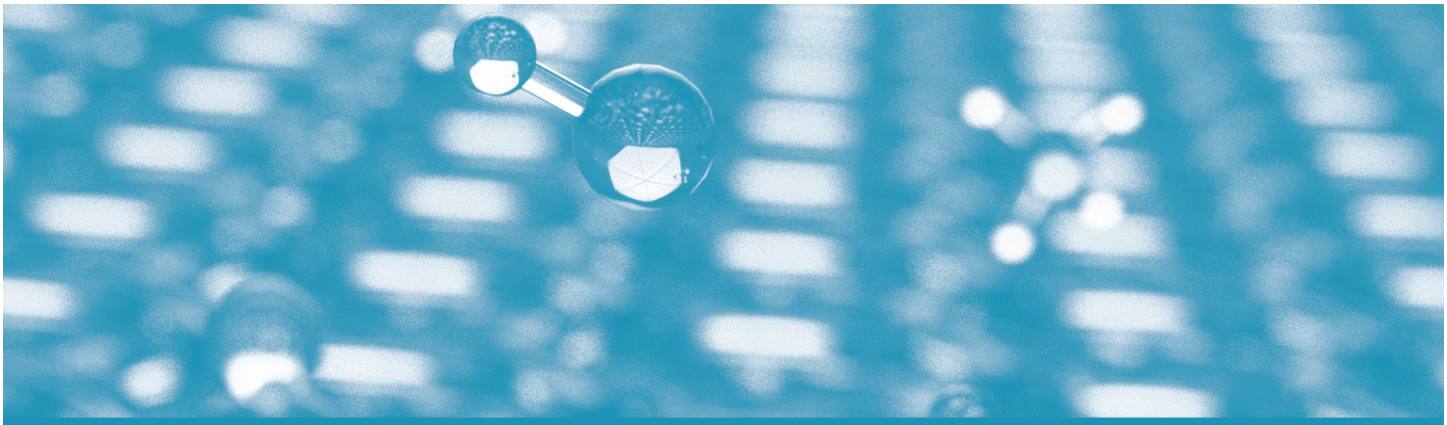
Mozilla Press Center (2014). Firefox OS Expands to Higher-Performance Devices and Pushes the Boundaries of Entry-Level Smartphones. Retrieved from https://blog.mozilla.org/press/2014/02/firefox-os-news-2/

UNDP (2014). Table 12: Innovation and technology. UNDP Data Set. Retrieved from https://data.undp.org/dataset/Table-12-Innovation-and-technology/jixu-gnyy/widget_preview?height=425&variation=vb6g-9i38&width=500

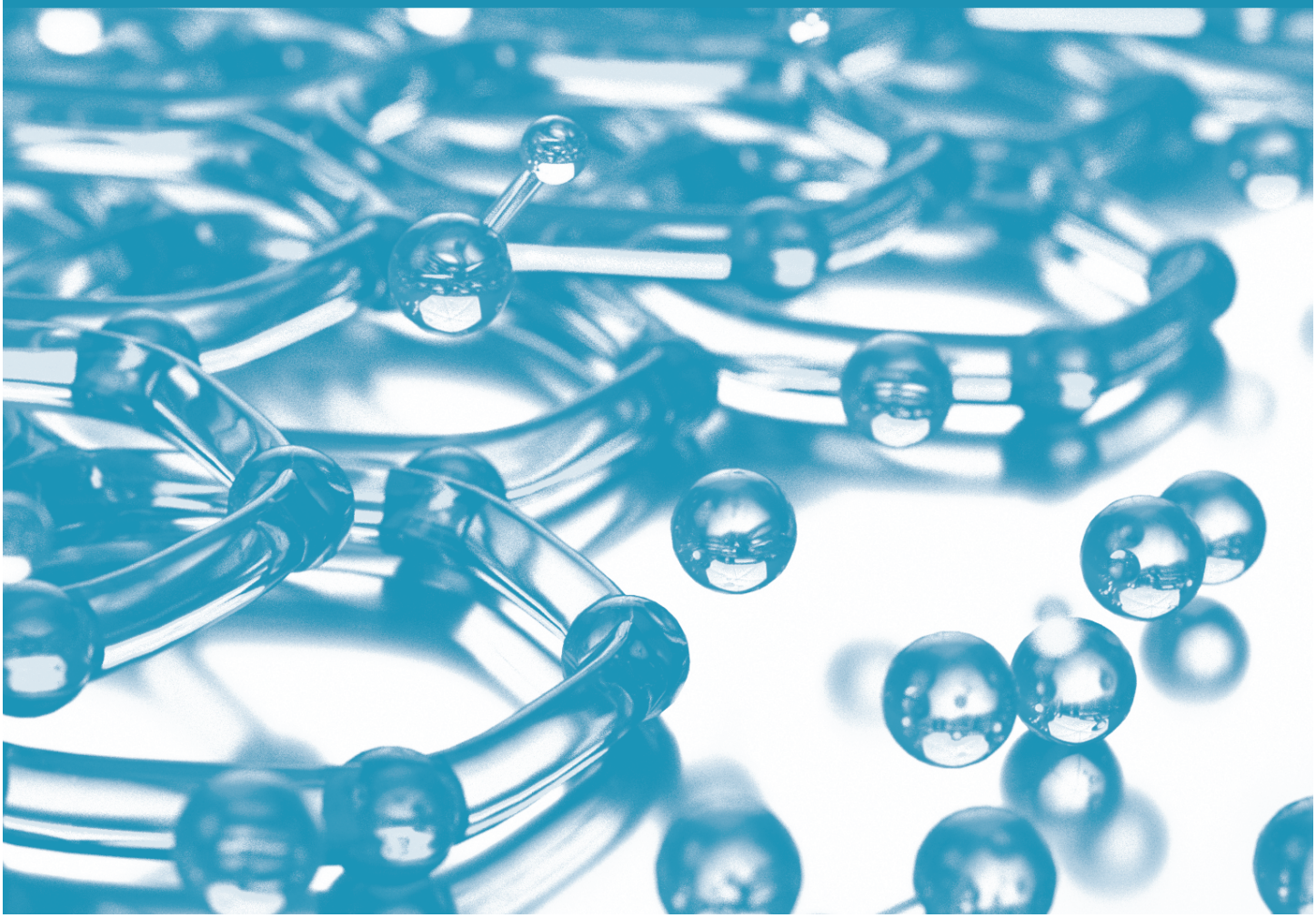
World Intellectual Property Organization (2004). Yearly Review of the PCT: 2003. No. 901(E). Retrieved from http://www.wipo.int/export/sites/www/pct/en/activity/pct_2003.pdf

World Intellectual Property Organization (2014). US and China Drive International Patent Filing Growth in Record-Setting Year. PR/2014/755. Retrieved from http://www.wipo.int/pressroom/en/articles/2014/article_0002.html

York, J. (2012). Flickr. Retrieved online from https://www.flickr.com/photos/jilliancyork/7544150850/



Patent Pools

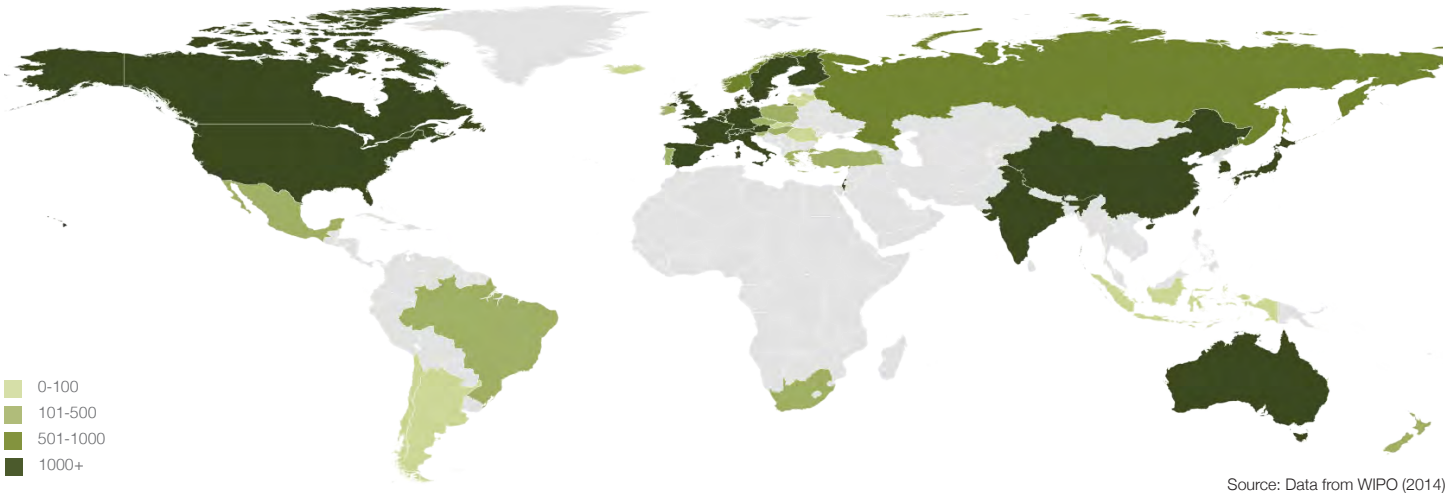


"In 2012, for the first time, residents of China (560,681) accounted for the largest number of patents filed throughout the world." - WIPO

Chapter 2: Patent Pools

Patent pooling allows owners of patents to broaden the scope of implementation. This type of joint licensing program can also have a positive impact on innovation for emerging economies, as it reduces transaction costs and makes it easier for companies to develop new products without hefty licensing fees.

Figure 2.1 - Total PCT Filings (2011-2013)



Source: Data from WIPO (2014)

DEFINITION

A patent pool is a formal association between two or more companies, organizations, or governments, agreeing to cross-license essential patents in an area of technology. The general purpose of patent pools is to reduce the transaction and administrative fees associated with licensing technologies in areas where substantial collaboration and overlap is inevitable. By agreeing ahead of time to cross-license with a set royalty fee, companies are able to create cost certainty in the development of new technologies and pre-empt costly infringement litigation. These agreements also have the added benefit of fostering wider adaptation of new technologies, since parties to the agreement may be able to commercialize their developments faster.

Patent Pools and Increased Innovation through Risk Mitigation

A patent pool can help standardize the provision of services, thereby expanding the consumer market beyond what a company could achieve through its own research and development. Patent pools are primarily used as a risk mitigation tool between firms where technology overlap is certain. This helps explain why the ICT industry has dominated recent waves of patent pools in response to an increase in both patent awards across a wide variety of technologies and the volume of patent litigation between rivals over the last two decades (WIPO 2011).

Since patent pools are contractual agreements between firms and not widely governed by international agreements, they offer a unique avenue for increased collaboration. The Human Genome Project, as discussed in Chapter 10 (Open Collaborative Projects), illustrates the value of enhanced collaboration. Another notable recent example is the Medicines Patent Pool (MPP), financed by UNITAID and formed in July 2010 to reduce the cost of HIV/AIDS medicines for patients in low and middle-income countries.[1] The MPP has successfully negotiated licensing agreements with various patent holders, enabling the manufacture of cheaper generic medications. Similarly, the Pool for Open Innovation for neglected tropical diseases, malaria and tuberculosis provides access to IP for pharmaceutical compounds, technologies, and data. The group is led by pharmaceutical companies, WIPO, and BIO Ventures for Global Health.[2]

Benefits of Patent Pools and Anti-Competitive Behavior

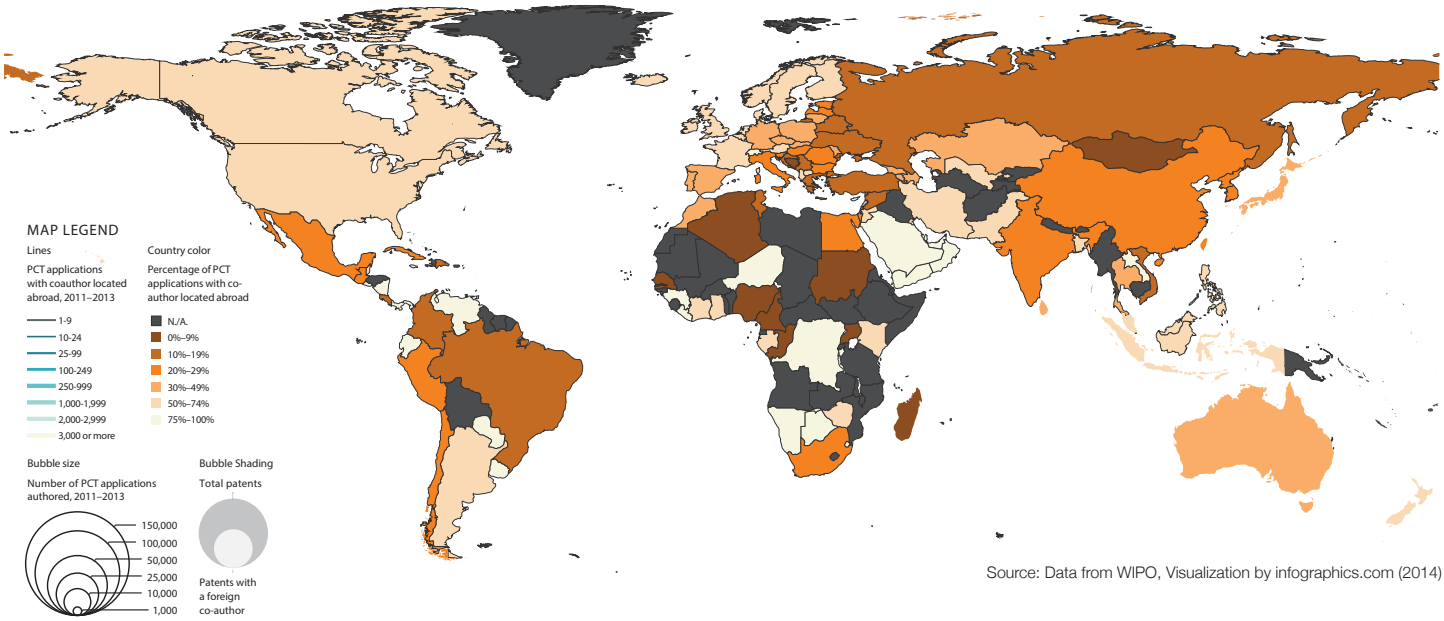
Advocates argue patent pools open up competitive entry into a field because they establish a single, reasonable royalty rate amongst the members (Brufani 2011). Patent pools eliminate problems caused by "blocking" patents, which can otherwise prevent companies in an industry from bringing commercial products to the market. At the same time, patent pools may harm competition because non-members do not benefit from the reduced royalty rate for use of the technology. Therefore they may provide an opportunity for anti-competitive behavior (WIPO 2014).

1 See http://www.medicinespatentpool.org/
2 See http://www.wipo.int/research/en/

Summary Findings

Over 30 countries have filed all of their patents between 2011-2013 with a foreign coauthor. While some nations have only filed one (e.g. Niger, Guinea), others with a high number of PCT applications (e.g. 400 in Barbados, nearly 900 in Luxembourg) filed almost all of theirs with a foreign coauthors. For the past five years, the number of cross-country collaborations on PCT has increased considerably, as well as the range of countries included in such collaborations. For this given period, the number of patents filed with authors located in both the US and India was above 10,000.

Figure 2.2 - Percent of Patents with Foreign Coauthor



Source: Data from WIPO, Visualization by infographics.com (2014)

Pro-Competitive Effects	Anti-Competitive Effects
Increased efficiency by integrating complementary patents	Distortion of competition
Reduced transaction costs	Anti-competitive licensing practices
Clearing blocking positions	Potential forum for price-fixing

Anti-Competitive Effects and Concerns

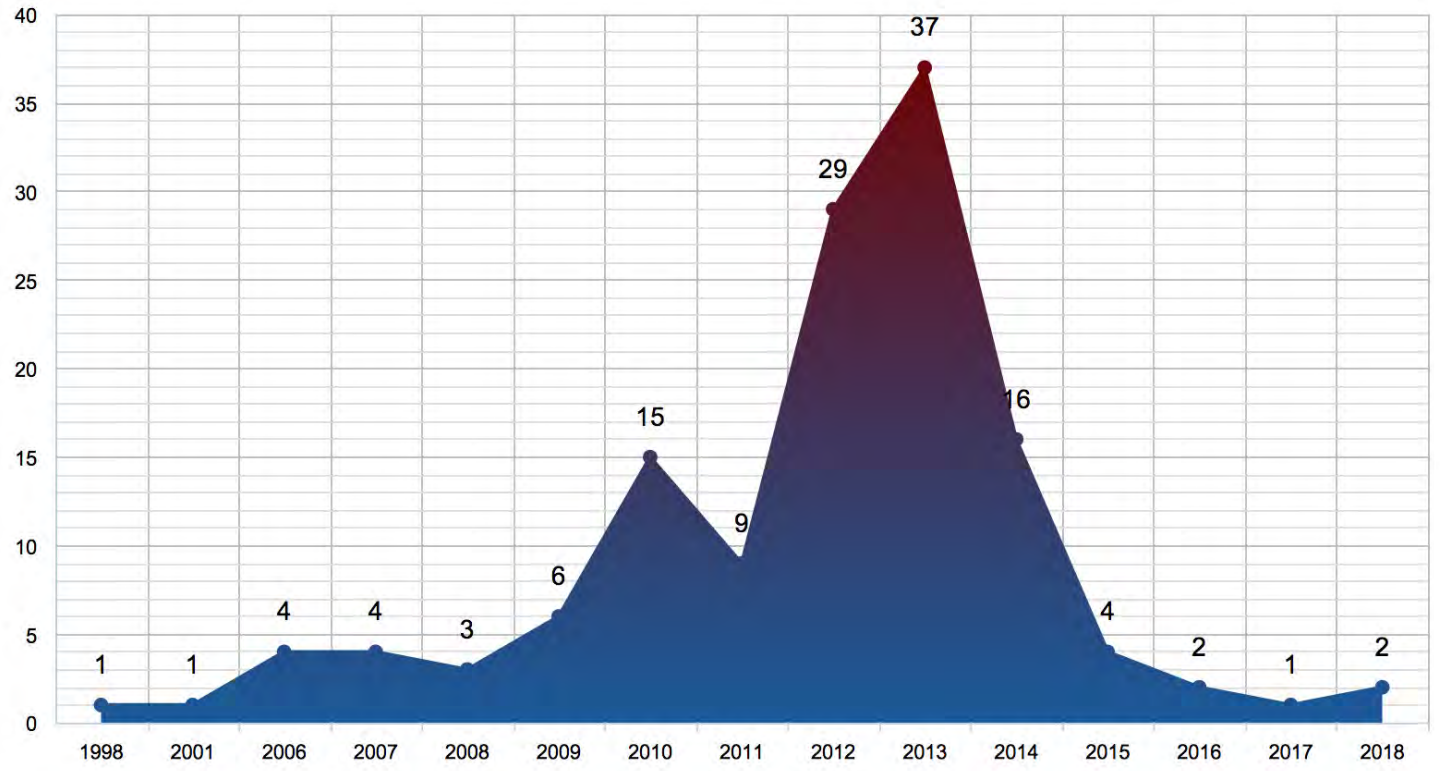
Today, over 120 countries have adopted or are in the process of implementing antitrust legislation.[3] In the US, a patent consortium seeking to enter a patent pooling agreement must seek an independent review from the Department of Justice which will examine both the pool's expected competitive benefits and its potential competitive hazards (Roberti 2005). Once the Department has cleared the consortium of anticompetitive behavior, the individual companies and organizations may form a new entity (usually an LLC) to administer the patent portfolio.

Other countries have adopted similar review processes to evaluate the anti-competitive effects of patent pools. The International Competition Network is an organization that advocates for the adoption of superior competition standards. They provide competition authorities with a specialized yet informal venue for maintaining regular contacts and addressing practical competition concerns. This allows for a dynamic dialogue that serves to build consensus and convergence towards sound competition policy principles across the global antitrust community.

3 See http://www.agcm.it/en/other-countries.html

Case Study: MPEG-2 Patent Pools

Figure 2.3 - MPEG-2 Patents by Year of Expiration



Source: robglidden.com

In June 2007, the MPEG-2 Technology Pool was formed, providing access to 27 patents from nine organizations (such as Sony, Matshushita, and Philips) that are essential to the MPEG-2 Video and Systems coding standards. These standards are used in set-top boxes, DVD players and recorders, TVs, personal computers, game machines, cameras, DVD Video Discs and other products, facilitating the establishment of a standardized protocol to protect web-based copyrighted works.[1]

The patents were licensed to over 1,500 private organizations and have been referred to as a standard for patent pools that followed. This example also highlights one of the key benefits of patent pools: the distribution of risk, as all 27 patents under the MPEG-2 Technology Pool are equal in value, with revenues earned distributed equally among all nine organizations.

While one might argue that this patent pool might generate an anticompetitive effect, it has fostered transparency and communication between participating entities and decreased the necessity for trade secrets. Although most of the MPEG-2 patents will have expired by 2015, the patent pool will remain effective as long as one of the patents is still active.

This example highlights one the key benefits of patent pools: the distribution of risk, as all 27 patents under the MPEG-2 Technology Pool are equal in value.

1 See http://www.mpegla.com/main/programs/m2/pages/Intro.aspx

References

Brufani, S. (2011). Patent Pools: The road to successfully establishing them. Presentation. April 28, 2011. Retrieved from http://ec.europa.eu/dgs/jrc/downloads/events/20110428-tto-circle/jrc_20110428_ttocirle_brufani.pdf

Clark, J., Piccolo, J., Stanton, B. & Tyson, K. (2000). Patent Pools: A Solution to the Problem of Access in Biotechnology Patents? USPTO. Retrieved from http://www.uspto.gov/web/offices/pac/dapp/opla/patentpool.pdf

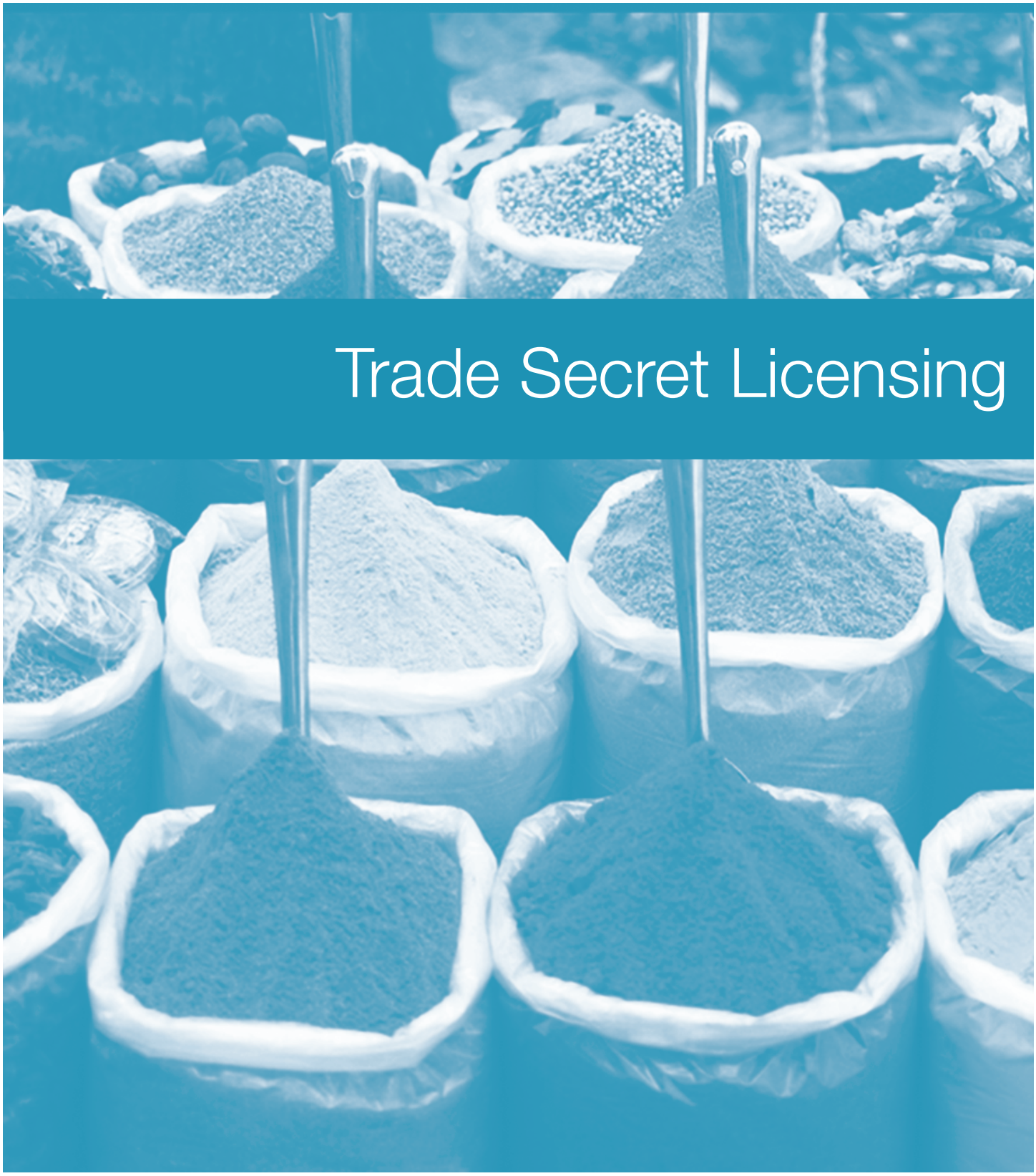
Gliden, R. (2011). Half of MPEG-2 Patents Expire in 2012. Retrieved online from http://www.robglidden.com/2011/12/half-of-mpeg-2-patents-expire-in-2012/

National Science Foundation (2014). Retreived from: http://www.nsf.gov/news/mmg/index.jsp?s=0&page=1

Roberti, M. (2005). The RFID Patent Pool: Next Steps. RFID Journal.

Word Intellectual Property Organization (2011). The Changing Face of Innovation. Retrieved from http://www.wipo.int/export/sites/www/freepublications/en/intproperty/944/wipo_pub_944_2011.pdf

Word Intellectual Property Organization (2014). Patent Pools and Anti-Trust: A Comparative Analysis. Retrieved from http://www.wipo.int/export/sites/www/ip-competition/en/studies/patent_pools_report.pdf



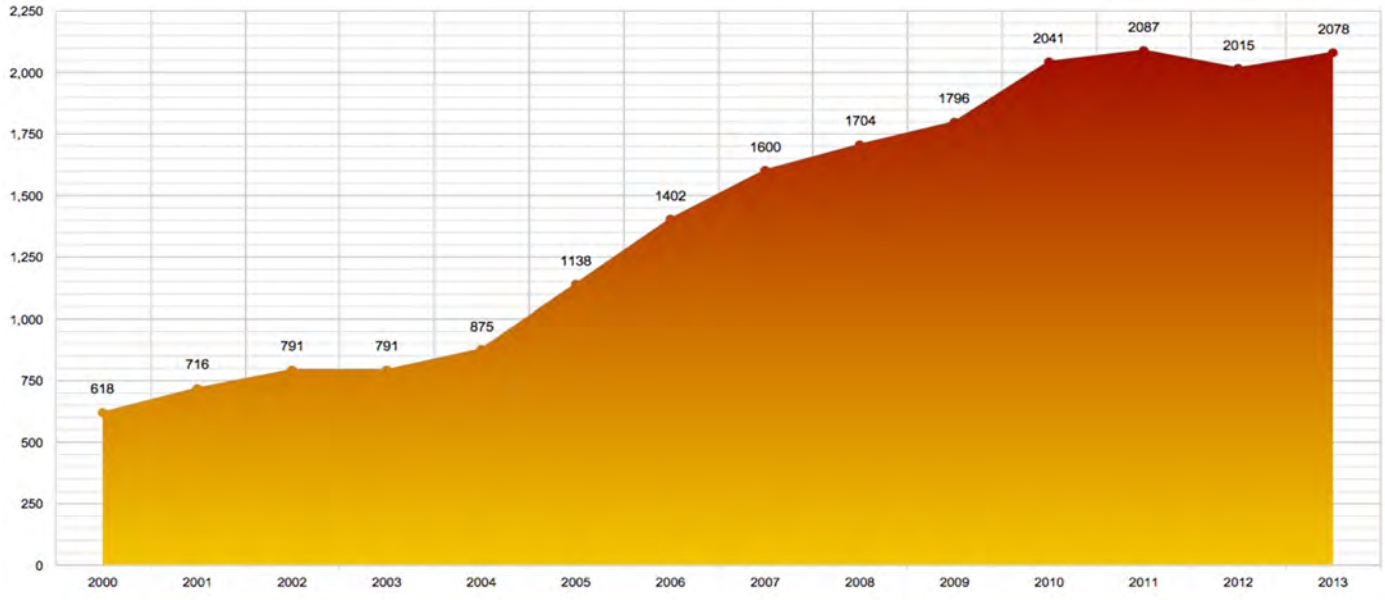
Trade Secret Licensing

"Codified knowledge is potentially patentable, but know-how, which cannot be fully captured in written form, can only be protected through trade secrets."
- The Protection of Trade Secrets, WIPO

Chapter 3: Trade Secret Licensing

Trade secrets are the oldest form of IP protection, and have the potential to bolster international technology transfer, open innovation and global knowledge flows. From 2001 to 2011, the number of trade secret decisions in the US increased by nearly 200 percent, due to increased workforce mobility and advances in technology.

Figure 3.1 - Number of Trade Secret Cases in the United States (2000-2013)



Reference: American Law Institute, Restatement of the Law of Torts, § 757, comment b (1939)

DEFINITION

A trade secret is "defined within the context of its use.

a. It must lend a competitive advantage,
b. must be kept secret within an enterprise,
c. and must not be generally known within an industry."

American Law Institute, Restatement of the Law of Torts, § 757, comment b (1939)

Shifting Landscape of Innovation

Trade secrets have grown in importance in the 21st century with the rise of computer technology and the information revolution. In an interconnected marketplace, protecting one's IP is more important than ever, as misappropriation can cost companies millions of dollars annually. It is in the expanding realm of international "open innovation" that trade secret laws may be turned to greatest advantage, particularly for smaller firms and individual inventors from developing countries. These actors often can leverage their special creativity and local knowledge most effectively by collaborating with large, well-established multinational corporations that are looking for fresh ideas. That kind of partnering – the building of "trusted networks" of SMEs and other innovators – is enabled by national trade secret laws that protect the integrity of shared information.

Trade Secret Licensing Agreements

Since trade secrets do not exist until they are litigated, frameworks for better trade secret licensing agreements in developing countries should be laid out. Indeed, trade secret protection in the US is relatively more advanced than in most of the rest of the world. The issue is particularly acute in many of the largest emerging economies such as China, Brazil, Russia, and India. For example, economic development in Brazil may have been hampered by weak trade secret protection and ineffective enforcement relative to the US (Sherwood 2009).

As supply chains and operations expand globally, a company's ability to protect its trade secrets may be significantly diminished by weak rule of law and ineffective or non-existent enforcement in a number of countries. The courts often deny trade secret status usually due to failure to properly document or secure the trade secret. Companies should be proactive in investing in trade secret protection; such expenditures should not be viewed as sunk costs, but rather important investments to preserve and enhance value.

The Trade Related Aspects of Intellectual Property (TRIPS) and the Anti-Counterfeiting Trade Agreement (ACTA) are two frameworks which directly address trade secrets and establish international standards for IPR enforcement. For more information on TRIPS and ACTA, consult Chapter 7 (Litigation).

Interview with Dr. Ali Jazairy

CSF: What have been some general trends of the past five years in regards to trade secret licensing?

Ali Jazairy: According to a 50-state survey of trade secret decisions in all Federal and state courts in the US: in 2011 the number of trade secret decisions was 2074 and the number of combined noncompete and trade secret decisions in 2011 was 2514. This represents an increase of 190 percent and 142 percent from a decade earlier, respectively. With a global marketplace, rapid advances in technology and telecommunications, a highly-skilled mobile workforce, and networked strategic business relationships like extensive outsourcing, IP is bound to leak, particularly in the form of trade secrets. This has resulted in the increase of the sheer number of trade secret and noncompete decisions on a global scale.

CSF: What factors do you attribute to this increase?

AJ: The past fifteen years have witnessed two coupled effects: an Eastward-shifting center of balance of innovation combined with the advent of new paradigms for innovation, such as networked innovation. According to a recent study, Indian and Chinese entrepreneurs founded or co-founded roughly 30 percent of all Silicon Valley startups in the late 1990s. The impact of dot-com bubble Indian and Chinese Silicon Valley returnees in their home countries has contributed to the increased global flow of knowledge, particularly through an "Eastward Vector" (the first effect).

In addition, in today's world, highly-qualified employees will tend to change jobs more easily as they are lured to work for a competitive company across the street. When they change jobs, employees take what they know with them and effectively facilitate a knowledge flow between companies. Information will tend to flow more easily due to a more mobile workforce and faster connections to potential global partners through the ubiquitous information and communication technologies, enabling the new phenomenon of networked or "Open Innovation" (the second effect).

CSF: How might trade secret licensing bolster international technology transfer, open innovation, and knowledge sharing?

AJ: Trade secret licensing has the potential to be a key enabler for building solutions to the international community's common global challenges. One needs to re-model and re-frame discussions on international technology transfer through a change of perspective. Our mindset needs to shift from seeing technology transfer as an "unkept" promise, and we need to engage in a conversation on the future opportunities and markets opened by this transfer.

In this context, exchanging trade secrets on a global scale is bound to generate a new revenue stream through licensing of used and/or unused IP, including trade secrets, thereby bolstering international technology transfer, open innovation and global knowledge flows. Trade secrets will undoubtedly be used more often on a worldwide scale in the future. The question is whether their full potential will be unleashed through the creation of intellectual partnerships.

CSF: What is a practical example of a situation in which a trade secret might act as a catalyst for knowledge sharing and provide a win-win situation for licensor and licensee?

AJ: A simple example is car tires; when it rains, a thin and uniform film of water forms between the car tire and the surface of the road. Highways can become extremely slippery. A polymer physicist may have a recipe that cannot be reverse engineered which makes tires resistant to slippery roads. A tire manufacturer may be interested in licensing this polymer process and engage in a licensing negotiation. Rather than being contaminated through the full disclosure of the trade secret that may not be of interest, the tire manufacturer (the potential licensee) sets up a few successive filters between itself and the polymer physicist (the potential licensor). The filters establish two options: if the trade secret is of interest, proceed with more detailed information; otherwise exit the trade secret licensing negotiation. If, in the end, the process is of real interest, the secret is transferred, providing a win-win situation for the licensor and the licensee.

CSF: You've mentioned that "innovation is becoming harder today." One would think that the democratization of access to innovation platforms would have the opposite effect. Can you elaborate on this finding?

AJ: Innovation cycles start by being disruptive and end by being incremental. Most of the recent technological breakthroughs are no more than the low-hanging fruits, and future big technological gains will become much harder to attain. Converting terabytes of genomic knowledge into medical value will be more difficult than discovering and mass producing antibiotics.

Moreover, a recent study shows that 80 percent of U.S. per capita income growth during 1950-1993 was due to rising educational attainment and research intensity. Yet neither can increase endlessly and, in the absence of another factor, economic growth is likely to slow down.

In addition, if knowledge increases as technology progresses, then successive generations of innovators may face an increasing "knowledge burden." Innovators can compensate by seeking narrower expertise, which in turn will reduce their individual capacities and affect the organization of innovative activity. As a result, there will be a greater reliance on teamwork.

CSF: What role will trade secrets play in this new context?

AJ: The licensing of trade secrets between global stakeholders, organized in a quadruple helix innovation configuration (business, government, higher education and citizens working together), will enable a higher density of knowledge flows and eventually provide the missing link between innovation and growth.

Source: Digital Agenda for Europe

Emir Ali Jazairy, Ph.D. is Senior Counsellor, Innovation and Technology Sector at the World Intellectual Property Organization (WIPO). The interview answers are the personal opinions of the interviewee and do not constitute statements by or opinions of WIPO.

References

American Law Institute. Restatement of the Law of Torts, § 757, comment b (1939)

Beck, Russell (2014). Table: Trade Secret and Non Compete Reported Decisions. Fair Competition Law.

National Science Foundation (2014). Retrieved from: http://www.nsf.gov/news/mmg/index.jsp?s=0&page=1

Sherwood, R. (2009). Trade Secret Protection: Help for a Treacherous Journey. *Washburn Law Journal 48* (1).

Franchising

"One of the big promises of franchising is its ability to develop a host market's small and medium-sized enterprises (SMEs) and bolster local entrepreneurship."
- Ian Allon, Technical Director at SMS Market Research

Chapter 4: Franchising

Franchising has been one of the fastest and most popular means of expansion for private companies in the 21st century, with the number of franchises around the world expected to have quadrupled between 2012 and 2017. It can also provide an opportunity to bridge the knowledge gap between the Global North and the Global South by having franchisors engage in technology transfer with franchisees.

Figure 4.1 - Percentage of Franchising per Country

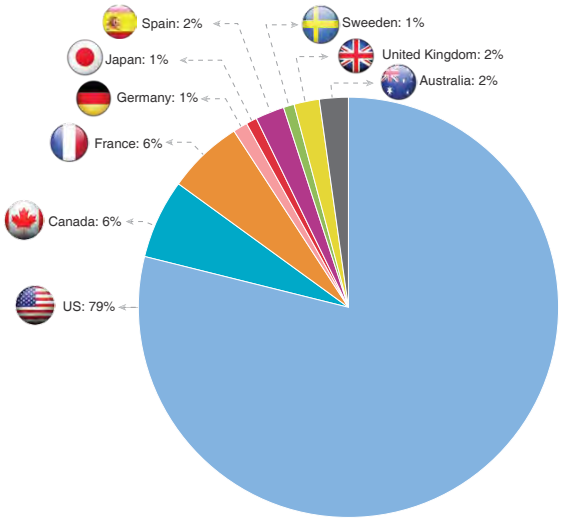
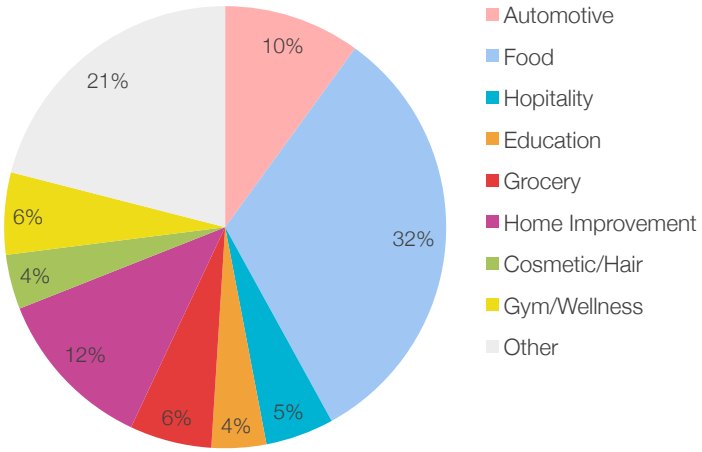


Figure 4.2 - Percentage of Franchising per Industry



Source: Franchise Direct (2014)

DEFINITION

A franchise operation is a contractual relationship between two entities in which the business owned by the franchisor is licensed for commercial use to the franchisee. In most franchise relationships, the franchisee makes a substantial capital investment in the business owned by the franchisor, in exchange for the rights to sell the franchisor's products or services in a new market under the trade name of the franchise. This legal and commercial arrangement concerning the use of an established brand owned by the franchisor is a popular means of expanding to new markets where much of the risk is absorbed by the franchisee putting up the capital investment.

Different Forms of Franchise Agreements

A franchising agreement goes beyond distribution agreements and extends to the entire operation or method of business. While distribution agreements are often short and straightforward, successful franchising requires a high level of collaboration and assistance over longer durations.

Business format franchising allows for the most flexibility for local entrepreneurs, while retaining the look and feel of the brand. The franchisee not only distributes products and services under the franchisor's trademark, but implements the franchisor's business format and procedures of conducting business.

In the context of emerging economies, the business format franchise allows an established brand to contract firms and individuals with expertise in local markets. These local franchisees will likely have done market research and have more familiarity with local laws and regulations. The franchisor can then invest less in management and set-up costs in the new market.

The Rise of Cross-Border Franchising

Since the recession, the overall number of franchise businesses has increased internationally. According to Franchise Times, 36.2 percent of companies on their Top 200 list are outside the US, compared with 24 percent in 2000 (Maze 2013).[1] Some nations such as China have revisited their franchising policies to make foreign investment an easier and quicker process. For instance, McDonald's outlets first opened in Chinese cities in1990, but didn't start franchising until 2004 (Edwards 2011).

Common issues raised in a franchising agreement are fees, capital requirements, territories, contract duration, and IPRs. In order to best leverage the benefits of an established brand, the franchisee must gain access to many forms of IP owned by the franchisor. The use of the franchisor's trade name, business know-how and trade secrets, sales and business procedures, and copyrighted materials are shared with the franchisee in exchange for royalties and license fees.

1 The Franchise Times Top 200 is a list of 200 largest US-based franchise companies by sales.

Figure 4.3 - Top 20 Global Franchises (2014)

Franchise Name	Country of Origin	Industry
Subway	United States of America	Sandwich and Bagel Franchises
McDonald's	United States of America	Fast Food Franchises
KFC	United States of America	Chicken Franchises
Burger King	United States of America	Fast Food Franchises
7 Eleven	United States of America	Convenience Store Franchises
Pizza Hut	United States of America	Pizza Franchises
GNC Live Well	United States of America	Wellness Products & Services
Wyndham Hotel Group	United States of America	Hotel Franchises
Dunkin' Donuts	United States of America	Bakery & Donut Franchises
DIA	Spain	Convenience Store Franchises
RE/MAX	United States of America	Real Estate Franchises
Domino's Pizza	United States of America	Pizza Franchises
Ace Hardware Corporation	United States of America	Home Improvement Retail Franchises
Circle K	United States of America	Convenience Store Franchises
InterContinental Hotels Group	United Kingdom	Hotel Franchises
Hertz	United States of America	Car Rental & Dealer Franchises
Baskin-Robbins	United States of America	Ice Cream Franchises
Jani-King Commercial Cleaning Services	United States of America	Commercial Cleaning Franchises
Liberty Tax Services	United States of America	Tax Franchises
Snap-on Tools	United States of America	Automotive Repair Franchises

Source: Franchise Direct (2014)

Franchising in Emerging Economies

Emerging markets represent a considerable opportunity for long-term growth to businesses and franchisors. Franchisees have specific local knowledge of new markets that can allow for increased profits which would otherwise have been unrealized if the franchisor had gone into the market alone. While an established brand's trademark alone may be enough to secure profits through a distributor agreement in a new market, a local franchisee with knowledge of local customs and expectations may be able to alter the franchise's business model to better fit the local community. Through increased collaboration, the franchisor and franchisee may see greater profits than by simply distributing products.

In setting up a franchise in an emerging economy, the potential for fast growth must be carefully balanced with the real concern of protecting the brand. A poorly run franchise may have lasting impacts on the ability of the franchisor to re-enter that market. To avoid this risk, franchise agreements often contain strong termination provisions in which the franchisor may terminate the agreement at will in the event the brand is being harmed.

Master Franchising in Developing Countries

In the context of emerging economies, master franchising agreements provide another means of avoiding risk. By contracting with a master franchisee, a foreign franchisor can establish a minimum number of franchise outlets within a geographical area over a specified period of time. The master franchisee is then responsible for sub-franchising activities. The local expertise and network of the master franchisee is used to reduce the transaction costs of seeking out new franchisees in the developing country.

Master franchising agreements allow the franchisor to expand quickly in new markets, and capital for the expansion generally comes from the franchisee. However, a main criticism of the master franchising system stems from the predominance of establishment schedules. Master franchisees may be under strong pressure to meet the minimum number of franchise outlets laid out in the master franchising contract rather than focusing on the success of individual franchise outlets. Failures can also happen when the franchisor does not adjust its products to meet the needs of local market conditions, as took place with Wal-Mart in China, or with Best Buy in Turkey.

References

Cabral, K. (2010). Flickr. Retrieved online from http://www.flickr.com/photos/keoni101/5292428084/

Edwards, W. (2011). The Pros and Cons of Franchising in China. Retrieved from http://www.chinabusinessreview.com/the-pros-and-cons-of-franchising-in-china/

Franchise Direct (2014). Table: Top 100 Global Franchises - 2014 Rankings. Top 100 Global Franchises 2014 - Top 100 Overview. Retrieved from http://www.franchisedirect.com/top100globalfranchises/rankings/

Maze, J. (2013). Franchise Times Top 200. Retrieved from http://www.franchisetimes.com/Resources/Top-200/index.php

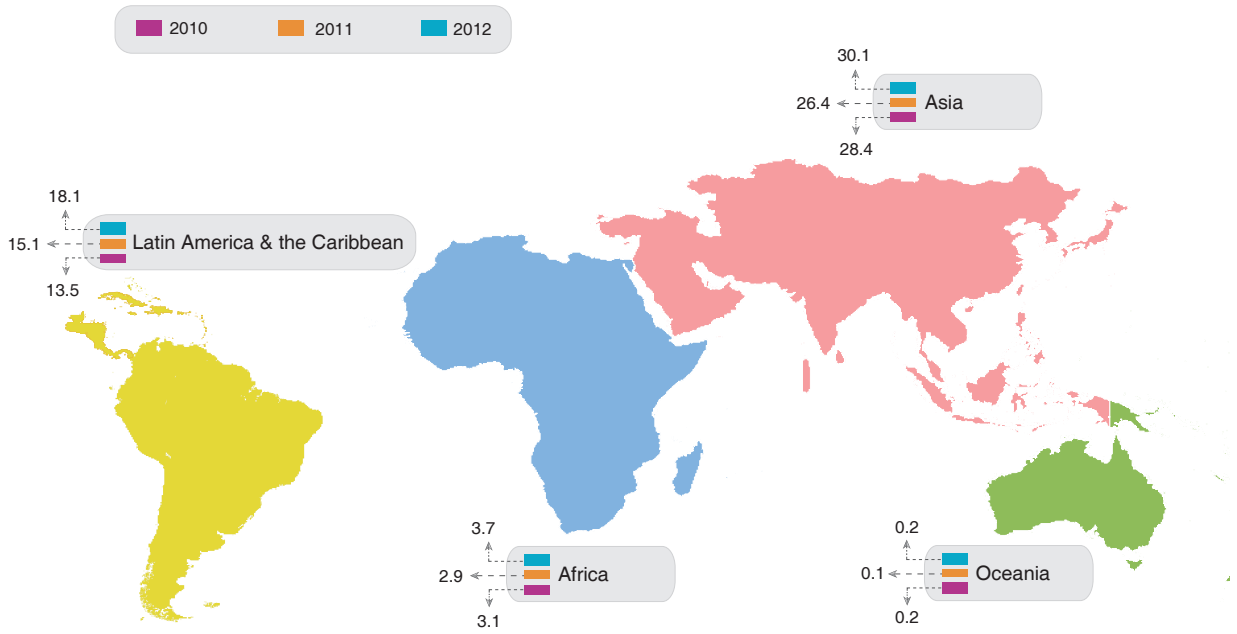
Joint Ventures

"We live in a time when the global economy is increasingly integrated. Neither countries, nor firms, nor managers can go at it alone without sacrificing the advantages of good partnerships." - Paul Beamish & Nathaniel Lupton, Managing Joint Ventures

Chapter 5: Joint Ventures

Even though culturally different markets make it difficult for joint ventures to be successful, the model has allowed large firms to expand into new strategic locations. It has also enabled emerging economies to bolster their organizational learning while engaging in knowledge and technology transfer.

Figure 5.1 - Percentage Share in Foreign Direct Investments (2012)



Source: UNCTAD (2013)

DEFINITION

A joint venture is a business agreement in which parties agree to develop, for a finite time, a new entity and new assets by contributing equity. They exercise control over the enterprise and consequently share revenues, expenses and assets. The definition of joint ventures as well as their legal status can vary widely across jurisdictions.

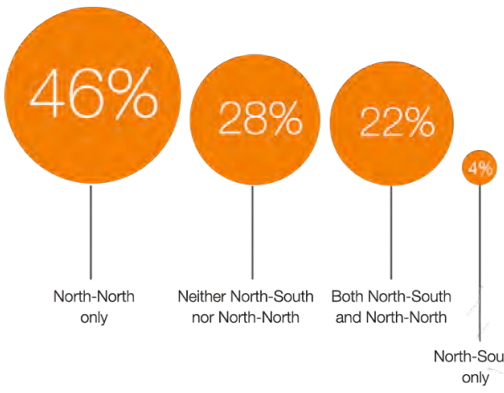
Trends Between Developed and Developing Countries

Historically, joint ventures in developing countries came into wide use after WWII as a new form of foreign direct investment. Investors from developed countries willing to extend their operations into newly independent developing countries started to search for local partners. At present, joint ventures are one the most prevalent methods for business transactions and an efficient way of distributing risk. Data underlines that joint ventures have recently increased in key regions such as Europe, Asia Pacific, and the Middle East and North Africa (Allen & Overy 2013).

Foreign companies form joint ventures with domestic companies already present in desirable markets as a way for the latter to provide knowledge of the domestic market. Other assets include a familiarity with local bureaucracies and legislations, as well as a firm grasp of the labor markets and rules. Foreign partners, in exchange, often offer advanced process and product technologies, specifically if they are already well established. They also provide access to export markets and expand the potential market for local manufacturing facilities. For both sides, the possibility of joining with another company in a new venture can lower capital requirements relative to operating alone.

Increased North-South Joint Ventures

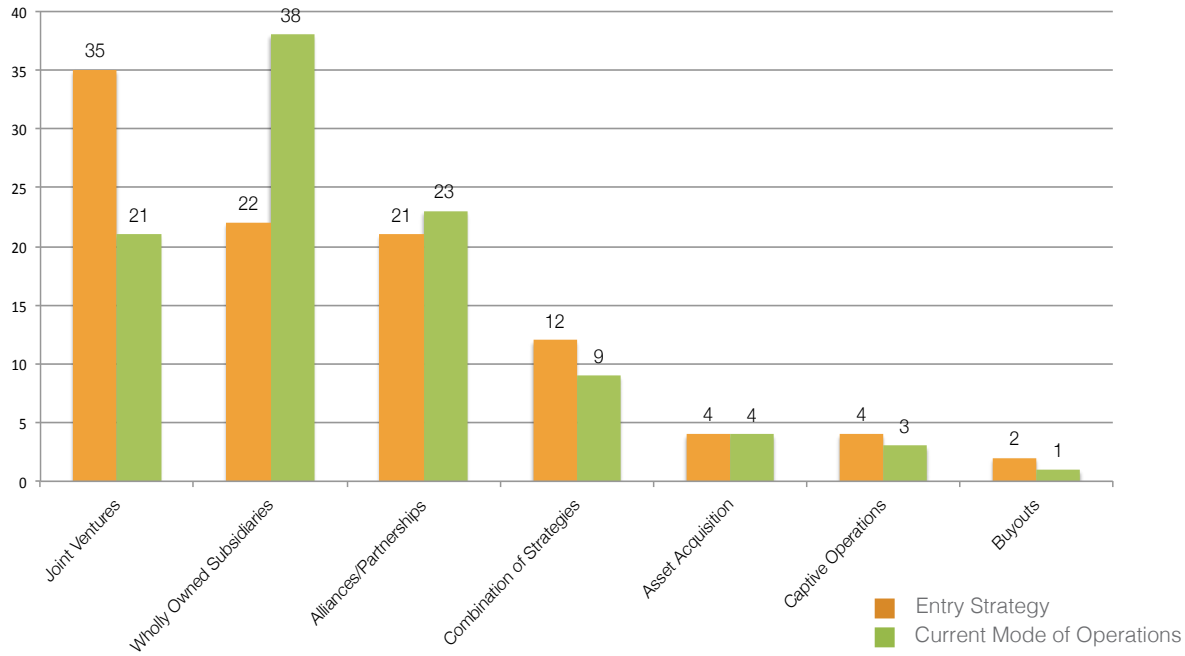
A survey of Canada's health biotechnology sector revealed that collaborations with developing countries are significant and increasingly reciprocal in terms of the exchange of financial resources and technological know-how (Daar et al. 2009).



Summary Findings

Data for the below bar graph is taken from a Deloitte survey in which 247 executives from consumer and industrial product companies with presence in emerging markets were interviewed. In the past decade, the rate of international joint ventures (IJV) has increased progressively in emerging markets in Asia, Latin America, and Eastern Europe. The report highlights that emerging markets account for about 70 percent of all IJV entries by multinational corporations as of 2009, as companies often choose low-cost centers.

Figure 5.2 - Operating Model (2009 Deloitte survey of 247 executives)



Source: Deloitte Review (2009)

The graph on the left underlines that 26 percent of health biotech firms are involved with countries located in the Southern hemisphere. This reflects a shifting landscape of collaborations where alliances are sought around the globe. Furthermore, the survey found that many of the firms involved in North-South collaborations have more than one such initiative.

Joint Ventures and Agriculture

In post-Apartheid South Africa, the government initiated a program to restore agricultural lands to dispossessed communities. In order to encourage rapid economic development and technical knowledge transfer, the government encouraged communities to enter directly into joint venture agreements with commercial partners. These private entities were expected to manage production activities and in turn, provide jobs, technical training and entrepreneurial opportunities to historically marginalized and economically deprived communities. However, many joint ventures have collapsed from major financial losses and overall have failed to deliver expected socioeconomic benefits (Lahiff et al. 2012).

Currently, there is a need for alternative policies that hold state agencies more accountable, and offer more equitable and sustainable models for communities and commercial partners to form long lasting joint ventures. For the communities, a core challenge would be to guarantee the provision of benefits to their members in both the short and long terms, while allowing them to eventually assume full control of farming operations.

New Challenges in International Joint Ventures

There has been a rise of "virtual corporations," with organizations essentially outsourcing most of their operations. Oracle Inc., the multinational computer technology company, has alliances with about 15,000 strategic partners such as Chevron and Ford. Visa and Mastercard have arrangements with over 21,000 financial institutions around the world (Gup 2003). However, cross-border joint venture agreements between developed and developing countries raise a number of questions. For instance, which nation should dictate the governing law of a joint venture agreement between two companies in two different countries? In most cases, the place of incorporation has a different governing law than that of the country where the joint venture is located.

One may also think about the risks of entities in the local country to appropriate knowledge from the original place of incorporation, consequently becoming a rival in the marketplace. Another challenge involves the strategic alignment between the entities entering int a joint venture agreement. Clear guidelines in regard to governance and decision-making are necessary to ensure success.

Joint ventures have the potential to bolster the ability of emerging economies to innovate, strengthen their knowledge, and to become more competitive.

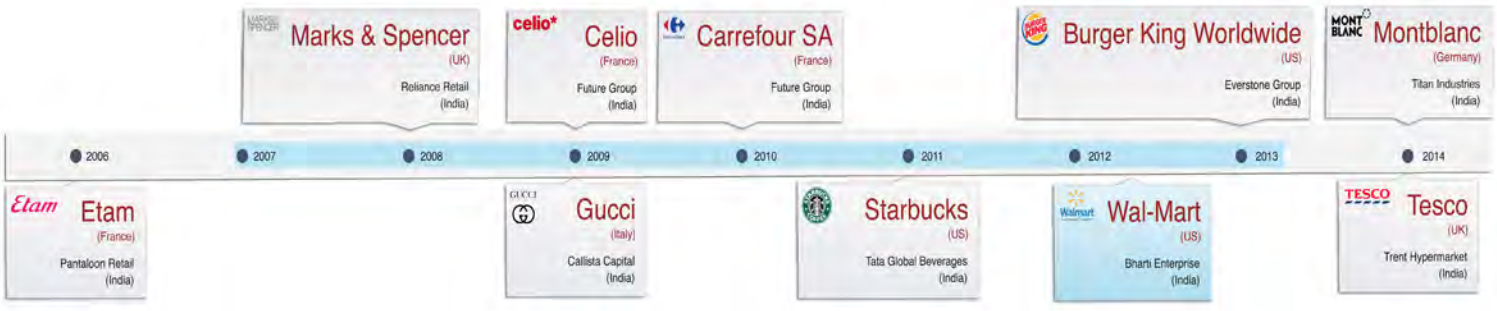
Case Study: Entering the Indian Retail Market

In a joint venture agreement, two or more parties join resources to implement a common vision. Even though culturally different markets make it difficult for joint ventures to be successful, the model has allowed large firms to expand into new strategic markets. It has also enabled emerging economies to bolster their organizational learning while engaging in knowledge and technology transfer.

Figure 5.3 - India's First Standalone Gucci Store in Nariman Point, Mumbai

Source: Adriana Valdez Young (2008)

Figure 5.4 - Examples of Multinational Retailers Entering Indian Market via Joint Ventures



Source: Times of India (2008-2014)

References

Allen & Overy (2013). The Allen & Overy M&A Index, Q4 2013. Retrieved from http://www.allenovery.com/SiteCollectionDocuments/Joint%20Ventures%20-%20A%20road%20more%20travelled.pdf

Gup, B. (2003). The Future of Banking. Greenwood Publishing Group.

Lahiff, E., Davis, N. & Manenzhe, T. (2012). Joint ventures in agriculture: Lessons from land reform projects in South Africa. IIED/IFAD/FAO/PLAAS, London/Rome/Cape Town.

Mahidhar, V., Giffi, C., Kambil, A. & Avanos, R. (2009) Rethinking emerging market strategies: From offshoring to strategic expansion. *Deloitte Review.* Issue 4.

National Science Foundation (2014). Retrieved from: http://www.nsf.gov/news/mmg/index.jsp?s=0&page=1

Ray, M., Daar, A. , Singer, P. & Thorsteinsdóttir, H. (2009). Globetrotting firms: Canada's health biotechnology collaborations with developing countries. *Nature Biotechnology 27*, 806–814.

Times of India (2008 - 2004). Retrieved from multiple articles on http://www.timesofindia.com

Young, Adriana Valdez (2008). Courtesy of photographer.

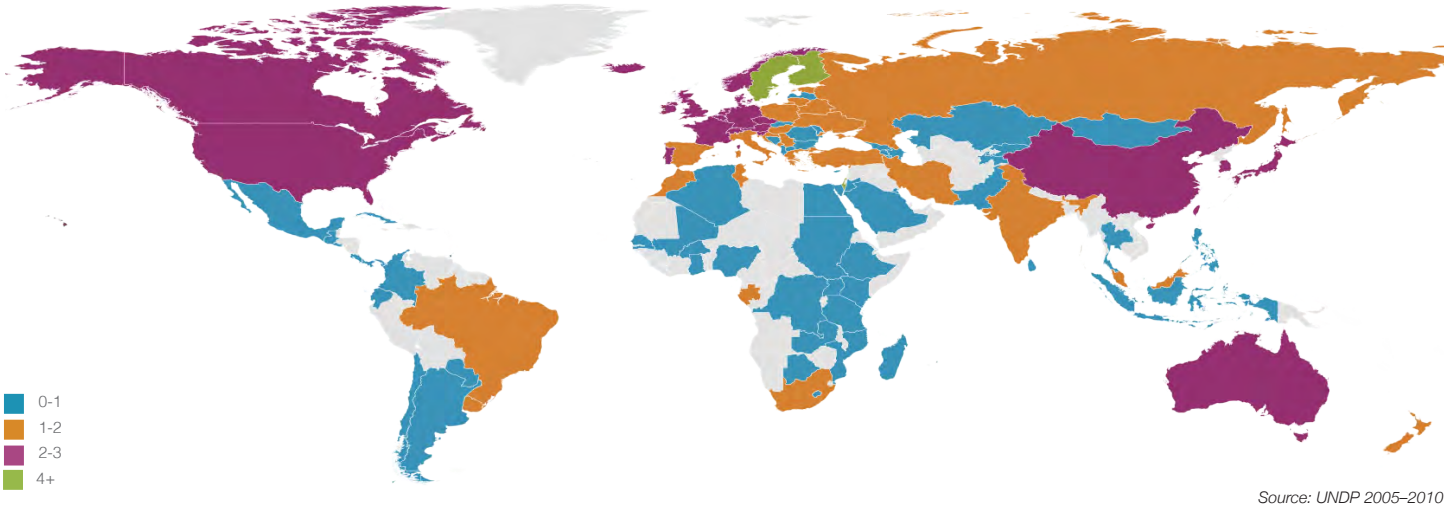
R&D Collaborative Contracts

"Central to R&D collaborative relationships is the need to share proprietary intellectual assets. Equally important is the need to protect that information from unintended use."
- The Alliance Management Group

Chapter 6: R&D Collaborative Contracts

Collaborative innovation has become a critical component of success in the 21st century, as innovation cycles have become faster, technological change more rapid, and markets farther reaching. In addition to R&D spending increasing worldwide, new research labs with members from various sectors are creating a paradigm shift in how innovation occurs.

Figure 6.1 - Research and Development Expenditure Percentage as Part of GDP (2005-2010)



Source: UNDP 2005–2010

DEFINITION

R&D collaborative contracts are formal strategic alliances between private firms, universities, and governments involving the transfer and leverage of knowledge, capital and distribution channels to develop new ideas and bring them to commercialization.

Collaborative R&D as a New Imperative

With trade globalization on the rise, firms have seen a seismic shift in their research innovation paradigms. In order for firms to responsibly meet the demands of markets outside of their established geographical comfort zones, R&D collaborative contracts between local governments, universities, and private firms allow for better flow of knowledge and increased innovation. The licensing and protection of IP rights plays an important role in determining the likelihood and potential success of these R&D collaborative arrangements, especially in the context of developing countries.

The main players in R&D collaborative contracts are 1) private firms and organizations; 2) universities and educational institutions; and 3) local governments. Private firms and organizations in developed countries often enter into R&D collaborative efforts with universities to tap into their IP portfolio and leverage their knowledge. Likewise, universities are able to gain access to capital infusions from these firms and are able to better commercialize their developments through increased market cooperation. Local governments also play an important role in this collaborative environment by shaping policies, setting national priorities, and subsidizing research efforts either through direct capital infusion or favorable tax treatment.

The Rationale for R&D Collaborative Contracts

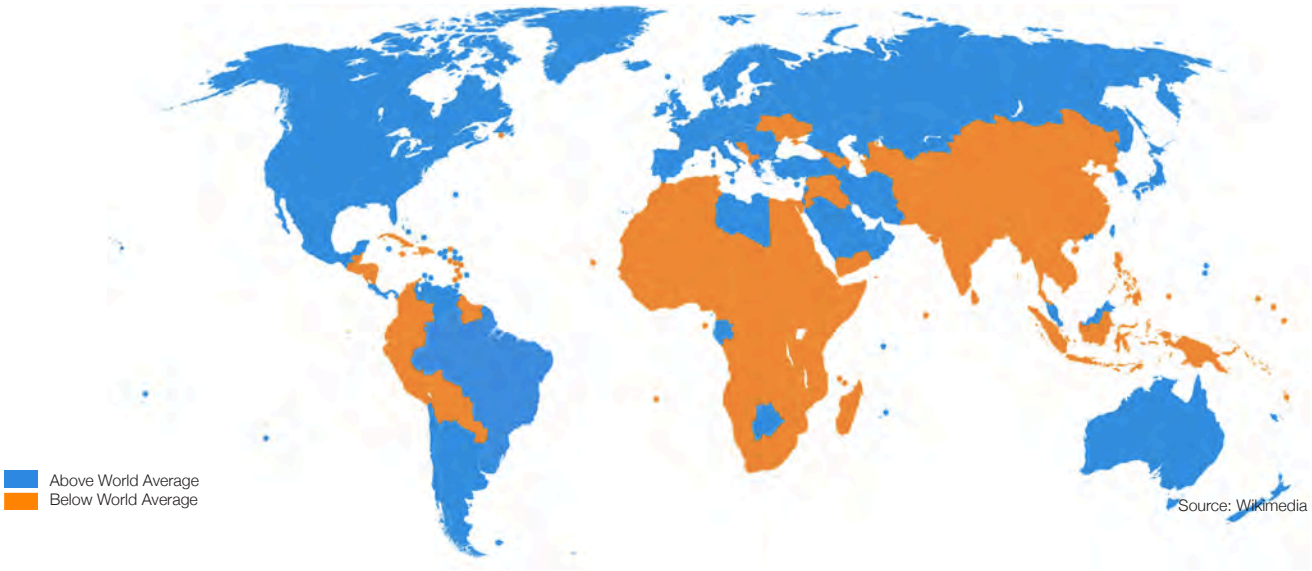
Entering into R&D collaborative contracts enables risk and cost mitigation through reduced set-up costs, increasing access to foreign markets, and access to strategic knowledge or technical skills unavailable domestically. Firms seeking to expand to new foreign markets benefit from local expertise, especially in areas where the local players are closely involved with the regulatory framework concerning the partnership.

While R&D collaborative contracts take many forms, the most prominent formal arrangement involves the licensing of IPRs. Firms and institutions seeking to broaden their research horizons and leverage complimentary knowledge must balance the desire for greater innovation and market growth with the risks associated with disclosing their IP.

IP licensing in R&D collaborative contracts is at the heart of knowledge flow between countries. From the perspective of a private sector firm, the biggest risk associated with an R&D collaborative contract with a foreign firm or institution is the potential spillover of IPRs beyond the contracted relationship. This concern is heightened in the context of R&D collaboration in developing countries, where IP frameworks are often less developed and involve more uncertainty of enforcement procedures.

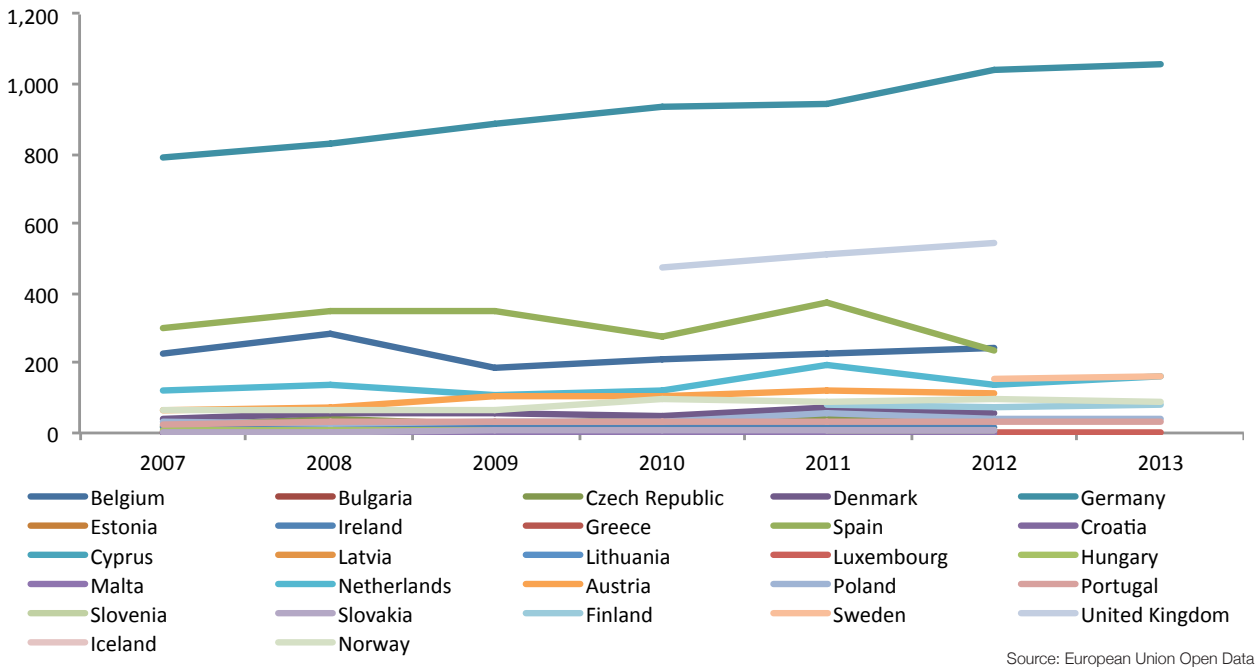
Even as international barriers to communication and trade decline, geography still plays an important role in determining relationships between firms. In a study of R&D collaboration patterns in the EU, the closer firms and universities were, the more likely they were

Figure 6.2 - Countries above and below the world average GNP PPP



Source: Wikimedia Commons (2014)

Figure 6.3 - National Public Funding to Transnationally Coordinated R&D (2007-2013)



Source: European Union Open Data (2007–2013)

to enter into collaborative R&D contracts (Scherngell and Barber 2008).

R&D Collaboration Shift: North-South to South-South

Much of the research on R&D collaboration is along a traditional North-South geographical divide. In recent decades, however, there has been a substantial increase in the number of collaboration efforts between firms and institutions where all parties are located in developing countries. This is often referred to as South-South Collaboration.

South-South collaboration represents a shift away from traditional reliance on the North and seeks to create new synergies. For example, the Developing Countries Vaccine Manufactures Network is a consortium of 24 manufacturers of vaccines from developing countries, committed to offering vaccines at an affordable price.[1]

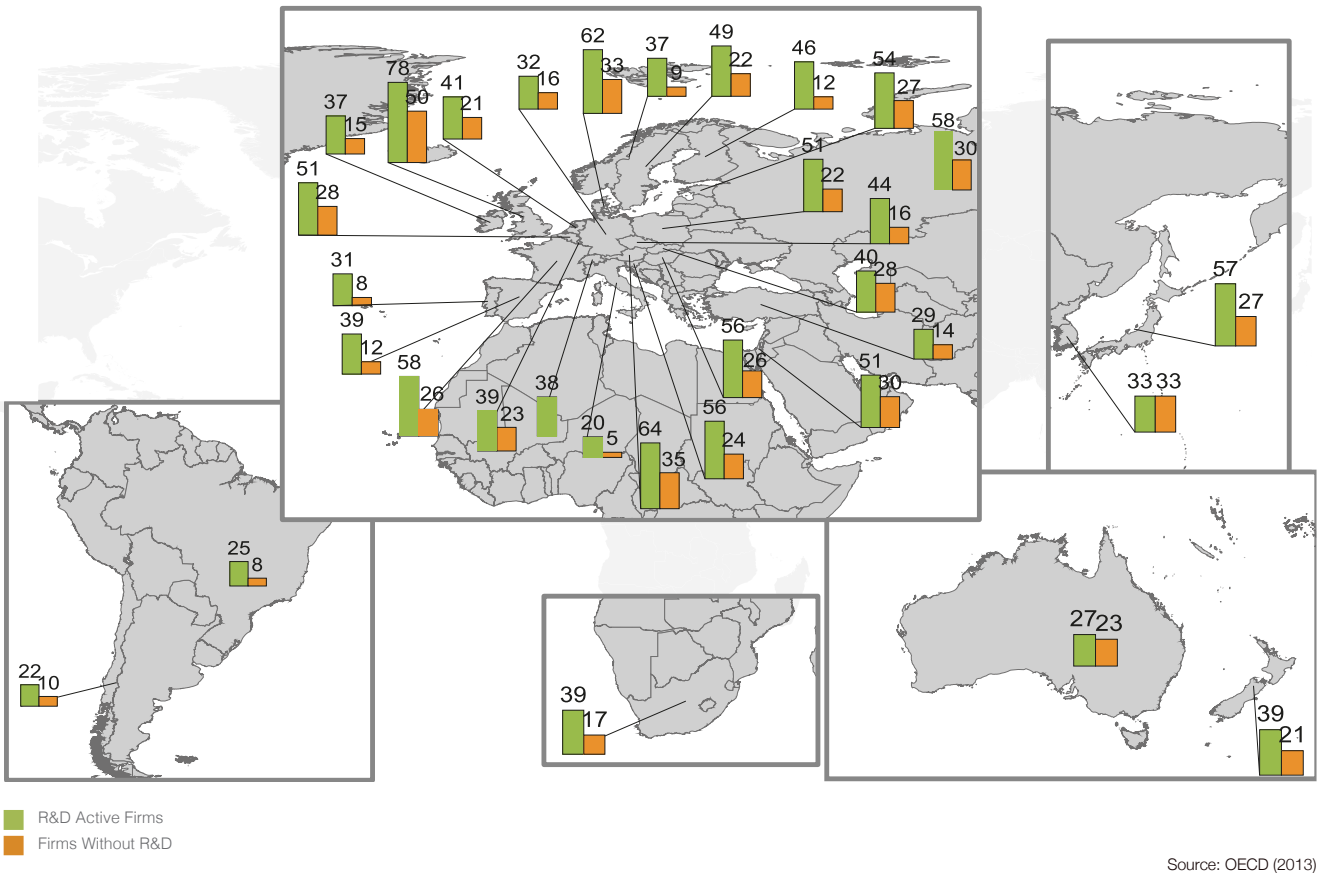
Global R&D spending will increase in the next ten years, with the South playing a key role. For instance, China's R&D efforts are projected to match and surpass those of the US in less than ten years (Batelle 2013). As a country's R&D spending is related to its development and competitiveness in the market, it will be critical to track patterns of R&D investments in developing countries.

1 See http://www.dcvmn.org/

Maps of Firms Engaging in Collaboration on Innovation

The below map shows firms engaging in collaboration on innovation as a percentage of R&D-active and non R&D-active firms from 2008 to 2010. In all countries listed, Australia and Korea are the only ones where R&D-active firms and firms without R&D engage in collaborations on innovation on a fairly equal level.

Figure 6.9 - Firms Engaging in Collaboration on Innovation



Source: OECD (2013)

References

European Union Open Data Portal (2014). National public funding to transnationally coordinated R&D. Retrieved from https://open-data.europa.eu/en/data/dataset/KhCSqUsepB6UGUR1zYxw"

National Science Foundation (2014). Retrieved from http://www.nsf.gov/news/mmg/index.jsp?s=0&page=1

OECD (2013). Science, Technology and Industry Scoreboard, Innovation for Growth. Retrieved from http://www.ncp-incontact.eu/nkswiki/images/6/66/OECD_Innovation.pdf pp.126

UNDP (2012). Open Data Table 12. Innovation and Technology. Retrieved from https://data.undp.org/dataset/Table-12-Innovation-and-technology/jixu-gnyy

Wikimedia Commons (2010). Average GDP PPP per capita 2010. Retrieved from http://commons.wikimedia.org/wiki/File:Average_GDP_PPP_per_capita_2010.svg

WIPO (2011). The Changing Face of Innovation. Retrieved from http://www.wipo.int/export/sites/www/freepublications/en/intproperty/944/wipo_pub_944_2011.pdf

Litigation

"The protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation [...] in a manner conducive to social and economic welfare, and to a balance of rights and obligations."
- Article 7, Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS)

Chapter 7: Litigation

The globalization of IP has created new legal challenges. Effective enforcement has become critical to protecting the IP system, leading to a debate around whether it is possible to create worldwide standards that promote technological innovation and information dissemination.

Figure 7.1 - Trade-Related Aspects of Intellectual Property Rights (TRIPS) Signatories (2014)

Source: WTO

DEFINITION

Litigation refers to the process of taking legal action to be settled in a court or tribunal. IP litigation encompasses a broad spectrum of actions ranging from copyright and patent infringement, to internet domain disputes and misappropriation of trade secrets.

The Increase in IP-Related Disputes

The rise in global interactivity has contributed to a sharp increase in IP-related conflicts. The sharp rise in cases can be associated with the increase in commercial and non-commercial uses of IP ownership, as well as a byproduct of innovation fueled by the Internet era. These types of IP-related conflicts are often cross-border and affect inventors and manufacturers alike, as well as entities involved in joint ventures.

The Global South has experienced fewer IP legal disputes. According to IP expert Darren Olivier, there was a 46 percent increase in IP cases from 2011 to 2012 in China, when it reached 87,000. Yet only roughly 100 cases were recorded in Africa in 2013 (Pickworth 2014). There are more IP suits in China than in any other nation. Although most of these are still in the trademark and copyright side, there is a growing patent jurisprudence in China.

The Knowledge Gap

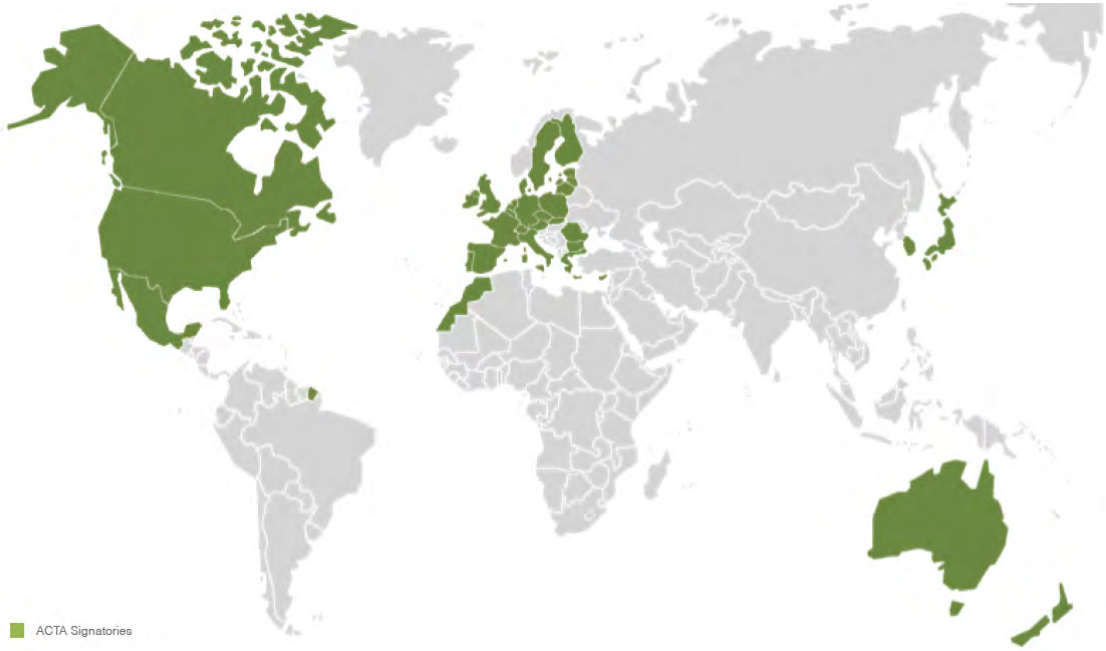
The ability to protect one's IP requires an efficient justice system and access to specialized IP litigation services. To avoid litigation, it is necessary to utilize existing IP protections provided by patent, copyright and trade secret laws and regulations, and consultants can help with this.

Yet innovators in developing countries are less familiar with IP legislation and have less access to adequate legal resources. Even if innovators are able to consult with IP professionals, a litigation firm might charge a price that is prohibitive. The nonprofit Public Interest Intellectual Property Advisors provides free IP services in developing countries, with the purpose of making globalization more inclusive and equitable. While a strong IP framework can spur innovation by protecting the rights of inventors around the world, affordable access to IP resources is also necessary.

Controlling Law in International IP Litigation

One of the main issues affecting international IP litigation is determining which body of law governs disputes. Each country's IP legal framework represents their unique history and culture. The number of actors affected by IP policies has grown considerably, raising the stakes and directly affecting public and private actors (such as NGOs, universities, businesses, and the government). In addition, globalization and the cross-border creation of IP has underlined the need for a more uniform legal framework to address IP policies.

Figure 7.2 - Anti-Counterfeiting Trade Agreement (ACTA) Signatories (2011)



Source: WTO

Below are two landmark international agreements on standards of IP regulation.

TRIPS

The Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS) regulates a broad range of IP issues in or for signatory countries. Ratified in 1994, the agreement requires all World Trade Organization (WTO) Member States to establish minimum standards of legal protection and enforcement for a number of different forms of IPRs.

Article 7 emphasizes that the protection and enforcement of IPRs should contribute to the promotion of technological innovation and dissemination of technology to the mutual advantage of producers and users of knowledge. In 2001, WTO established a Working Group on Trade and Technology Transfer to explore ways to increase technology flows to developing countries.

ACTA

The Anti-Counterfeiting Trade Agreement (ACTA) is an international treaty negotiated in 2007-2010 and signed in 2011 that aims to set uniform standards for IPR enforcement. In particular, ACTA aims to establish a robust legal framework for cross-border disputes of counterfeit goods, generic medicines, and copyright infringement. ACTA has 31 signatory countries (22 of which are Member States of the European Union), but was rejected by the European Parliament in July 2012.

The closed ACTA negotiations came under scrutiny for excluding civil society groups, developing countries and the general public. ACTA was criticized in particular for its potential to reduce access to vital medicines in developing countries. Defenders of ACTA argue that it would bolster countries' ability to confront IP violations in a more effective manner. The controversy surrounding ACTA and its 2012 rejection by the European Parliament highlights the complexity surrounding legal frameworks meant to enforce standards for IP rights enforcement.

Specialized IP courts

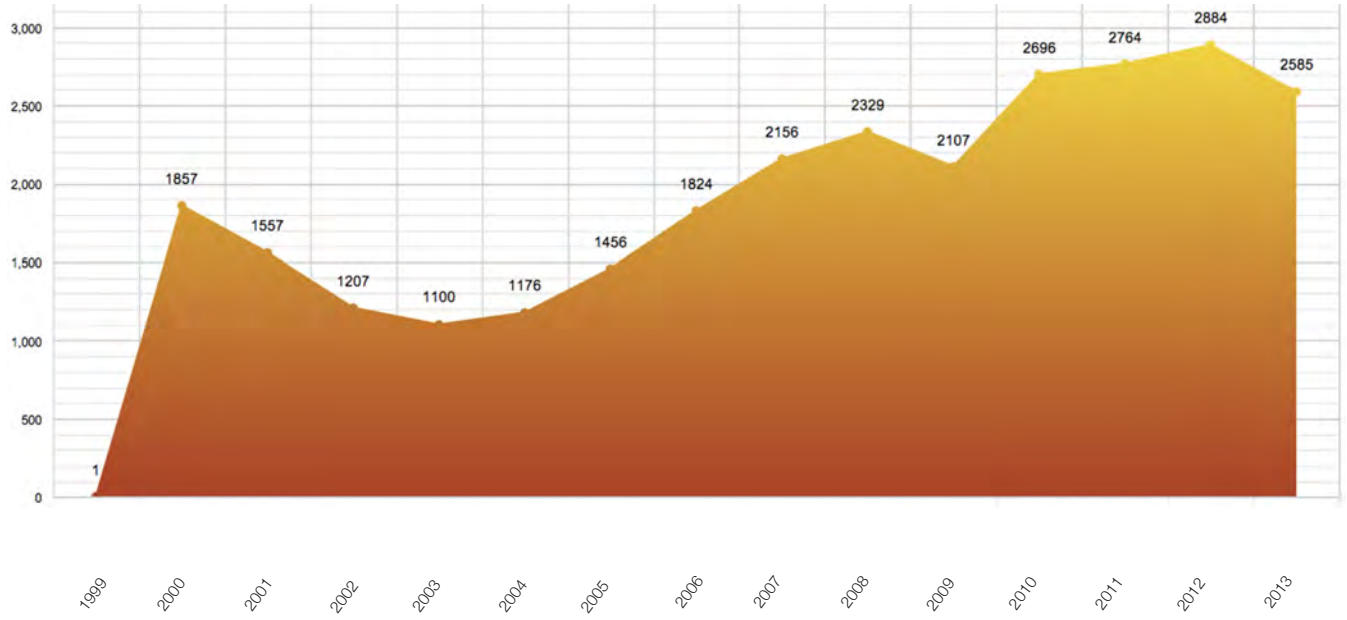
Governments are increasingly creating specialized courts and tribunals with jurisdiction over IP related issues. While many countries opt for general jurisdiction that includes IP disputes, others deem that certain courts should have specialized jurisdiction over IP disputes.

The TRIPS Agreement does not require signatory countries to create specialized IP courts. However, several TRIPS signatories have created these courts. In a study on the growth of specialized IP courts, the International Intellectual Property Institute (IIPI) identified 90 specialized IP courts globally and examined the different types of specialized courts in both developed and developing economies (Zuallcobley 2012).

Article Excerpt

"Infringement of IP rights through copying or free-riding can cause loss of market shares and considerably tarnish the business reputation of the IP holder. With the multiplication of international IP transactions, the number of IP-related disputes has likewise grown. Modern challenges such as digitization and globalization contribute to an increase in IP-related conflicts." -Ignacio de Castro and Sarah Theurich, WIPO

Figure 7.3 - Number of Domain Name Disputes Globally (1999-2013)



Source: WIPO (2014)

The globalization of IPRs has led to ethical legal quandaries over the past years, an example of which is the dilemma between cheap drugs and the protection of pharmaceutical patents. This underlines the importance of ensuring that all countries are equipped with the proper legal framework to address such issues. One might argue that the presence of a specialized court dealing with IPR cases might bolster the development process of a country. On the other hand, questions have been raised regarding the necessity of developing a specialized court in instances where IPR laws already exist. In those cases, courts of general jurisdiction are adequate to handle IP-related disputes.

Specialized Courts in the Global South

Most countries in the Global South have courts of general jurisdiction that hear most IPR cases. However, Brazil, Russia, India, China, and South Africa all have specialized divisions that exclusively hear cases relating to IPR. Given the growing number of disputes, regional courts might be necessary in countries such as China and India.

For example, South Africa established a special Copyright Tribunal that resolves copyright licensing issues. While the Copyright Tribunal resolves specific disputes relevant to copyright licensing, the South African Magistrates' Courts and High Courts still maintain jurisdiction on most cases having to do with lower commercial value disputes (ibid). The Copyright Tribunal is not a formal separate division of the High Court, but still oversees their own specific disputes. This allows judges and magistrates with backgrounds in IP to at least oversee the fact-finding portion of disputes (Pillay-Shaik and Mkiva 2013).

Unification as the Way Forward

In February 2013, 25 countries from the European Union signed the Agreement on a Unified Patent Court, an intergovernmental treaty geared towards providing a common patent court for all member countries (European Commission 2014). As of May 2014, four countries had ratified the agreement: Austria, Belgium, France, Malta and Denmark. Private entities mostly support the Agreement as they will be able to impact a broader customer base.

A single unified patent court could expand beyond the borders of Europe in the future. As legal frameworks for IP are changing worldwide, jurisdictions might take on new forms and an international harmonization of patent laws might be proposed.

References

Barbosa, R. (2007). International Copyright Law and Litigation: A Mechanism for Improvement. *Marquette Intellectual Property Review, 11* (1).

De Castro, I. & Theurich, S. (2012). Efficient alternative dispute resolution (ADR) for intellectual property disputes. Retrieved from http://www.wipo.int/export/sites/www/amc/en/docs/euro.pdf.

European Commission (2014). Communication from the Commission: General Report on the Activities of the European Union. Brussels, 21.1.2014. Retrieved from http://ec.europa.eu/transparency/regdoc/rep/1/2014/EN/1-2014-12-EN-F1-1.Pdf

Horan, A. (2005). Foreign Infringement of Intellectual Property Rights: Implications for Selected U.S. Industries. U.S. International Trade Commission.

Médecins Sans Frontières (2012). A Blank Cheque For Abuse: The Anti-Counterfeiting Trade Agreement (ACTA) and its Impact on Access to Medicines.

National Science Foundation (2014). Retrieved from: http://www.nsf.gov/news/mmg/index.jsp?s=0&page=1

Olivia Solon (2012). What is Acta and why should you be worried about it? *Wired UK.* Retrieved from http://www.wired.co.uk/news/archive/2012-01/24/acta-101

Pickworth, E. (2014). 'Disruption' delivers the competitive edge for companies. *Business Day Live.* Retrieved from http://www.bdlive.co.za/business/2014/02/19/disruption-delivers-the-competitive-edge-for-companies

Pillay-Shaik, P. & Mkiva, C. (2013). Litigation and enforcement in South Africa: Overview. Retrieved from http://us.practicallaw.com/0-502-0205

World Intellectual Property Organization (2010). IP Litigation Costs. *WIPO Magazine,* Issue 1. Retrieved from http://www.wipo.int/export/sites/www/wipo_magazine/en/pdf/2010/wipo_pub_121_2010_01.pdf

World Intellectual Property Organization (2014). Alternative Dispute Resolution. Domain name disputes statistics. Retrieved from http://www.wipo.int/amc/en/domains/statistics/cases.jsp.

World Intellectual Property Organization (2014). Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement). Retrieved from http://www.wipo.int/wipolex/en/other_treaties/parties.jsp?treaty_id=231&group_id=22

Yu, P. (2007). TRIPs and its Discontents. *Intellectual Property Law Review, 369* (2006). Retrieved from: http://scholarship.law.marquette.edu/iplr/vol10/iss2/7

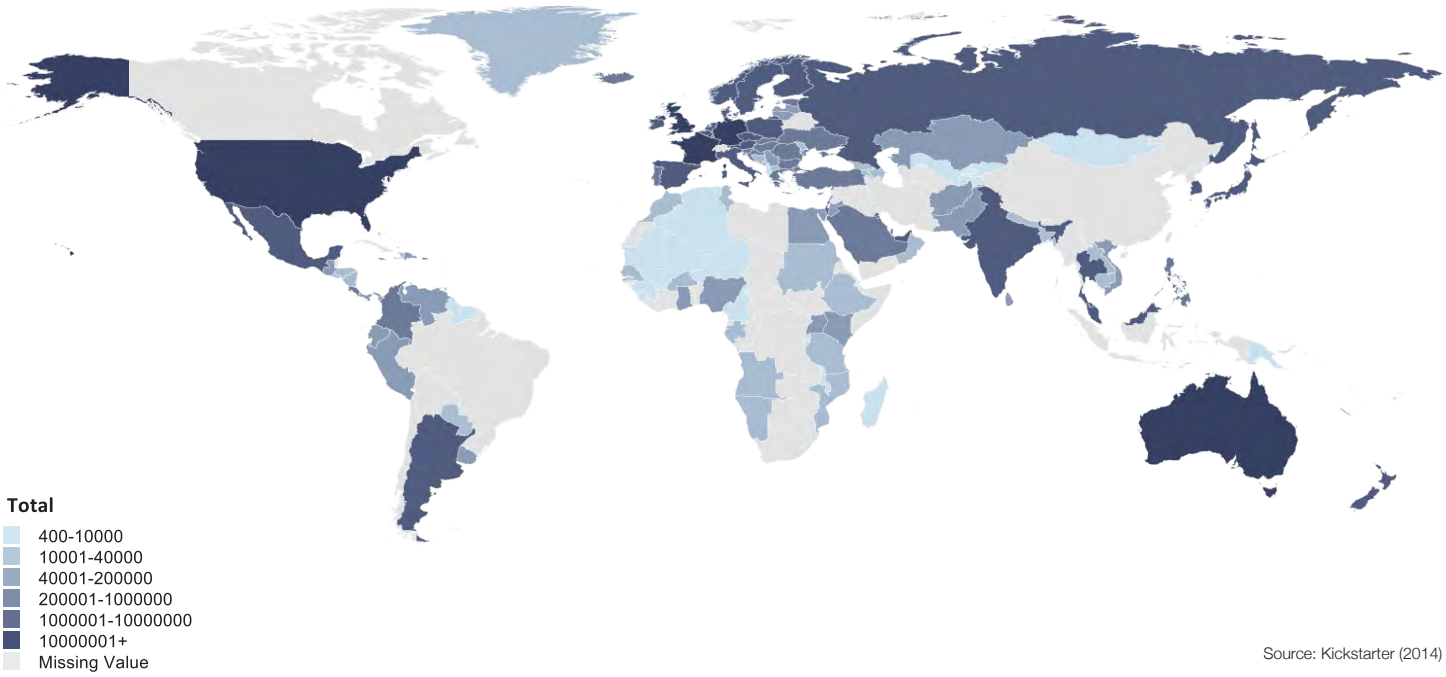
Zuallcobley, R. (2012). Study on Specialized Intellectual Property Courts. International Intellectual Property Institute. Retrieved from http://iipi.org/wp-content/uploads/2012/05/Study-on-Specialized-IPR-Courts.pdf

"Some of the biggest market disrupters, such as Facebook and large enterprises including GE, are currently using crowdsourcing services to solve their most complex problems, and everyone is taking notice." - Accenture Technology Vision 2014 Report

Chapter 8: Crowdsourcing

From crisis mapping to micro-lending, the power of the crowd is driving emergent forms of entrepreneurship, financing, and civic engagement on a global scale. By tapping into the social, political, and economic capital of many, new crowdsourcing platforms are slowly democratizing and disseminating new pathways to innovation.

Figure 8.1 - Amount Raised for Crowdfunding Projects on Kickstarter (as of March 2014, USD)



Source: Kickstarter (2014)

DEFINITION

Crowdsourcing enables companies and individuals to solicit ideas, opinions, content creation, labor or monetary contributions from large groups of people via an online platform. This chapter explores how crowdsourcing is a medium for increasingly distributed and democratic product and knowledge development in ways that have particular resonance in developing economies.

Digital Crowds

Crowdsourcing uses digital platforms to transform tasks formerly performed only by individuals or select groups, and opens them up to mass participation. The editors of Wired Magazine, Jeff Howe and Mark Robinson, coined the term "crowdsourcing" in 2005 after conversations on how businesses were using the Internet to outsource their work. Howe and Robinson noted a trend in "outsourcing to the crowd," which led to the term "crowdsourcing" (Howe 2006).

In Crowdsourcing (2013), Daren C. Brabham outlines different problem-based typologies of crowdsourcing:

(1) Knowledge Discovery & Management - an organization mobilizes a crowd to find and assemble information.

(2) Distributed Human Intelligence Tasking - an organization has a set of information in hand and mobilizes a crowd to process or analyze the information. Ideal for processing large data sets which computers cannot easily manage.

(3) Broadcast Search - an organization mobilizes a crowd to come up with a solution to a scientific, social or design problem.

(4) Peer-Vetted Creative Production - an organization mobilizes a crowd to come up with a solution to a problem that is subjective or dependent on public support.

Banking the Crowd

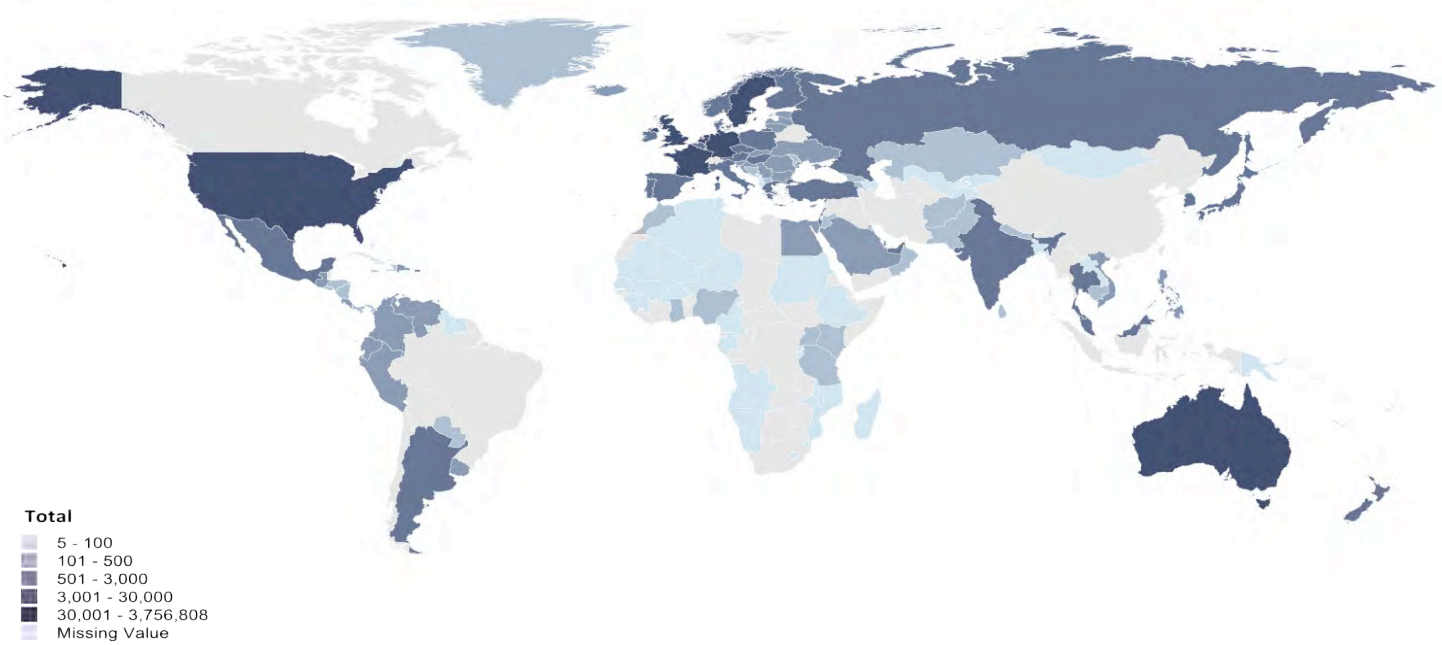
Companies, organizations and individuals can use a combination of these strategies to appeal to the "wisdom of the crowd," addressing problems via contributions in time, ideas or money. In the crowdsourcing typology of crowdfunding, artists, entrepreneurs, and social activists – both emerging and established – seek funding to invest in their projects. In return, contributors receive rewards, recognition or compensation.

Crowdfunding platforms have grown exponentially in size and scope over the past five years. According to Dan Marom and Kevin Lawton, crowdfunding experts and authors of "The Crowdfunding Revolution", around USD 3 billion were raised via crowdfunding platforms in 2012, and that number increased to USD 8 billion in 2013.

Summary Findings

While the World Bank predicts that the crowdfunding investment market will reach USD 93 billion by 2025, most of the backers for the world's largest funding platform for creative projects, Kickstarter, are still located within a very limited number of countries. This map highlights that the US, France, Germany, Sweden, the UK and Australia have over 30,000 contributors to Kickstarter projects. In regards to amount raised, over 70 percent of this crowdfunding stems from the US and a quarter of it from Europe. The rest of the world represents less than 5 percent of all crowdfunding efforts on Kickstarter.

Figure 8.2 - Number of Backers for Crowdfunding Projects on Kickstarter (as of March 2014)



Source: Kickstarter (2014)

The field of venture financing has been broadened to include anyone willing to donate as little as one dollar on a project they care about. All crowdfunding platforms are based on this concept, even though some of them make the funders direct investors to a project, while others limit the involvement of users to only providing funds.

An example of the latter is the crowdfunding platform Kickstarter (Kickstarter.com), where project creators - from fashion designers to documentary film directors - can seek funds to support the completion or scaling up of their work. They invite the general public to give micro-donations - from USD 1 up - in return for non-monetary rewards. These can range from having one's name listed as a contributor on a project website, to receiving one of the first product runs. Although there is no financial transparency system tying the creator to the crowd, the integration with the social networking site Facebook helps to build trust, community and accountability. Unlike when organizations receive foundation grants and are legally obliged to furnish reports of expenses and activities, crowdfunded projects often provide creative communications products to their donors, such as videos and email newsletters, in lieu of formal documentation. An example of a crowdfunding platform where users actually become active investors in the project they invest in is My Major Company. MMC is a French company that raises funds to produce recording artists and subsequently provides 40 percent of the artist's revenues to the funders.

Crowd Labor

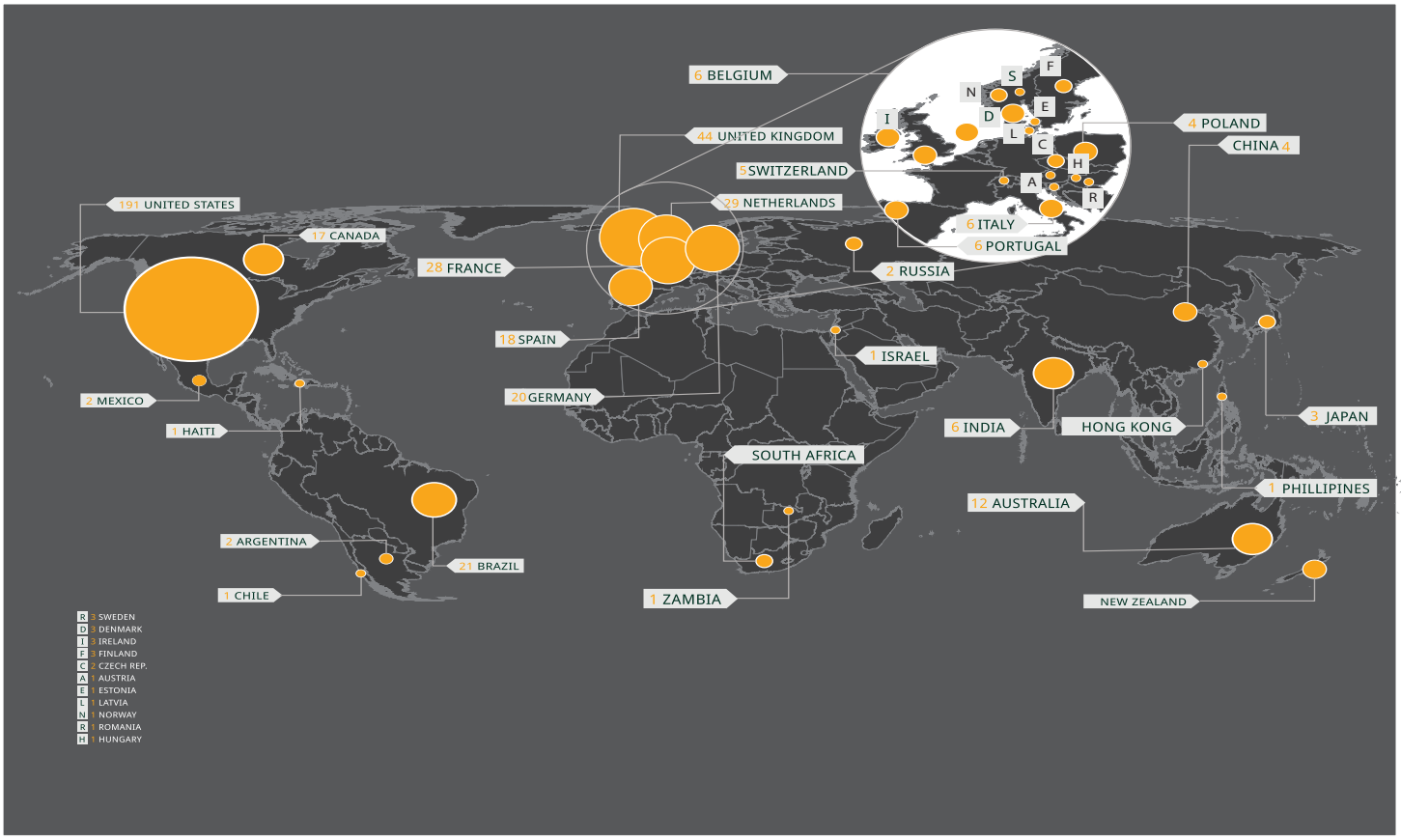
Another popular typology of crowdsourcing is crowd labor, in which a company or entity posts a set of specific micro tasks that only humans can perform (e.g. describing locations, analyzing photographs, making drawings). The tasks are open for the general global public to complete for very small fees. This typology of crowd labor has also been successfully applied to humanitarian contexts.

A recent crowdsourced labor project in an international humanitarian context was the mapping of damaged buildings and roads in the wake of Typhoon Haiyan. The Tomnod.com platform created by DigitalGlobe enabled users to tag 408,934 unique data points from satellite photographs that aided first responders and aid workers in the post-disaster relief effort.[1]

A similar crowdsourced relief effort was accomplished in rescue efforts after the 2010 earthquake in Haiti using the platform Ushahidi – a free and open source interactive mapping technology (ushahidi.com). Within two hours after the earthquake, Ushahidi-Haiti was set up by volunteers based at Tufts University. Volunteers set up a short code (4636) that witnesses and victims on the ground could use to send free text messages, sharing information about what they were seeing or experiencing. If messages contained actionable information, such as locations where people were trapped or injured, then a volunteer would map the GPS coordinates and provide the information to rescue teams on the ground.

1 See tomnod.com

Figure 8.3 - Crowdfunding Platforms Worldwide



Source: Crowdsourcing.org (2012)

Ushahidi volunteers worked with over 10,000 Haitian-American volunteers across the United States who translated every text message within 10 minutes. After 25 days in the wake of the earthquake, Ushahidi-Haiti volunteers had mapped about 2,500 reports.[2]

Investment Beyond Aid

Whereas contributors to crowdsourced projects are primarily motivated by non-monetary gain – namely being part of a creative community – those doing the crowdsourcing reap cost-effective access to intellectual and monetary assets otherwise unattainable. This has particular relevance to resource constrained start-up ventures and big businesses wanting to tap into global labor pools. An example of an emerging crowdsourcing model specifically active in developing countries is the platform Samasource.

In contrast to traditional outsourcing models that sub-contract companies to provide cost effective labor, Samasource is a social venture that directly employs poor women and youth to in the digital economy. Operating in countries including Gambia, Ghana, Haiti, India, Kenya, Nigeria, Pakistan, South Africa and Uganda, Samasource provides what it calls Microwork™.

It partners with large companies, such as Google, Cisco, and LinkedIn to define small units of computer-based work that are part of a larger data project. This work is then distributed to "digital factories," which consist of over 20 cybercafes in six countries, where women and youth receive training and piecework resulting in over USD 1.3 million in earnings since 2008.

Samasource founder, Leila Janah, elaborated on Samasource's mission as both a socially progressive and economically competitive enterprise: "Everyone at Samasource works incredibly hard-to-win contracts from companies like Google, LinkedIn, and Microsoft and get[s] the work done in unlikely places by people who've been overlooked by traditional employers" (Cutruzzula 2013).

2 See http://blog.ushahidi.com/2010/02/06/ushahidi-how-we-are-doing/

Case Study: Zidisha

Zidisha is a micro lending platform that bypasses local banks to connect lenders and borrowers directly. Entrepreneurs in developing countries create personal profiles and outline their goals to grow their small businesses. Through Zidisha, they secure direct loans from micro investors around the world, avoiding local banks charging exorbitant interest rates.

Figure 8.4 - Flow between Donor Countries and Donor Cities for Select Mobile-Related Projects via Zidisha

Source: Zidisha.org (2014)

Zidisha Case Study

Founded in 2008, the micro lending platform Zidisha specializes in giving small entrepreneurs in developing economies access to low-interest loans. Bypassing local banks and other micro-loan programs with high interest rates, Zidisha enables entrepreneurs to create personal profiles and promote specific small loan requests to enhance their existing business. Zidisha entrepreneurs are located mostly in Africa and have a lending base that is international - both from developed and developing economies.

While conducting fieldwork for a microfinance organization in West Africa in 2006, Zidisha.org founder Julia Kurnia noticed something startling. Loans that were funded at zero interest by well-meaning participants in the popular micro-lending websites were costing the impoverished beneficiaries more than 35 percent on average in interest and fees. The exorbitant rates were charged by the local intermediary organizations that administered the loans, in order to cover their operating costs.

It is generally assumed that such high interest rates are a necessary cost of making small loans in isolated and impoverished areas. Microlending websites that administer crowdfunded loans through local intermediaries assume that the borrowers not only lack the necessary computer skills to communicate with lenders themselves, but also that they cannot be trusted to repay loans without constant visits by loan officers.

Kurnia believed these assumptions were outdated, and to test her theory she founded Zidisha.org, a peer-to-peer microlending platform that turns the traditional approach to microfinance lending on its head. First, there are no intermediaries: instead, the entrepreneurs themselves post loan applications and communicate directly with lenders via Facebook-style profile pages. Zidisha does not outsource loan disbursements and repayment collection to local organizations either, but rather uses grassroots technology like mobile banking to conduct financial transactions with borrowers directly. The result? Radical transparency, and lower cost to borrowers than has ever before been possible in the developing world – even though Zidisha lenders earn interest as well.

Zidisha: Technology Entrepreneurs

Technology entrepreneurs seeking to raise capital on the Zidisha platform have small businesses they seek to enhance with basic inventory (e.g. printers, copy paper, laptops) as well as more sophisticated service features (mobile payment systems, professional writing and transcription services).

Figure 8.5 - Examples of Zidisha Projects by Category

Prepaid Phone Card Sales *Nairobi, Kenya* *$173*	Retailing Mobile Accessories *Mukuyu, Kenya* *$150*	M-PESA Line *Thika, Kenya* *$467*	Mobiles and Accessories *Bobo-Dioulasso, Burkina Faso* *$304*	Mobile Phone Sales *Bobo-Dioulasso, Burkina Faso* *$102*	Sim Cards* *Bandung, Indonesia* *$50*
M-PESA Services for Clothing Shop *Nakuru, Kenya* *$150*	I will use this loan in buying a printer *Naivasha, Kenya* *$50*	To pay for internet service *Naivasha, Kenya* *$50*	Mobile phone payment services *Kigumo, Kenya* *$150*	Laptop for online writing business *Thika, Kenya* *$50*	Funds to start a cybercafe and stationery store *Nairobi, Kenya* *$124*
Epson Printer for cybercafe *Juja Town, Kenya* *$150*	Stationary and working capital *Mumbuni Machakos, Kenya* *$150*	Computer Laptop n Tab Repair Equipment *Nairobi, Kenya* *$449*	Stock of paper for printing business *Nairobi, Kenya* *$449*	Buy an external hard drive *Nakuru, Kenya* *$50*	Sale of Computer Accessories *Nakuru, Kenya* *$150*
Laptop and Software for Online Transcription *Nairobi, Kenya* *$50*	Purchase of Computer for An Employee *Nyakongo Village, Kenya* *$150*	Hire Expert Writers to Contribute to My Website *Nairobi, Kenya* *$150*	Wire Cables for Installing Home Electricity *Njoro, Kenya* *$150*		

Mobile
Cybercafe
Professional Services
* Completely Funded

Zidisha Technology Entrepreneurs: Key Statistics

16% women entrepreneurs

$221 avg. loan requested

98% avg. on-time loan repayment

22% avg. amount of total loan raised

97% investing in retail inventory

95% entrepreneurs in Africa

85% lenders based in developed countries

55% urban-based entrepreneurs

Ushahidi: Global Implementations

Ushahidi (which means “testimony” in Swahili) is an open source web-based platform developed to map incidents of violence in post-election Kenya in 2008. Since then, Ushahidi has been utilized in a diverse spectrum of crisis and civic engagement situations as a flexible participatory mapping tool as illustrated below.

Figure 8.6 - Ushahidi: Global Implementations

Source: Ushahidi.com (2014)

Chapter 8
Crowdsourcing
Global Knowledge Flows

References

Brabham, D. (2013). Crowdsourcing. MIT Press Essential Knowledge Series.

Cornell University, INSEAD, & WIPO (2013). The Global Innovation Index 2013: The Local Dynamics of Innovation. Geneva, Ithaca, and Fontainebleau.

Crowdsourcing (2012). Crowdfunding Industry Report: Market Trends, Composition and Crowdfunding Platforms. Retrieved from http://www.crowdfunding.nl/wp-content/uploads/2012/05/92834651-Massolution-abridged-Crowd-Funding-Industry-Report1.pdf

Cutruzzula, K. (2013). Could Nairobi Be The New Silicon Valley? Retrieved from http://www.refinery29.com/2013/08/50517/lelia-janah

Empson, R. (2014). Zidisha Launches A Kickstarter-Style Micro-Lending Platform For Low-Income Entrepreneurs In Developing Countries. Retrieved from http://techcrunch.com/2014/01/23/zidisha-launches-a-kickstarter-style-micro-lending-platform-for-low-income-entrepreneurs-in-developing-countries/

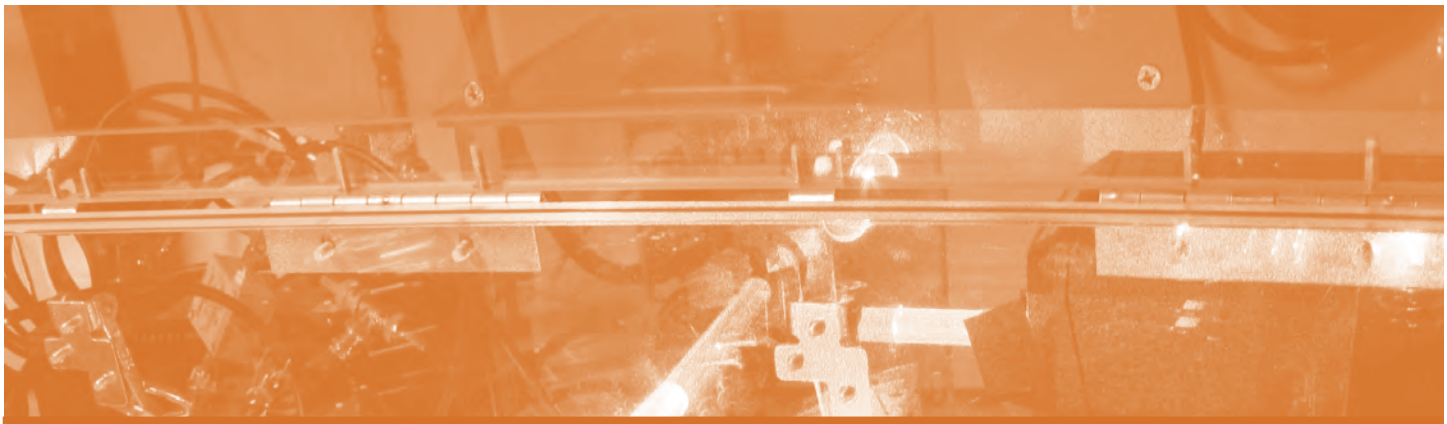
Howe, J. (2006). The Rise of Crowdsourcing. *Wired Magazine,* Issue 14(06).

Kickstarter (2014). One Billion. Retrieved from https://www.kickstarter.com/1billion

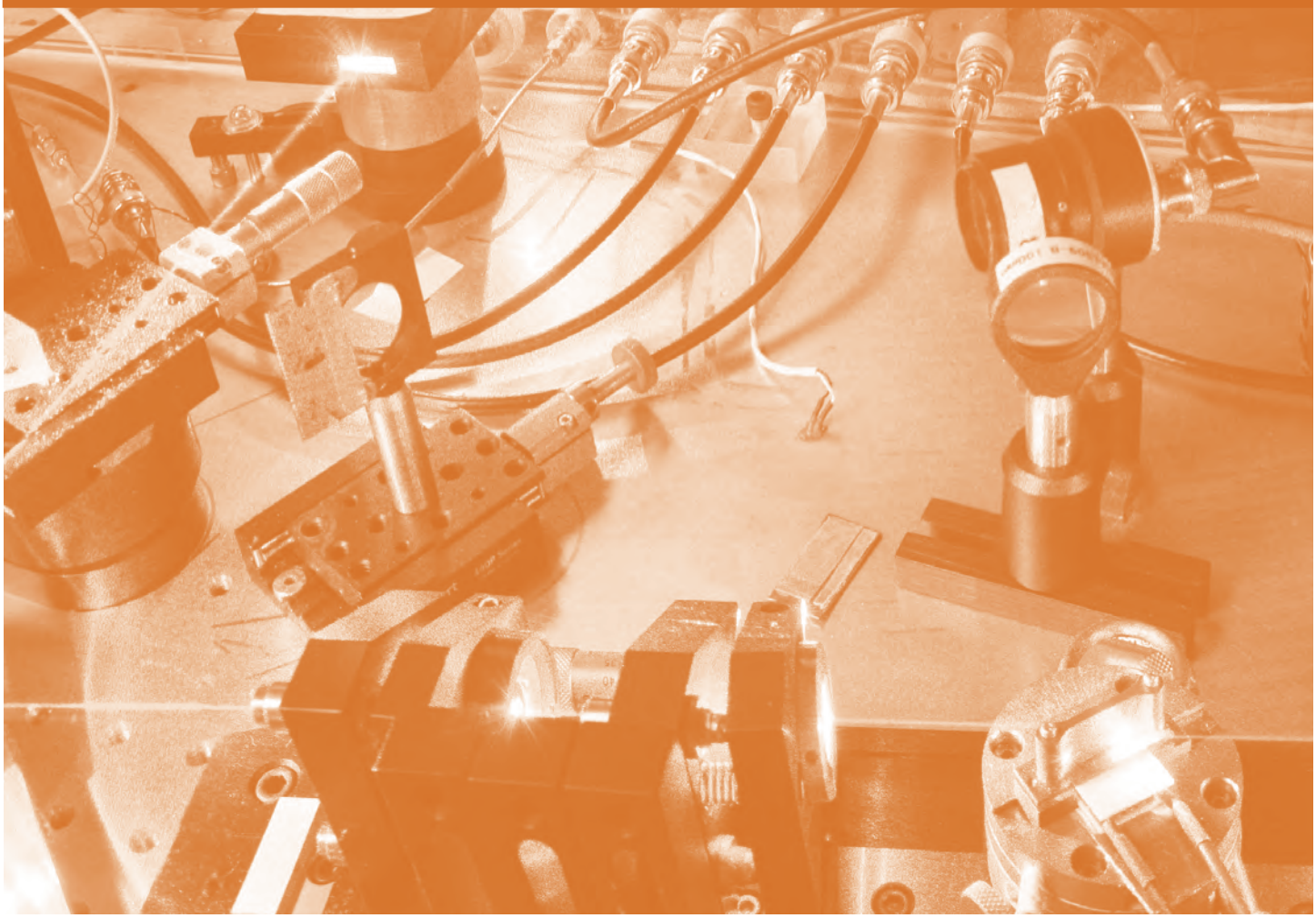
Ushahidi (2014). Retrieved from https://wiki.ushahidi.com/

Zachte, E. (2014). Wikimedia Traffic Analysis Report: Wikipedia Page Edits Per Country, Overview. Retrieved from http://stats.wikimedia.org/wikimedia/squids/SquidReportPageEditsPerCountryOverview.htm

Zidisha (2014). Retrieved from https://www.zidisha.org



Innovation-Inducement Prizes

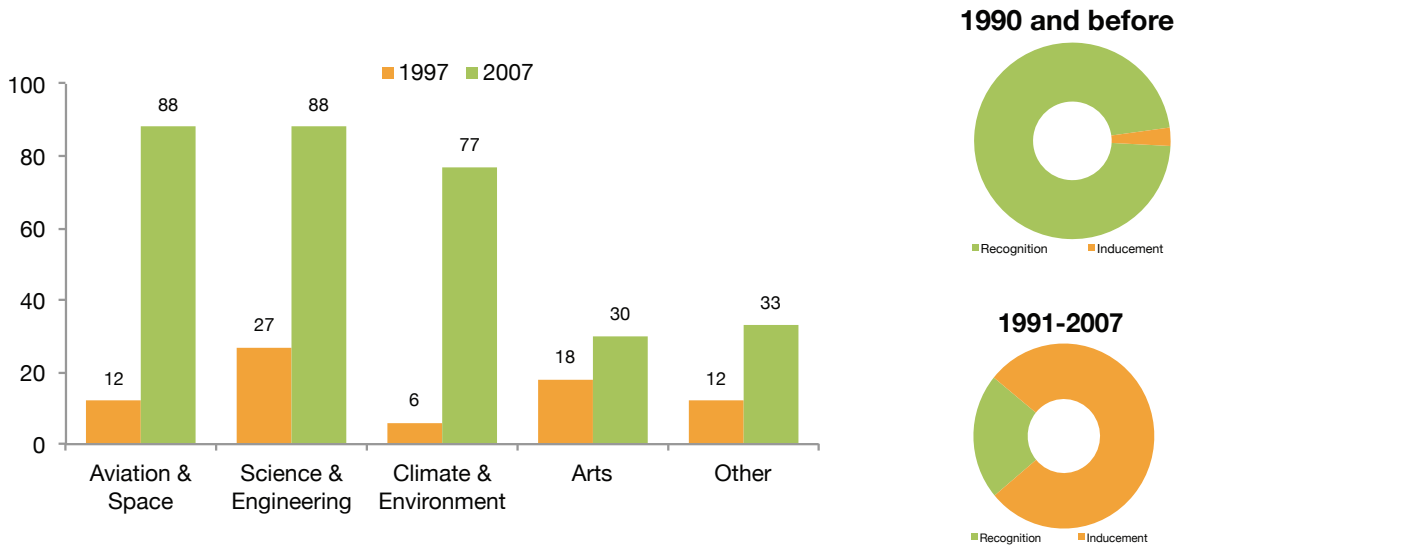


"Innovation-inducement prizes are a way of spurring interest in a particular issue, helping to attract new dynamic innovators to the area, mobilizing additional private investment for research, and stimulating interest among the general public."
- European Commission

Chapter 9: Innovation-Inducement Prizes

Inducement prizes have become instrumental for private companies, governments and international organizations to spur innovation on new global challenges ranging from effective governance to extreme poverty. While proof of their effectiveness is less empirical than anecdotal, they are a cost-effective method to engage audiences.

Figure 9.1 - Growth in Inducement Prizes



Source: McKinsey & Co. (2009)

DEFINITION

Prizes are an alternative means to reward inventors for their investments, and have long been around. Prizes are typically divided into targeted and blue-sky prizes (Scotchmer, 1991). Targeted prizes are formalized into standards that solutions can be evaluated against, whereas blue-sky prizes refer to a situation where the type of invention is not specified in advance.

The Rationale Behind Innovation-Inducement Prizes

In step with the rise of the Internet, innovation-inducement prizes have skyrocketed since the 1990s. While prizewinners gain monetary rewards, exposure and a chance to implement, the prize givers are the real winners gaining access to fresh ideas without the burden of costly R&D investments.

Historical Roots

The Royal Observatory was famously established in the 17th century with the ambition to improve navigation at sea and solve the "longitude problem" (Financial Times, 2010). After the in-house astronomers had failed for decades, a contest was initiated that offered an enormous sum in today's money terms for a solution to the problem. A carpenter surprised the Royal Observatory by providing a solution that involved developing an accurate clock that worked during rough sea conditions of rolling ships and extreme weather.

Prized Business

Enabled by digital technology and social media networks, prizes have become an effective mechanism to source "unexpected" solutions from unconventional outsiders. As a typology of crowdsourcing, innovation-inducement prizes are a particularly efficient means of advancing the development of new technology. Premiere academic institutes (MIT, Harvard, Stanford) and corporations (Microsoft, Google, Cisco) utilize prizes to radically diversify and scale sources of ideation amongst students, entrepreneurs, and professionals globally. Yet one challenge is that limited Internet access prevents individuals in developing countries from participating at the level of their peers in developed countries.

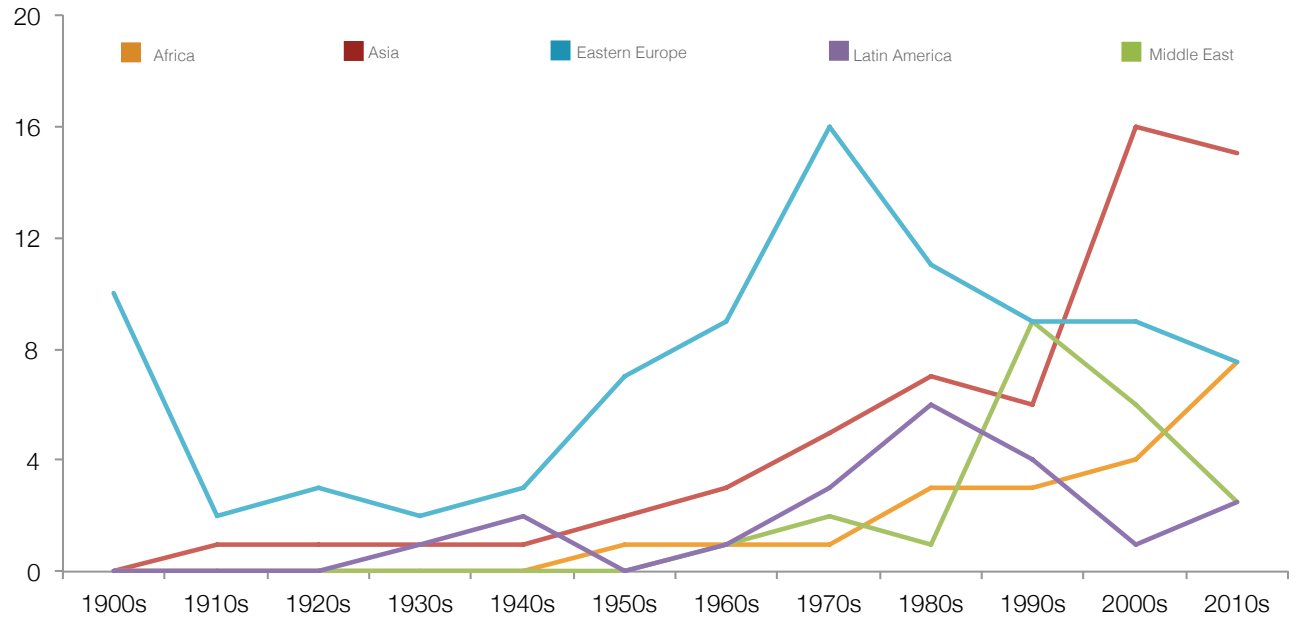
Founded in 2006 in affiliation with MIT, Global Minimum (GMin) is a non-profit organization dedicated to enabling locals to create and implement their own solutions to local issues. GMin collaborated with over 60 secondary schools in Sierra Leone to provide students with the opportunity and resources to translate innovative ideas to physical prototypes. Launching an Innovate Salone Sierra Leone in 2012 in affiliation with Maker Faire Africa, GMin organized a high school invention challenge.

One of the finalists was Kevin Doe (aka DJ Focus), a 16-year-old boy from Sierra Leone. Kevin distinguished himself in building his own FM radio station and homemade batteries from discarded metal and other recycled objects. As a finalist, Kevin had the opportunity to travel to the US, where he was a resident practitioner at the MIT International Development Initiative and guest presenter at Harvard

Summary Findings

While the Nobel Prize is considered a recognition prize (based on the beneficial effects of the achievement) as opposed to an innovation-inducement prize, it is notable that the number of winners from Asia and Africa has dramatically increased over the past 20 years. In fact, the number of Nobel Prize winners for Eastern Europe is now equal to that of Africa. Since 1902, there have been 471,370 Nobel laureates from Western Europe, 370 from North America, and only 19 and 16 from Latin America and Africa respectively.

Figure 9.2 - Nobel Prize Winners by Region (1900-2010)



Source: Washington Post (2013)

School of Engineering. As a result, engineering and development students were able to learn from Kevin's ad-hoc and efficient maker style, and to consider new ways of using cheap, freely available materials to meet local energy and communication needs.

The Innovate Salone functions as an educational development program, applying a competition model organized in affiliation with a premiere institution and channeling resources from a developed to an under-developed country. It also illustrates the potential of open innovation and competition frameworks to identify talent in developing countries and enable innovators to apply their creativity to develop IP in ways that advance both developing and developed countries.

Another example of a premiere institution using ideas competitions as a means for diversifying ideation sources and talent is the World Bank Youth Summit, inaugurated in 2013. Inviting youth ages 18-35 to submit solutions to four case competitions, the World Bank Group (WBG) pursued its goal of lowering the average age of its followers, consultants and personnel. Hailing from the UK, the US and Nigeria, the winning teams solved challenges posed by real, ongoing WBG projects in Peru, Nigeria, Morocco, and Sub-Saharan Africa. Winners were invited to present their ideas at the Youth Summit in Washington DC, where they connected with staff to advise project teams, and joined the WBG registry of preferred consultants.

To enable youth around the world to tune into the Summit, WBG offices on all continents opened their doors to youth to participate in live web-streaming sessions. At the event's culmination, WBG president Dr. Jim Yong Kim announced that the Bank would end its policy of limiting junior professionals from applying for permanent positions. Thus, the innovation-inducement competition was part of a multi-pronged strategy to diversify the Bank's audiences and associates, and rebrand it as a more participatory and youth-friendly institute.

Innovation-inducement prizes can be an effective means of cultivating global brand awareness and loyalty, as well as talent recruitment. For example, 1.65 million students from over 190 countries have participated in the Microsoft Imagine Cup.[1] In addition to providing educational and professional experience to leading youth innovators, Microsoft creates brand awareness and loyalty amongst a targeted youth demographic by releasing its software resources for tinkering. In 2013, national rounds were hosted in over 80 countries, over 50 percent of which were developing countries. As the original content submitted by teams remain their own IP, the Imagine Cup also educates teams about copyright laws and alternative approaches to patents, like Creative Commons licensing.

Organizing Around Prizes

Rather than using prizes as a community building strategy, some institutions are solely dedicated to facilitating innovation-inducement prizes. An example of this is Citymart.com (formerly Living Labs Global), a social impact organization that accelerates the diffusion of proven solutions across cities globally. They help high impact

1 See https://www.imaginecup.com/Custom/Index/About

catalyzing their local start-up community. (See the case study in the R&D Collaborative Contracts section).

The philanthropy sector is also participating in innovation-inducement prizes. A McKinsey report on the use of innovation prizes in philanthropy found that competitions are effective not only in driving innovation, but also in "changing wider perceptions, improving the performance of communities of problem-solvers, building the skills of individuals, and mobilizing new talent or capital" (McKinsey 2009). The report highlights how multinational corporations have begun sponsoring philanthropic competitions as a way of breaking into new fields and engaging innovators (and potential consumers) in emerging markets. For example, Ashoka's Changemakers competitions have been sponsored by brands such as Citibank, Staples, and Nike.

Another example is Making All Voices Count, a recently launched philanthropic initiative supporting transparency and accountability in 12 developing countries. It is run by a consortium of foundations, governments and non-profit organizations. Its Grand Challenge platform focuses global attention on creative and cutting-edge solutions to transform the relationship between citizens and their governments.

In step with the rise of the Internet, innovation-inducement prizes have skyrocketed since the 1990s. While prizewinners gain monetary rewards, exposure and a chance to implement, the prize givers are the real winners gaining access to fresh ideas without the burden of costly R&D investments.

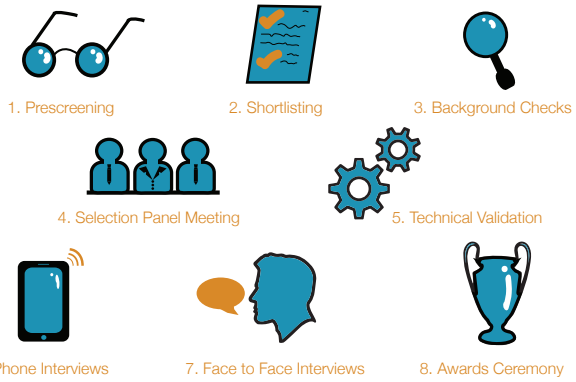
Case Study: African Innovation Foundation

The African Innovation Foundation (AIF) started the Innovation Prize for Africa in 2011, which honors innovative achievements that contribute toward developing new products in Africa.

Figure 9.3 - Abuja Awards Ceremony (May 2014)

Source: Courtsey of Pauline Mujawamariya

Figure 9.4 - Innovation Prize for Africa Application Process Flow



Source: Information from Pauline Mujawamariya, Visualization by Community Systems Foundation

To invest in African innovators is to support African sustainable development and inclusive growth. Innovation Prize for Africa (IPA), an initiative of the African Innovation Foundation (AIF), aims to build a strong innovation ecosystem by mobilizing and rewarding the best African innovators who develop market oriented solutions. IPA gives a total of USD 150,000 to three innovators every year, and creates international exposure for these innovators to ensure that they can take their ideas to the next level.

IPA contributes to the African innovation ecosystem in many ways. It facilitates dialogue and exchange of solutions, allowing innovators to collaborate. Through IPA, AIF works with various stakeholders in innovation spaces, incubation centers and accelerators. IPA has helped start the discussion on the importance of investing in homegrown innovation and African human capital.

Innovation Prize for Africa targets technological breakthroughs in manufacturing and service industries, health and wellbeing, agriculture and agribusiness, environment, energy and water, and ICTs. In these past three years, IPA has attracted about 2000 applications from 48 African countries.

In May, Dr. Nicolaas Duneas and Mr. Nuno Peres from South Africa were named winners of the IPA 2014 Grand Prize. They received USD 100,000 for their Osteogenic Bone Matrix (OBM) innovation, the first injectable bone-graft device containing naturally extracted bone growth proteins from mammals. This is an innovative product for the treatment of bone injuries as it stimulates the patient's own tissue regeneration system. The product may radically change the way orthopedic surgeons treat bone injuries the world over, exemplifying knowledge flows going from South to North.

The runner-up prize went to Mr. Logou Minsob for his FoufouMix machine, seen as the innovation with the best business potential. His machine is a food processor designed to replace the mortar and pestles women typically used to prepare foufou, a popular dish in West Africa. This device has the potential to lessen their burden in terms of time and energy.

The Special Prize for the innovation with the highest social impact went to Dr. Melesse Temesgen of Ethiopia for the Aybar Broad Based Furrow Maker (BBM), a low-cost farming device that easily drains excess water from waterlogged fields. Up to 5 million hectares of land in Ethiopia and a much larger area in Africa are not available for farming because they are waterlogged. It is estimated that the income of farmers will more than triple as a result of using this technology.

The IPA 2013 Grand Prize winners are now ready to scale up their innovation called AgriProtein, which provides a more ecologically friendly, naturally occurring type of animal feed. After the high media exposure received since winning the IPA Award, the AgriProtein team received more than 40 business requests from various countries outside of Africa and raised USD 11 million. They are expanding to accommodate this global demand.

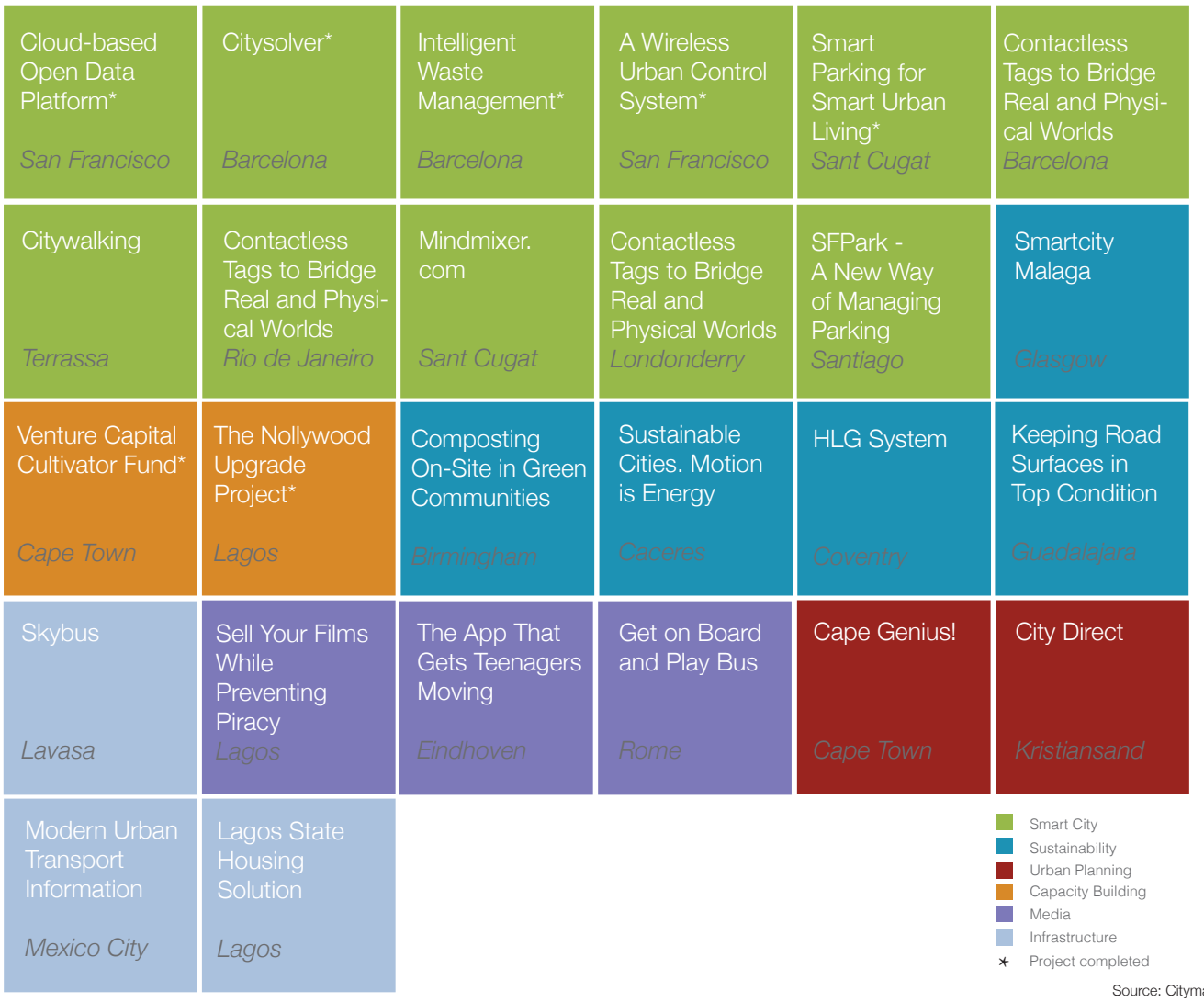
"Winning the AIF prize gave us African and international exposure as well as the cash to enable us to benefit from that exposure. The recognition helped us take our business to the next level and secure the funding for industrial-scale commercialization of our business."

-- Contribution by Pauline Mujawamariya, Program Manager at AIF

Case Study: Citymart.com

Citymart.com is an online marketplace for innovations to improve the quality of life in cities. Since 2009, the Citymart platform has connected 42 municipalities seeking innovative solutions to social, economic and environmental challenges with 1,519 solution providers. Below are 27 pilot projects that have advanced to implementation.

Figure 9.5 - Citymart.com Pilot Project Implementations



Source: Citymart (2013)

How can cities connect with leading ideators around the world?

Just as citizens and companies are turning to global exchange platforms, municipalities also are taking advantage of web-based innovation schemes to attract best in class ideas that address their most pressing design challenges. Citymart.com (previously Living Labs Global) is a multifaceted platform to faciliate innovation-driven partnerships in over 40 cities around the world. Cities seeking design solutions represent a mix of small and mid-sized locales (Birmingham, UK; Lavasa, India; Guadalajara, Mexico) with booming global giants (London, Lagos, Rio de Janeiro). Since 2009, Citymart.com has published more than 75 design challenges and linked cities with solutions in areas such as health, transport, technology, tourism, energy, sustainability, public utilities, citizen participation, and other public services.

The result is that Citymart.com is able to provide an efficient platform for cities to gather valuable market intelligence from a diversity of private companies, research centers, and individual entreprenuers at no cost.

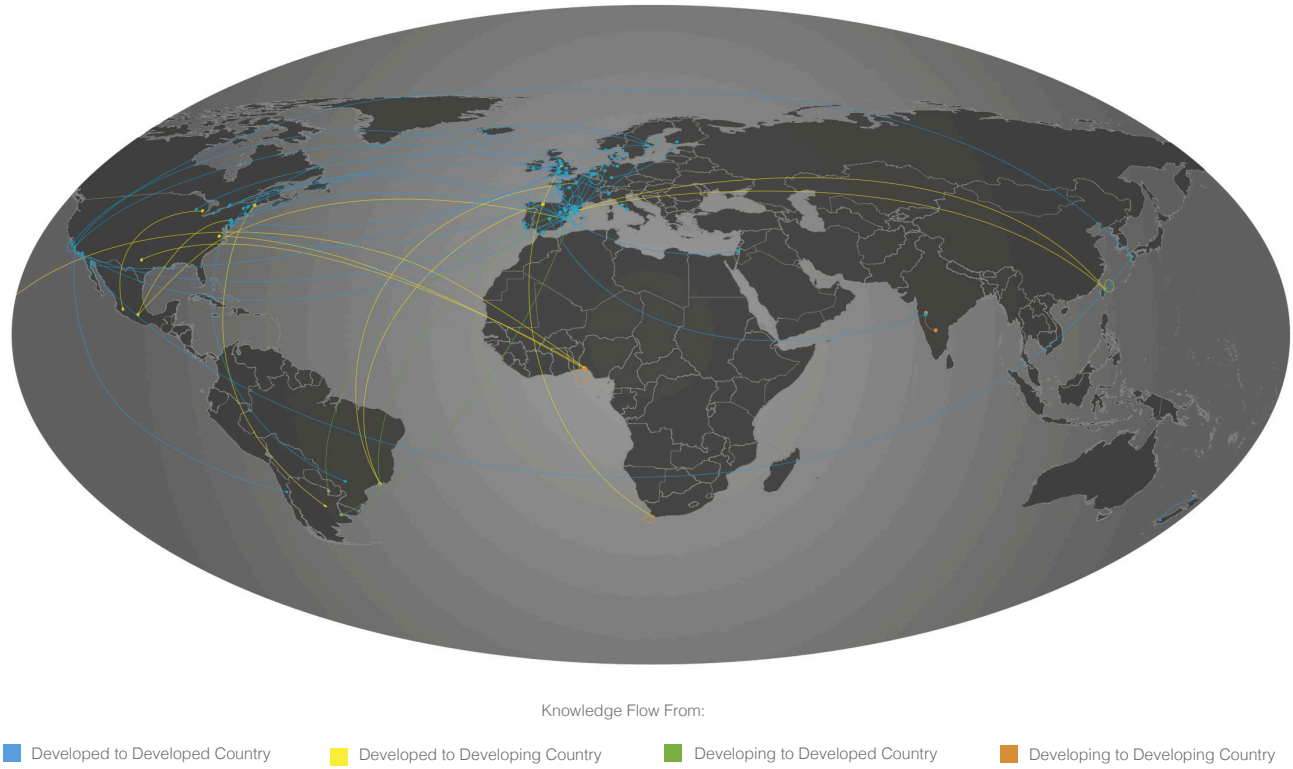
The mechanics of the process are as follows:

1) Call: Citymart interviews and selects cities to define their challenges and present them as challenges for innovations.

2) Submit: Solution providers present their innovations for evaluation by cities, and cities browse worldwide urban and social innovations.

3) Select: Cities select the most promising solution providers through a transparent evaluation process.

Figure 9.6 - Citymart.com City to City Knowledge Exchange



Source for : Citymart.com (2013)

4) Connect: Cities and selected solution providers meet in a Mathcmaking & Learning Summit.

5) Transform: Selected solutions are piloted. Cities exchange results, make better investments and improve lives. Solution providers validate their products and enter new markets.

Incentives for cities to participate include gaining international exposure, learning from other leading cities and creating growth opportunities for local businesses.

In a review of 38 design challenges completed to date, more than a quarter of the municipalities that sought design solutions were located in developing countries. Yet a sparse 11 percent of design solutions were chosen from cities in developing countries for application in developed countries. Despite the geographic diversity of participants, the majority of matchmaking is occuring between cities in developed countries.

Overall, the platform serves as an idea accelerator, matchmaker for public-private partnerships, and global disseminator of proven urban design solutions. The creators of the Citymart platform shared some of the engagement strategies behind their successful innovation platform here:

CSF: What outreach strategies do you use to gain partnerships with municipalities to sponsor design challenges?

Citymart: We carry out extensive outreach that reach about 1,100 cities, of which we have engaged about 500 in a dialogue. We reach out through a variety of ways, but all contacts are directly managed by a small team in our Barcelona office.

CSF: How to you entice cities to use the Citymart platform?

CM: Each region (Africa, Latin America, Asia) requires a variation on the approach, but broadly we have a single global value proposition for cities: opening problems and sharing solutions delivers better services to your community, faster and at lower cost. In different cases we have had city leaders, consultants, entrepreneurs, researchers, transnational organizations and agencies recommend Citymart as a method to city leaders.

CSF: How did Citymart get involved with the Lagos State Government and the Nollywood Upgrade Project?

CM: Lagos was one of the cities we originally approached in 2010 as part of an outreach that at the time involved about 60 cities, and we were met with a very professional, enthusiastic team. Lagos has proven to be a very professional partner organization and the Nollywood Upgrade Project – while surely a complex undertaking to put together – was one of the fastest projects in our global network to be deployed.

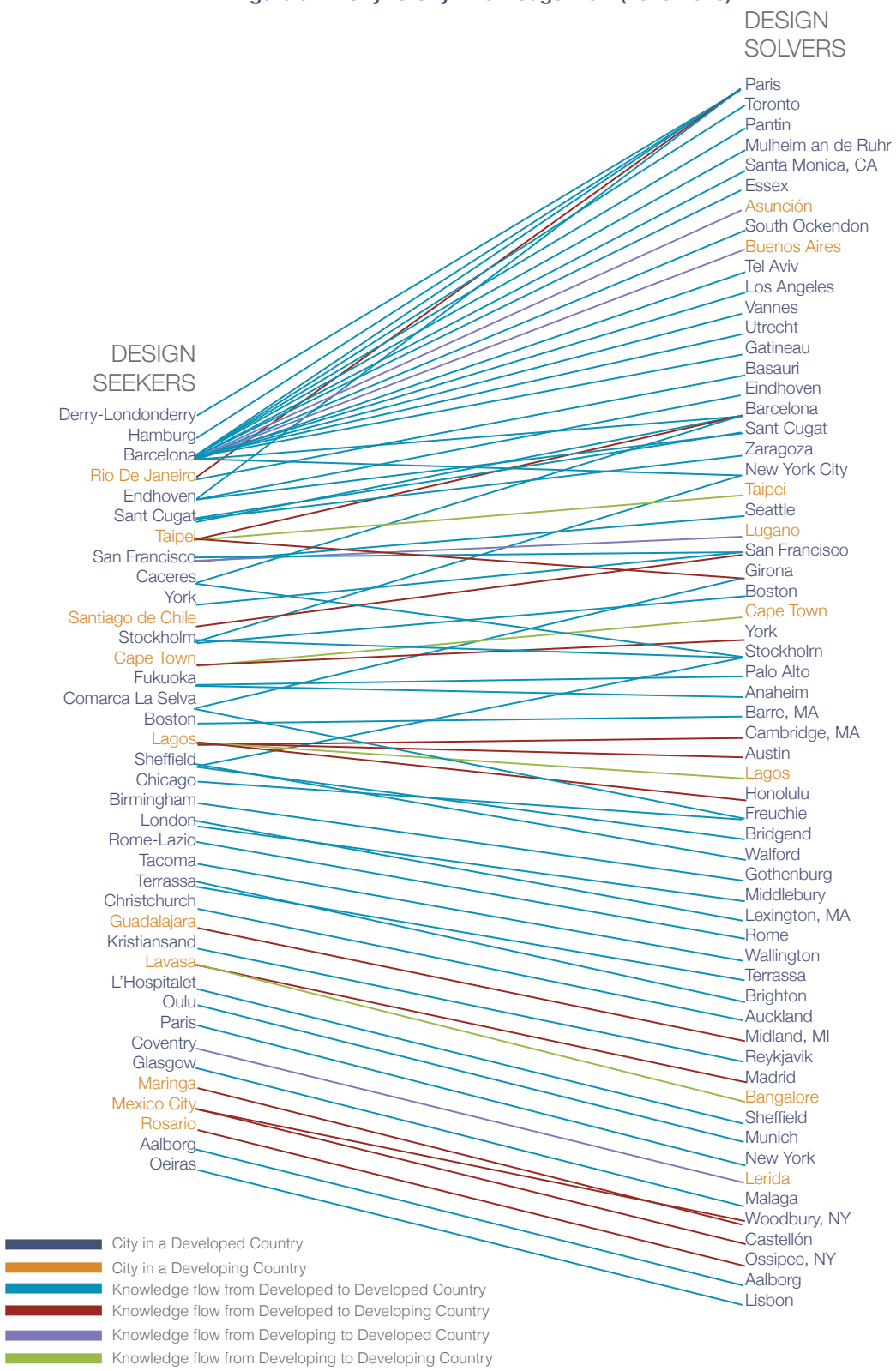
CSF: How do you increase idea contributions from companies and individuals in developing countries?

CM: On average our research team find 200 solutions of each challenge, of which many are in developing countries. We do not segregate by degree of technology or sophistication, but simply seek out solutions that could work to help meet the challenge. We provide complete support to help any provider participate (which happens at no cost). In addition, our research team actively makes use of LinkedIn and Citymart partners in order to reach relevant groups of professionals based or with working experience in developing countries.

Case Study: Citymart.com *(continued)*

Design Seekers are local municipalities who have posted an urban design dilemma on the Citymart.com platform to crowdsource potential solutions from Design Solvers, companies or individuals with an innovative approach to addressing their issue.

Figure 9.7 - City to City Knowledge Flow (2010-2013)



Case Study: Instabeat

While the majority of innovation-prize inducements take place online, other platforms have been used over the past years. Taking advantage of the wide-reaching audience of television, programs such as Shark Tank (United States) and Stars of Science (SoS, Qatar) are honoring entrepreneurs such as Ms. Hind Hobeika, who was a finalist on SoS.

Figure 9.8 - Hind Hobeika presenting her tool at INK Talks

Source: Ink Talks (2013)

New technology has been revolutionizing the way we create, fund, and support innovation. Taking advantage of the rising popularity of reality television, the Qatar Foundation has developed Stars of Science (SoS). In the same genre of television talent competitions such as the renowned American program "Project Runway," SoS invites young inventors from across the Arab world to compete for the title of best inventor and receive up to USD 600,000 to launch their endeavor.

This has enabled young scientists to access resources they could not have otherwise have gained and promote their ideas directly to the public. Hind Hobeika, a 30-year-old from Lebanon, is an engineer and inventor. She is also the founder and CEO of Instabeat, which she prototyped as a contestant on SoS and later funded through Indiegogo. Instabeat is a heart rate monitor for swimming mounted on swim goggles. It displays real-time visual feedback to the swimmer, and displaces clunkier devices that require a chest belt.

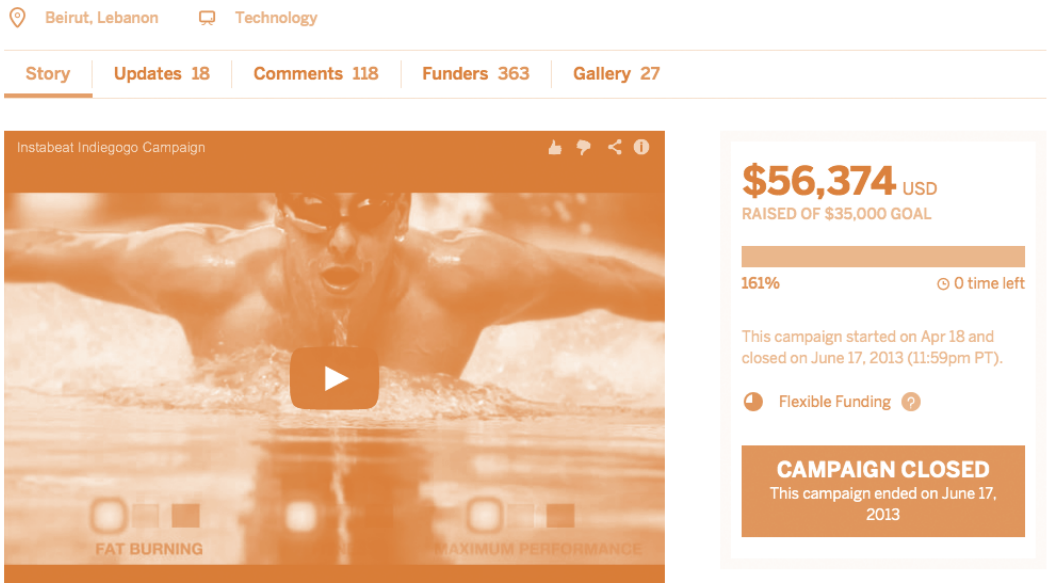
CSF: Tell us how you got involved with Stars of Science?

Hind Hobeika: The Dean of mechanical engineering sent us an email to apply to the competition. I was the only one to get selected from Lebanon and my experience was incredible. I spent four months in a lab with experts trying to build a product from scratch. We had access to all of the resources and mentors we needed to build a functional product. It was truly a life changing experience that made me realize that turning an idea into a product is not unrealistic and is achievable with the right support.

CSF: How do you think this kind of entertainment program fosters innovation in the Arab world?

HH: I think using reality TV as a platform inspires Arab youth and makes them see that people coming from similar backgrounds and living the same kind of life are able to create a lot from so little. It's meant to change the mindset that invention is only reserved for big companies and industry experts. This is something crucial in all economies, not only developing ones.

Figure 9.9 - Detail from the Instabeat Crowdfunding Campaign on Indiegogo



Source: Indiegogo (2013)

CSF: What kind of expertise developing IP did SoS provide you with?

HH: They put us in touch with an IP lawyer from a Doha based firm (Saba IP), which provided us with a workshop on the guidelines for writing a patent and conducting a search, as well as a one one-on-one session to talk about our product specifically. We also had to write the patent ourselves during the show and submit it to the firm so that it could be filed before the show was broadcast in the Gulf and our country of residence. It would have been helpful to receive more legal support, specifically to refine our patent and to file under the PCT or in the US.

CSF: After SoS, what were some of the main challenges you faced in taking your idea from prototype to market-ready product?

HH: Finding the right talent! Industries in the Middle East are 90 percent service based so there is little expertise on the ground in manufacturing, product design, industrial design, electronics, etc. Outsourcing is feasible but expensive and it means having less control over the process. There's also little guidance as to where to outsource manufacturing.

CSF: Describe your experience using Indiegogo as a crowdfunding platform.

HH: The flexibility of the platform, their customer support, and their team are all absolutely amazing. The Indiegogo staff were extremely helpful, making sure we had everything we need to launch a functional product.

CSF: Where were your donors from?

HH: From 51 different countries! The highest numbers came from the US (40 percent), the UK (15 percent), Germany (10 percent), and France (10 percent).

CSF: How did Indiegogo help you build a community of supporters beyond donations?

HH: They featured us on their homepage and in their newsletter and that helped increase traffic a lot. We also used social media as a means to promote the product, which is directly integrated with Indiegogo.

CSF: What current challenges does your business face in terms of developing and protecting your intellectual property?

HH: In IP terms, Lebanon is not part of the PCT convention, so I needed to file in each country separately. This can be quite expensive with no local lawyers, which meant we had to work with lawyers in the US.

References

Boudreau, K. and Lakhani, K. (2013). Using the Crowd as an Innovation Partner. *Harvard Business Review, 91*(4): 61–69.

Citymart (2013). 23 Solutions to Change the Future of Cities. Retrieved from http://blog.citymart.com/2013/05/15/23-solutions-to-change-the-future-of-cities/

Financial Times (2010). Everyone should launch prizes. Retrieved from http://www.ft.com/cms/s/0/d86bacf4-11f4-11e0-92d0-00144feabdc0.html#axzz35UtobptT

Gök, A. (2013). The Impact of Innovation Inducement Prizes. Compendium of Evidence on Innovation Policy.

Indiegogo (2013). Instabeat. Retrieved from https://www.indiegogo.com/projects/instabeat

Ink Talks (2013). Innovational Talks. Retrieved from http://www.inktalks.com/talks/science/2

Knowledge Ecology International (2008). Selected Innovation Prizes and Reward Programs. Retrieved from http://www.keionline.org/misc-docs/research_notes/kei_rn_2008_1.pdf

Max Fisher (2013). The Amazing History of the Nobel Prize, Told in Maps and Charts. *The Washington Post (Washington D.C.)* 15 October. 2013

McKinsey & Company (2009). And the Winner is… Capturing the Promise of Philanthropic Prizes. Retrieved from http://mckinseyonsociety.com/downloads/reports/Social-Innovation/And_the_winner_is.pdf.

National Science Foundation (2014). Retrieved from: http://www.nsf.gov/news/mmg/index.jsp?s=0&page=1

Scotchmer, S. (1991). Standing on the Shoulders of Giants: Cumulative Research and the Patent Law. *Journal of Economic Perspectives, 5,* 29-41.

Thomas, K. (2006). Prizes for Technological Innovation. The Brookings Institution. Retrieved from http://www.brookings.edu/~/media/research/files/papers/2006/12/healthcare%20kalil/200612kalil.pdf

Verhulst, S. (2013). The Impact of Innovation Inducement Prizes. Retrieved from http://thegovlab.org/the-impact-of-innovation-inducement-prizes/.

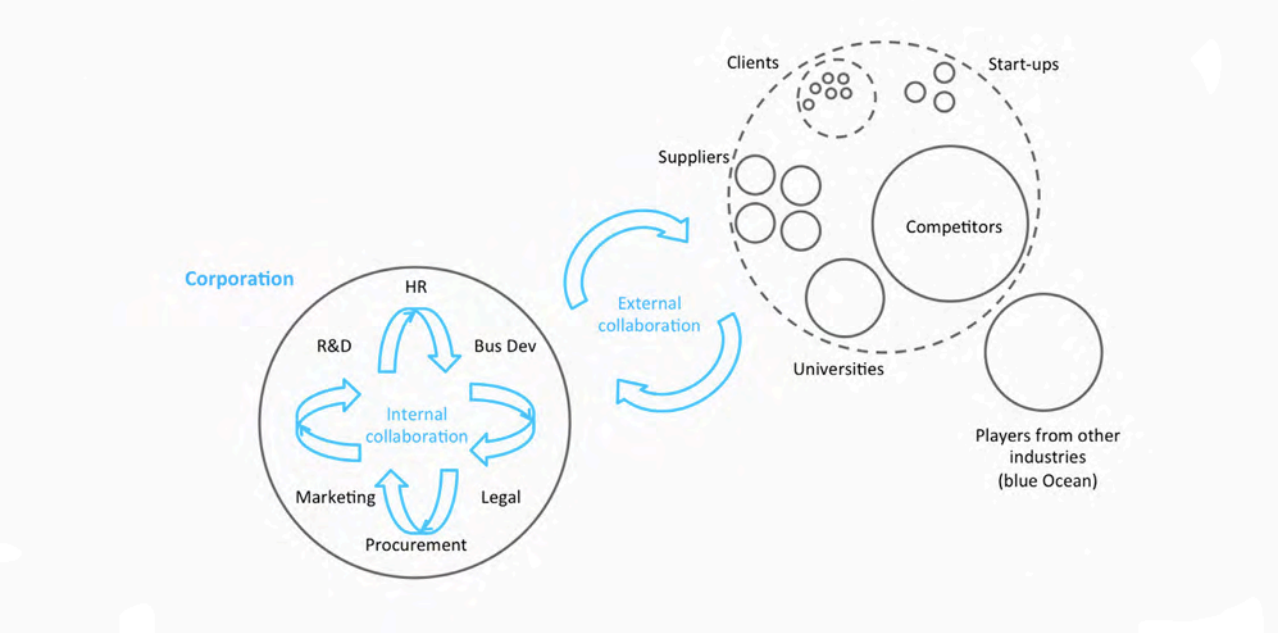
Open Collaborative Projects

“Harnessing the power of the crowd is essential to disrupting current processes and accelerating the pace of innovation.” - Steve Liguori, Executive Director of Global Innovation, General Electric

Chapter 10: Open Collaborative Projects

Wider Internet access has increased the potential for innovations by way of open collaborative platforms and marketplaces. By building interconnected networks of problem-solvers, the democratization of innovation can enhance the implementation of actionable solutions to global challenges.

Figure 10.1 - The Open and Collaborative Innovation Dynamics Process



Source: bluenove.com (2013)

DEFINITION

An open collaborative innovation can be described as the osmosis and reverse osmosis of knowledge across the porous membrane separating an organization or community and its environment. This section will focus on the rise of open collaborative platforms as a way to connect entities or individuals encountering a challenge with problem solvers across the globe. As we will see, these initiatives are stemming both from the public sector (e.g. European Commission's Open Living Labs Project) and the private sector (e.g. InnoCentive).

The Concept of "Openness"

In order to discuss open collaborative projects, it is first important to first have a firm grasp on the concept of "openness" within the context of innovation. While the term is still debated and sometimes used erroneously, the general consensus in regards to closed and open innovation is as follows (Huizingh 2010):

- *Closed Innovation*: a proprietary innovation is developed in-house. Both the process and the outcome are closed.

- *Private Open Innovation:* the outcome is closed but the process is opened up..

- *Public Innovation:* A project is developed as a public good and released to the public.

- *Open Source:* both the innovation process and outcome are open.

Collaborative Innovation Applications in the Developing World

Overall R&D spending has increased worldwide, with a 45 percent combined international increase from 2002 to 2011 (Wilsdon et al 2011).

Innovation collaborations have consequently increased for a variety of reasons, including but not limited to: advancements in communication technologies, improved equipment for R&D, increasing availability of information, interdependency of issues faced, and wider access to problem-solvers.

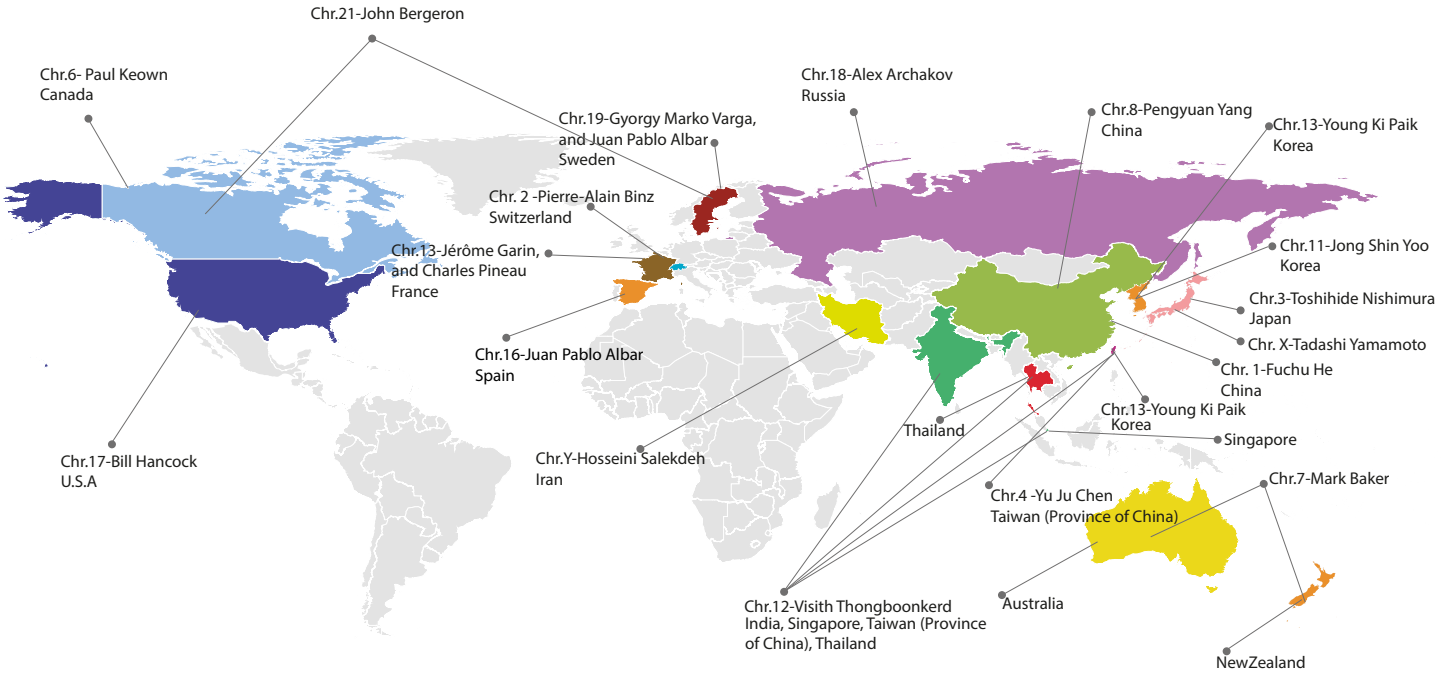
A core question is whether the developing world is benefiting from and/or contributing to Open Collaborative Projects – or whether this impacts the net uptake and impact of these technologies.

While few in-depth survey exist to answer this question in detail, the intellectual environment and technical abilities to turn ideas into open innovation projects are shifting as countries develop economically. A World Bank conceptual framework clarifies a series of conditions for ICT development in the developing world: building infrastructure, institutional support, licensing and regulatory frameworks, developing business environments, and mobilizing global institutions (World Bank 2005). Today, as these conditions are met, companies supporting open source development and other international entities now consider developing countries as places to both recruit talent and establish innovation hubs.

Summary Findings

The ongoing Human Proteome Project is set to characterize all genes of the known genome and generate a complete map of the protein-based molecular architecture of the human body. The Chromosome-Centric project benefits from the contributions of 25 countries, all of which are working either individually or in collaboration on a specific chromosome and mitochondria. For instance, contributions on Chromosome 12 are coming from four Asian countries (India, Singapore, Taiwan (Province of China), and Thailand), while the Royan Institute in Iran is characterizing the Y chromosome. Even though Latin America and Africa are not contributing to the Human Proteome Project, the number of countries from the Global South actively participating in the mapping of the protein based molecular architecture of the human body is high.

Figure 10.2 - Location of Working Groups of the Human Proteome Project



Source: Human Proteome Project (2014)

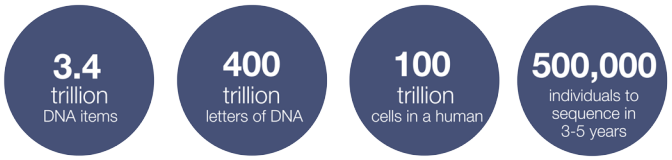
"A Watershed Moment": The Human Genome Project

In 1988, a Memorandum of Understanding was signed between the US National Institutes of Health and the Department of Energy to "coordinate research and technical activities related to the human genome."[1] The Human Genome Project, which was declared complete in 2003, would end up being the single largest collaborative biological project. The scale of the endeavor was massive: thousands of researchers from 20 institutions in six nations deciphered the sequence of all 3.2 billion pair bases of DNA that make up the human genome.

It is now possible to sequence a human genome in about two days. The National Health Service of the UK announced that it was planning to sequence 100,000 individuals by 2017. According to Don Tapscott and Anthony D. Williams (2008), the Human Genome Project represents "a watershed moment, when a number of pharmaceutical firms abandoned their proprietary human genome projects to back open collaborations." They argue that the change from a purely individualistic and self-interested perspective to shared R&D was caused by a paradigm shift: by sharing information and working together, the innovation process was tremendously accelerated and additional funds were created.

While the Human Genome Project revolutionized the ways in which innovation could be crowd-sourced and open to experts from various expertise and locations, these locations remained mostly confined within the Global North: five developed countries (France, Germany, Japan, United Kingdom, and United States) and China.

1 See http://www.genome.gov/10001763



The Rise of Open Collaborative Projects

It has now been over ten years since the Human Genome Project came to completion, and the potential of open collaborative projects has expanded to other areas. Fields such as business, technology and policy-making have experimented with using external ideas to advance their mission – whether that may be profit, technological innovation, or democracy. An important number of firms have stopped relying solely on their own research and have explored alternative ways to gain access to innovative opportunities. Already in 1986, the ratios of internal R&D versus external R&D had grown tenfold from 1967 levels. In a 2012 survey, over 40 percent of life science industry representatives reported that they would likely be involved in more collaborative research in 2013, and 39 percent expected their R&D efforts to take on a more global context (Batelle 2012).

Initiatives such as ideas competitions and innovation networks have leveraged the expertise of end-users and researchers from the field to accelerate innovation solutions. Large companies rely increasingly on a healthy mix on collaboration, development alliances, IP licensing, and acquisitions to incorporate enabling

Figure 10.3 - Presence of Living Labs in Latin America, Africa, and South-East Asia

South America | Africa | South-East Asia

Source: Open Living Labs (2013)

technologies, bolster performance and security, and mitigate risks.

According to Open Innovation EU, a worldwide network, here are six key principles to follow for open innovation and collaborative development:

1	Success can be gained by creating the most and the best ideas in the industry;
2	External R&D can create significant value, with internal R&D claiming some portion of that value;
3	Research does not have to be originated by an organization for said organization to profit from it;
4	Building a better business model is more important than getting to the market first;
5	Success can be gained by making the best use of internal and external ideas;
6	Organizations should profit from others' use of their IP and others' IP should be purchased whenever it advances an organization's business model.

Open Collaborative Platforms and Tools

The rise in open collaborative projects has partly been made possible by the existence of vast open platforms for participation, in which groups of innovators are exchanging knowledge, connecting with innovation-seekers, and generating value. In addition to companies opening up their application programming interfaces (API), entire websites are now devoted to building innovation communities. Marketplaces connecting seekers and solvers are a growing force and include entities such as Innocentive, whose user-base contains millions of problem solvers and clients include NASA and Procter & Gamble.

By collaborating with the open source community, private organizations are hoping to gain innovations and credibility. Linux, a computer operating system created in 1991, was essentially built via open collaborations, as the software is free and open source. Since the source code may be distributed commercially, Linux has benefited both the public sector (e.g. all state high schools in the state of Kerala, India, are required to run Linux) and the private sector (Linux vendors include IBM and Hewlett-Packard).

The use and promotion of Free and Open Source Software (FOSS) helps unveil some of the uptake and participation in Open Collaboration projects. Practically, many programs in Africa are currently working with FOSS, such as FOSSFA (the Free Software and Open Source Foundation for Africa) and AVOIR (African Virtual Open Initiatives and Resources), a network of 11 institutions

developing FOSS and capacity building in software engineering in Africa (Sowe 2011). While closed-source products are harder to hack and often undergo a more thorough R&D process, FOSS has enabled open collaborative communities not to be constrained by lack of funds or to resort to piracy in regards to using software for their projects.

At the WIPO Conference on "Open Innovation: Collaborative Projects and the Future of Knowledge[1]" in January 2014, there was a virtually unanimous view that open innovation is consistent with IP. Furthermore, most forms of open innovation in the era of Big Data depend on robust IP regimes for the protection and diffusion of innovations produced through global collaborations and community-based efforts.

"It is only by staying abreast of emerging market trends and competitor actions that organizations and open innovation ecosystems can proactively adjust their product and service offerings and reconfigure their internal resources and operating routines" **- Kohli and Jaworski (1990)**

1 http://www.wipo.int/meetings/en/details.jsp?meeting_id=31762

Case Study: Coventry Living Lab

In order for firms to responsibly meet the demands of markets outside of their established geographical comfort zones, R&D collaborative contracts between local governments, universities, and private firms allow for better knowledge flow and increased innovation.

Figure 10.4 & 10.5 - Prototype of Electric Vehicle and Recharging Station

Source: European Network of Living Labs, CABLED Project

How can companies engage research institutes and consumers in collaborative research? How can cities position themselves as testing labs for sustainable design? And how can this type of multi-stakeholder, urban research be scaled across a continent?

Enter the European Network of Living Labs (ENoLL), a global community of 331 Living Labs dedicated to advancing sustainable innovation. ENoLL supports "co-creative, human-centric and user-driven research, development and innovation."[1]

As a member of ENoLL, the City Lab Coventry (CLC) aims to create an exemplar Low Carbon community in Coventry and offers large-scale, low-carbon vehicle trials, among other services. From 2009 to 2012, the Lab ran a multi-stakeholder research initiative called the Coventry and Birmingham Low Emission Demonstrators (CABLED) project as part of a nationwide program.[2] The project made electric cars available across Birmingham and Coventry and collected data on their everyday use.

The collaborative research team was comprised of private companies, universities, and the local government. Coventry University selected a representative sample of drivers and analyzed the data on their impressions of driving. Moreover, the University also developed eight hydrogen vehicles that were part of the trial and analyzed the market to see how people would use them.

The vehicles were trialed over the course of one year each to allow manufacturers ample opportunities for insights into their market potential. Overall, through this multi-stakeholder research collaboration, extensive vehicle evaluation and usage data emerged to influence a successful production and launch of ultra-low-carbon vehicles and related public infrastructure. Through linking car manufacturers, the electricity supplier, the local councils and academics in one consortium, the CABLED project improved the accesibility of low carbon vehicles to the public, thereby marking an important step forward for the future of transport in the UK.

-- Contribution by Catherine Louch, Business Development Officer at City Lab Coventry

1 See http://www.openlivinglabs.eu/FAQ
2 See http://www.arup.com/Home/Projects/CABLED.aspx

References

Batelle (2012). 2013 Global R&D Funding Forecast. Retrieved from http://www.rdmag.com/sites/rdmag.com/files/GFF2013Final2013_reduced.pdf

European Network of Living Labs (2012). Retrieved online from http://www.arup.com/Projects/CABLED.aspx

Huizingh, E.K.R.E. (2010), Open innovation: State of the art and future perspectives. *Technovation* (2010), doi:10.1016. Retrieved from http://www.rug.nl/staff/k.r.e.huizingh/openinnovationstate.pdf

Human Proteome Project (2014). Participants. Retrieved from http://www.thehpp.org/participants.php

Kohli, A. K., & Jaworski, B. J. (1990). Market orientation: the construct, research propositions, and managerial implications. *Journal of Marketing 54* (2): 1–18.

National Science Foundation (2014). Retrieved from: http://www.nsf.gov/news/mmg/index.jsp?s=0&page=1

Board of Innovations (2011). Open Innovation & Crowdsourcing Examples. Retrieved from http://www.boardofinnovation.com/list-open-innovation-crowdsourcing-examples/

Open Living Labs (2013). Living Labs. Retrieved from http://www.openlivinglabs.eu/livinglabs

Schware, R. (2005). E-development: From Excitement to Effectiveness. World Bank Global Information and Communication Technologies Department. Retrieved from http://www-wds.worldbank.org/servlet/WDSContentServer/WDSP/IB/2005/11/08/000090341_20051108163202/Rendered/PDF/341470EDevelopment.pdf

Sowe, S. (2011). Free and Open Source Software in sub-Saharan Africa. United Nations University Publications. Retrieved from http://unu.edu/publications/articles/free-and-open-source-software-in-sub-saharan-africa.html

Tapscott, D. & Williams, A. (2008). Wikinomics: How Mass Collaboration Changes Everything. New York: Penguin.

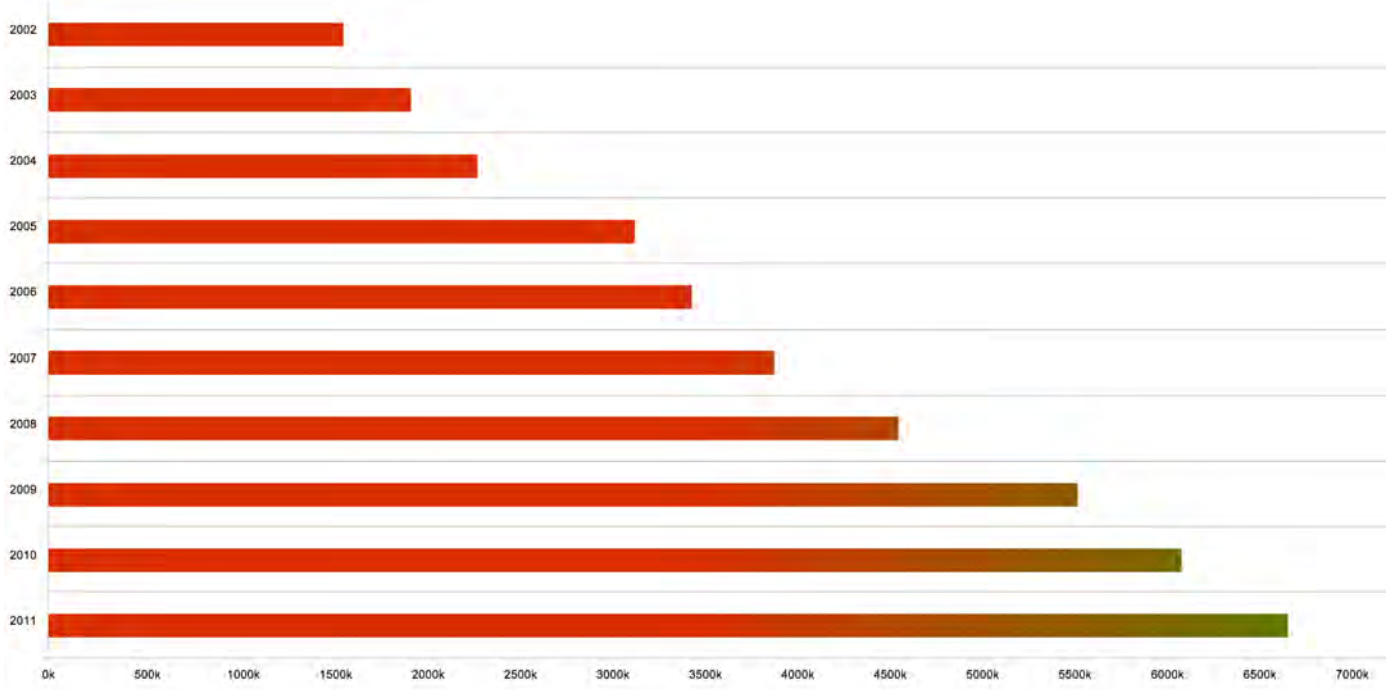
Wilsdon, J. et al. (2011) Knowledge, networks and nations: global scientific collaboration in the 21st century. Royal Society Policy document 03/11. The Royal Society, London.

"Whenever people think about virtual education, they always think of it as an either/or; virtual education versus physical. But we think virtual education is going to make physical education more valuable." - Salman Khan, Founder of Khan Academy

Chapter 11: Open Education Resources

Open Education Resources (OER) are a range of learning materials which can be shared and repurposed. OER, both online and offline, are increasing equity by empowering developing countries to access and contribute to openly licensed, high-quality content.

Figure 11.1 - Number of Students in the United States Enrolled in at Least One Online Course



Source: Babson Survey Research Group and Quahog Research Group (2013)

DEFINITION

According to the William and Flora Hewlett Foundation, open education "…is the simple and powerful idea that the world's knowledge is a public good and that technology in general and the Worldwide Web in particular provide an extraordinary opportunity for everyone to share, use, and reuse knowledge" (Hewlett Foundation n.d.). Open educational resources (OER) include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.

Open Education Resources

Global citizens continue to face an array of barriers to sustained, quality education across the world. These include physical distance from school, lack of supplies, too few teachers, or poor quality content. The OER movement aims to limit barriers to free, high quality content.

The Hewlett Foundation realized the democratizing potential of the Internet for education and began laying the investment and structural groundwork for OER in the early 2000s. Mindful of the lack of bandwidth in many countries, the Foundation developed OER packages that could be downloaded and distributed offline. It invested in early OER startups, many of which are now the established leaders in the field: MIT OpenCourseWare, Carnegie Mellon University's Open Learning Initiative, African Virtual University, Creative Commons (CC), and the Widernet eGranary.

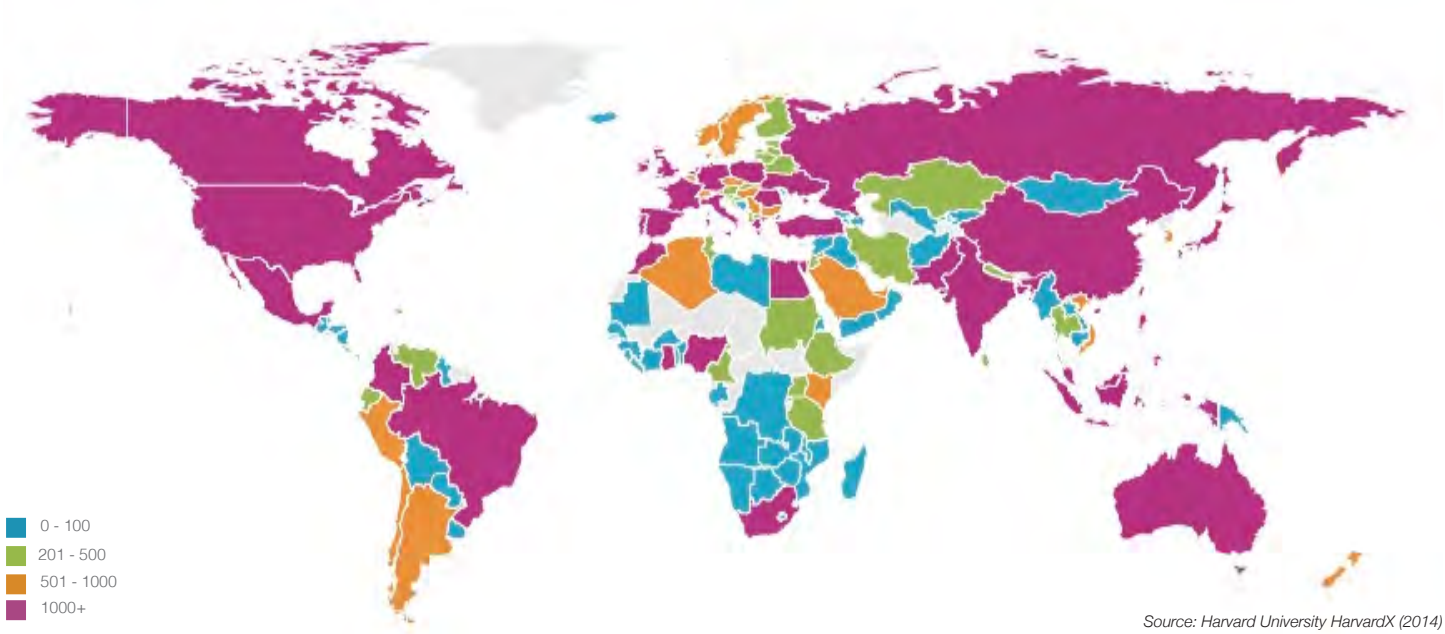
In addition, the Foundation provided a standard definition of OER as "high-quality digitized educational materials offered freely and openly for anyone with access to the Internet." More specifically, they state that "OER are teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and re-purposing by others."[1]

With concrete initiatives in place, OER adopted core principles and approaches to reach both developed and developing countries. Categories emerged to address specific needs for K-12, college, higher learning, and informal resources. Within this structure, myriad groups provide OER services broken into four groups:

1	**Facilitators:** academic and research organizations providing funding and coordination support. Examples: Hewlett Foundation, Carnegie Mellon Open Learning Initiative, University of Michigan
2	**Communities:** networks of organizations and individuals aggregating, providing, and producing content for OER. Examples: UNESCO OER Community, Teachers Without Borders, Wiki Educator

1 See http://www.hewlett.org/programs/education/open-educational-resources

Figure 11.2 - Number of Students Enrolled in HarvardX's Introduction to Computer Science Course



Source: Harvard University HarvardX (2014)

Summary Findings

The map above shows estimated enrollment numbers from each country for HarvardX's "Introduction to Computer Science" Course, launched in the Fall of 2012. There are 190,000 registrants from 185 countries, the highest of which is the US (35 percent of all students) followed by India (11.6 percent of all students) and the UK (4.4 percent). While the US and UK numbers for this course are aligned with the estimated worldwide registration, India's overall student registration is at 8.8 percent. In general, courses in computing and quantitative methods are much more popular in the Global South than classes in fields such as History and Poetry. In Africa, Nigeria is the most enrolled country with over 10,000 students. Surprisingly, less than 1 percent of enrolled students come from China.

3	**Makers:** developers and experts creating open source technologies and tools. Examples: Open Education Resources Commons
4	**Contributors:** experts who publish educational content. Examples: OpenCourseWare Corsortium, Connexions

Open educational resources are typically openly licensed under CC licenses, making the resources free and providing the legal rights to anyone to reuse, revise, remix, redistribute and retain (a copy of) the educational resources. CC licenses work globally and there are teams of CC "affiliates" in 75 countries to help citizens learn about open licensing and OER.

Shifting OER Landscape

The US is a key testing ground for OER success. The transformational uptake of OER remains an uphill battle, as "OER is showing positive green shoots, but still has ways to go before reaching mainstream" (Boston Consulting Group 2013). While OER content production and awareness is on the verge of mainstream adoption, the ease of access and discoverability of material remain in early stages.

Measuring the coverage of OER is difficult at best, though anecdotal evidence suggests higher learning institutions and businesses most easily contribute to and use OER. Still, by 2012, 40 percent of K-12 educators in the U.S. were using OER to supplement core materials, particularly in math and science (ibid). Many US educators still await proven efficacy and higher quality materials before fully adopting OER. There is also confusion about who owns the copyright to the content teachers produce on the job. This is important to know as only the copyright holder can put a CC license on the educational resource to make it an OER.

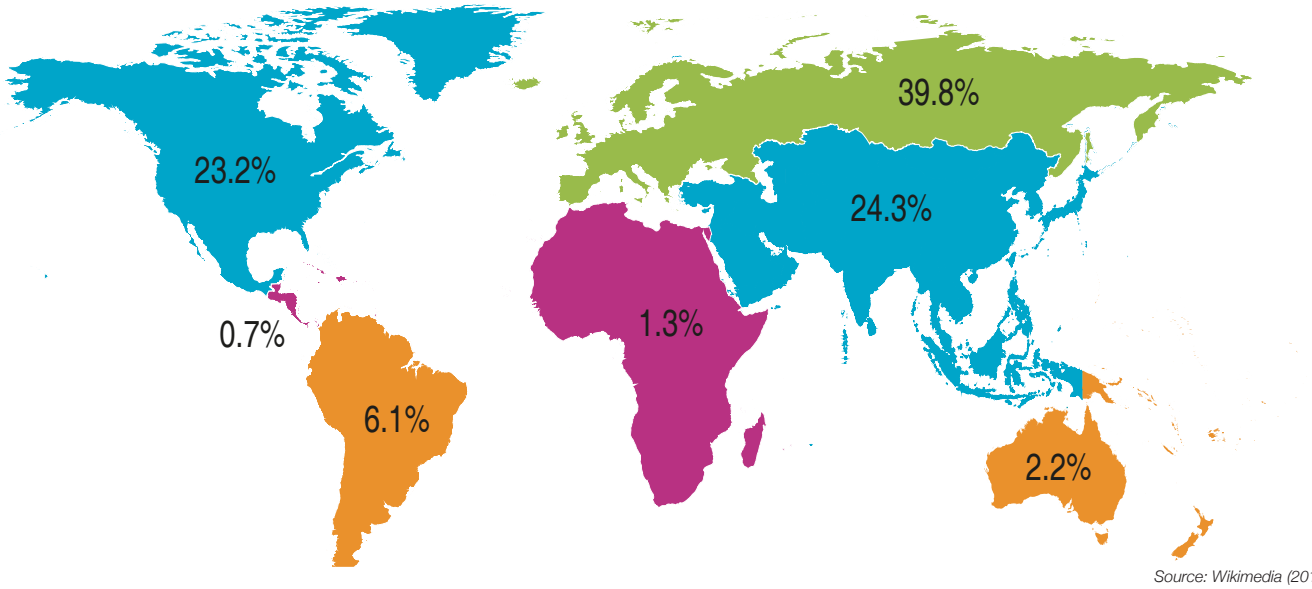
For the same reasons OER arose – technology innovation, digital educational resources and open licensing – OER content is no longer limited to text and the efforts of the Hewlett Foundation. Three years after the origin of OER, YouTube was founded and by 2006 the Khan Academy began providing free, CC licensed educational videos. Today it offers a full suite of education videos. By January 2013, six million people used Khan Academy each month.[2] Still, only about 35 percent of Khan Academy users live in developing countries.

MOOCs and Their Relationship to OER

Massive Open Online Courses (MOOCs) are web-based courses made available free of charge to a very large number of people. While most MOOCs are free, not all of them are openly licensed. This distinguishes them from OER. Another difference is that MOOCs are offered exclusively online, while OER can be distributed offline. Even though MOOCs are a recent phenomenon, they are used widely. The number of MOOCs offered grew from about 100 in 2012 to almost 700 in 2013 (Shah 2013). Courses from a variety of prestigious universities are offered via MOOC platforms, such as edX, Coursera, and Udacity.

2 See http://www.skollfoundation.org/entrepreneur/sal-khan/

Figure 11.3 - Percentage of Monthly Page Edits on Wikipedia by Region



Source: Wikimedia (2014)

Summary Findings

About 40% of Wikipedia edits come from Europe, followed by over 24% and 23% in Asia and North America respectively. It is important to note that while the United States is third in this ranking, that region represents a very important percentage considering the United States and Canada's populations (relative to nations such as India and China, for instance). The United States by itself represents 18.7% of monthly page edits, with the United Kingdom following in second position with 6.5% of edits. Only about 1% of contributions come from Africa (representing 25,000 monthly page edits), and even these are concentrated within a few nations: for instance, Egypt represents 7,000 of these edits, while South Africa and Algeria both account for 4,000 of the edits. The complete monthly page edits on Wikipedia from 1 January 2014 to 31 March 2014 was nearly 2 million.

Skeptics argue that MOOCs have failed at providing an equitable approach to education, considering the majority of platforms and universities offering classes are located in the Global North. The below steps have been identified as critical in order to ensure a successful MOOC uptake in developing countries:

Proxy indicators such as Internet connectivity or level of access can be analyzed for the potential of MOOC use. For instance, the developing world may be on the verge of readiness. By 2012, Caucasus and Central Asia, Eastern Asia, Western Asia, Northern Africa, and Latin America reached above 30 percent Internet Usage per 100 population. Only Southern Asia, Oceania and Sub-Saharan Africa remained below 15 percent (United Nations 2012).

Area	2000	2001
Caucasus and Central Asia	0.5	31.5
Eastern Asia	3.7	39.9
Latin America and the Caribbean	3.9	38.8
Northern Africa	0.7	33.5
Oceania	1.8	8.8
South-Eastern Asia	2.4	23.7
Southern Asia	0.5	10
Sub-Saharan Africa	0.5	12.6
Western Asia	3.2	34.6

Source: UNSD, MDG Report 2012

Even if these conditions are met, however, students in developing countries may first need sustained exposure to technology for successful uptake, as "critical literacies to efficiently evaluate large quantities of data become vital for the successful participation in a MOOC" (Liyanagunawardena 2013).

The Future of OER

Educators are increasingly sharing their content as OER, for free, with the world. OER is set to replace much of the expensive, proprietary content used in academic courses, as it is already doing in popular courses such as computer programming. Shifting to this model will not only generate more equitable economic opportunities, but it will also bolster contributions from emerging economies.

Current discussions surrounding OER and MOOCs aim to address both the shortcomings in developed countries, as well as the uptake of OER in the developing world. The Hewlett Foundation's model urges that the "potential of OER" should be "demonstrated in developing countries" (Hewlett 2013). It furthermore sets forth the goal to "pursue limited, high-impact, international partnerships to produce and distribute OER in developing countries and demonstrate the movement's potential" (ibid). However, this goal alone speaks to the limited use of OER in developing countries.

Initiatives such as OER Africa are bolstering the dissemination of OER, ensuring the creation of context-specific material and partnering with local universities. OER Africa provides support to regional educational networks and individual universities. For instance, students at the Kamuzu College of Nursing in Malawi were provided with a CD-ROM containing educational materials for midwives seeking to enhance their capacities beyond their current degree.

From Print to Digital Encyclopedias

Conventionally, an encyclopedic entry was produced by one person and depicted knowledge in a stable and one-dimensional manner. The reader consulted the end product of the editorial process and was not part of production. Wikipedia and new online encyclopedias, on the other hand, show that knowledge is debatable.

The divide between Wikipedia contributors living in developed and developing countries is wide: 70 percent are in the Global North, and 27.7 percent are in the Global South. Contributors in India and China represent 3.5 percent and 2.4 percent of total contributions, yet most countries in the Global South have nearly no contributors.

Only 1.3 percent of all monthly page edits come from Africa.[3] This disparity in contributions has consequences on the content of the platform: according to the MIT Technology Review, Wikipedia's pages on places in Sub-Saharan Africa tend not to be comprehensive (Simonite 2013). The number of revisions on the Wikipedia page of the East African nation Burundi was about 2,000 as of April 2014. Luxembourg, a smaller country in Europe, had been revised over 4,000 times.

The map underlines the discrepancy between Wikipedia edits in the Global North and the Global South. Indeed, 63 percent of all contributions come from Europe and the US. Almost 500,000 out of the 1.9 million monthly page edits come from North America.

Region	Contributor Share
Africa	1.3
Asia	24.3
Europe	39.8
Central America	0.7
North America	23.2
South America	6.1
Oceania	2.2
Unknown	4.6

Unlike Wikipedia, Encyclopedia Britannica does not open up its content to its user base. However, contributors to the encyclopedia come from a diversity of fields and sectors. As of 2008, there were 4,411 named contributors to Encyclopedia Britannica: thousands of experts, scholars and leaders that include Nobel Prize winners and five American presidents. Individuals are able to sign up for an annual USD 70 subscription, and universities are charged about USD 1 per student.

3 See http://stats.wikimedia.org/wikimedia/squids/SquidReportPageEditsPerCountryOverview.htm

Case Study: AgShare

Figure 11.4 - AgShare Toolkit Website Homepage Images

Source: Agriculture OER, oerafrica.org

Connecting Small Farmers and University Researchers

AgShare bolsters the OER capabilities of African universities to conduct agricultural field research, improve productivity, and produce free, openly-licensed educational resources. AgShare was co-created by Michigan State University, OER Africa (an initiative of the South African Institute for Distance Education), and faculty at four African universities: Makerere University in Uganda, US International University in Kenya, Moi University in Kenya, and Haramaya University in Ethiopia. The target participants are Masters-level students and faculty engaged in relevant research who can release their findings via OER to universities across the region. The research then gets distributed as digital and print curricular materials, including online videos of case studies, printed posters, and multimedia DVDs.

AgShare addresses the need for improved agricultural education in African universities, which is limited by outdated graduate teaching materials and small budgets for purchasing new materials. In particular, there are significant gaps between classroom teaching and the emerging research that can positively impact farming practices and rural development.

Even though farmers are the primary beneficiaries and end-users of agricultural science and technology, they generally contribute little to identifying research or curriculum priorities. Furthermore, faculty often originate from urban areas and lack direct agricultural experience. The result is that many students and faculty are disconnected from the context and issues of smallholder farmers. The effectiveness of agricultural technology generation and dissemination systems requires improved responsiveness to farmer needs. OER, such as AgShare, can address these limitations because they are made to be shared, modified, and are freely available through online and offline learning networks. From 2010 to 2012, four African universities in Uganda, Ethiopia, Kenya and the US piloted the platform. The pilot experience demonstrated students were able to fuse practice with theory and pace their learning using OER. Faculty saw a new method for engaging students through hands-on, case study-based activities.

AgShare is part of the broader OER Africa Initiative, supporting separate projects spanning agriculture, health, foundation OER, and teacher education. The AgShare videos are available on the OER Africa YouTube channel, which as of May 2014 had 310 educational videos, 1,615 subscribers and 1,740,970 views. An example of topics covered in AgShare videos include farmers sharing best practices for caring for particular crops, an analysis of middlemen buyers, marketing strategies for cash crops like coffee, and the unpacking of value chains.

As agriculture accounts for 70 percent of the labor force in most African countries and is concentrated in the hands of smallholders and pastoralists (Economic Commission for Africa 2009), there is a large-scale need for innovative approaches to agricultural development that can eliminate poverty and hunger. AgShare is striving to help transform farming from a low-skill, manual labor intensive industry to a knowledge-intensive, networked sector, supported by quality higher education and participatory, community-based research.

References

Babson Survey Research Group and Quahog Research Group (2013). Table: Total and Online Enrollment in Degree-granting Postsecondary Institutions – Fall 2002 through Fall 2011. Ten Years of Tracking Online Education in the United States"

Boston Consulting Group (2013). The Open Education Resources ecosystem: An evaluation of the OER movement's current state and its progress toward mainstream adoption. Retrieved from http://www.hewlett.org/sites/default/files/The percent20Open percent20Educational percent20Resources percent20Ecosystem_1.pdf

Economic Commission for Africa (2009). Developing African Agriculture Through Regional Value Chains. Retrieved From http://www.uneca.org/sites/default/files/publications/era2009_eng_full.pdf

EdX (2014). Retrieved online from https://www.edx.org/schools-partners

Harvard University HarvardX (2014). Map: World Map of Enrollment. Retrieved from http://harvardx.harvard.edu/harvardx-insights/world-map-enrollment

Hewlett Foundation. (n.d.) Open Educational Resources. Retrieved from http://www.hewlett.org/programs/education/open-educational-resources

Hewlett Foundation (2013). Open Educational Resources: Breaking the Lockbox on Education. White Paper.

Liyanagunawardena, T., Williams, S. & Adams, A. (2013). The Impact and Reach of MOOCs: A Developing Countries' Perspective. E-learning papers Number 33.

OER Africa (2014). Retrieved from http://www.agsharetoolkit.com/

Shah, D. (2013). MOOCs in 2013: Breaking Down the Numbers. *EdSurge Blog.* Retrieved from https://www.edsurge.com/n/2013-12-22-moocs-in-2013-breaking-down-the-numbers

Simonite, T. (2013). The Decline of Wikipedia. *MIT Technology Review*. Retrieved from http://www.technologyreview.com/featuredstory/520446/the-decline-of-wikipedia/

United Nations (2012). The Millennium Development Goals Report 2012. Retrieved from http://www.un.org/millenniumgoals/pdf/MDG%20Report%202012.pdf

Wikimedia Traffic Analysis Report (2014). Monthly requests or daily averages, for period: 1 Jan 2014 - 31 Mar 2014 (2014 Q1) .Retrieved from http://stats.wikimedia.org/wikimedia/squids/SquidReportPageEditsPerCountryOverview.htm

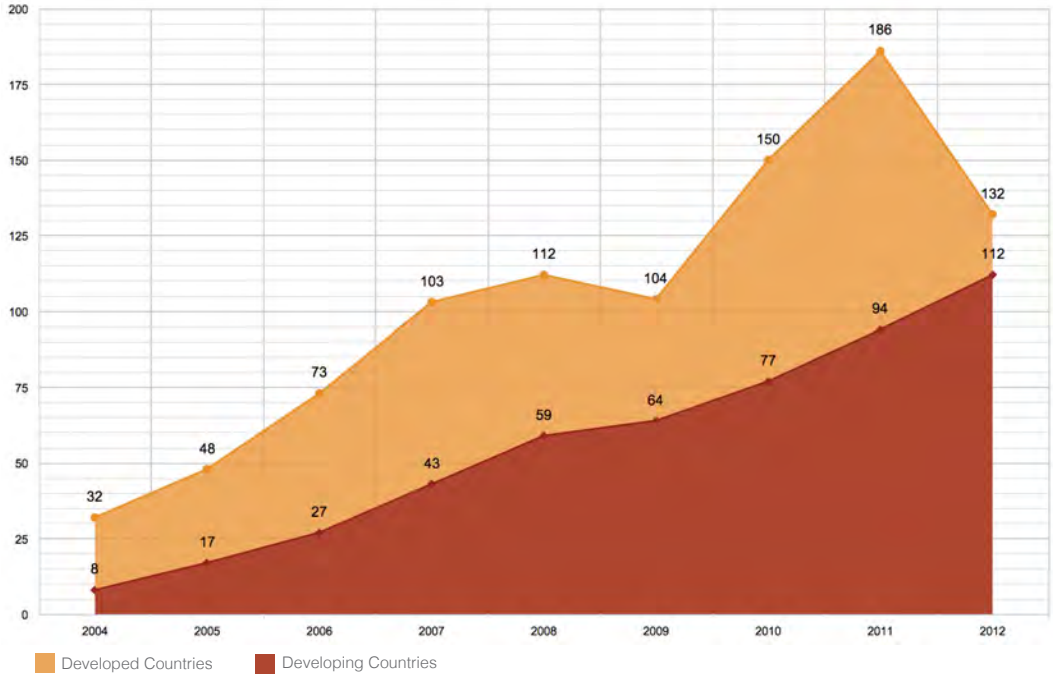
Innovation in Renewable Energy

"It is essential that businesses, academics and the government collaborate in order to accelerate the advancement of solar technologies."
– Gregg Zank, Senior Vice-President and Chief Technology Officer at Dow Coming

Chapter:12 Innovation in Renewable Energy

Success in the renewable energy sector will require investments from the private sector, cooperation with the public sector and citizens, and government policies. The field of renewables represents a prime example of how today's global challenges can best be solved by engaging a network of multiple stakeholders through transformative partnerships.

Figure 12.1 - Global New Investment in Renewable Energy: Developed vs Developing Countries (USD Billions)



DEFINITION

Renewable energy is generated from natural processes that are indefinitely replenished. These include sunlight, wind, tides, rain and geothermal heat.

Renewable Energy as a Model Sector for Cross-Sector Innovation

Global demand for renewable energy has increased considerably. Renewables accounted for 19 percent of global energy consumption in 2012 (REN21 2014). As the population approaches nine billion by 2050, the demand for energy will continue to rise while nonrenewable energy sources become more scarce and costly. According to the International Energy Agency (IEA), renewable energies will constitute 25 percent of the global energy mix by 2018 (IEA 2013). The Renewables 2014 Global Status Report highlights that developing countries will account for over two-thirds of the overall rise in renewables, led by China. The most notable public-private partnership (PPP) projects are in the Global South, specifically in Argentina, Bangladesh, China, India, Indonesia, Mongolia, and Vietnam.

As renewables are cost-effective investments, energy services are moving from the public sector to PPPs. For example, in 2013 the electronics conglomerate Siemens partnered with the C40 Cities Climate Leadership Group, a self-proclaimed "network of the world's megacities committed to addressing climate change" to standardize emissions accounting and increase the number of cities reporting on their annual emissions.[1]

Renewables and Innovation

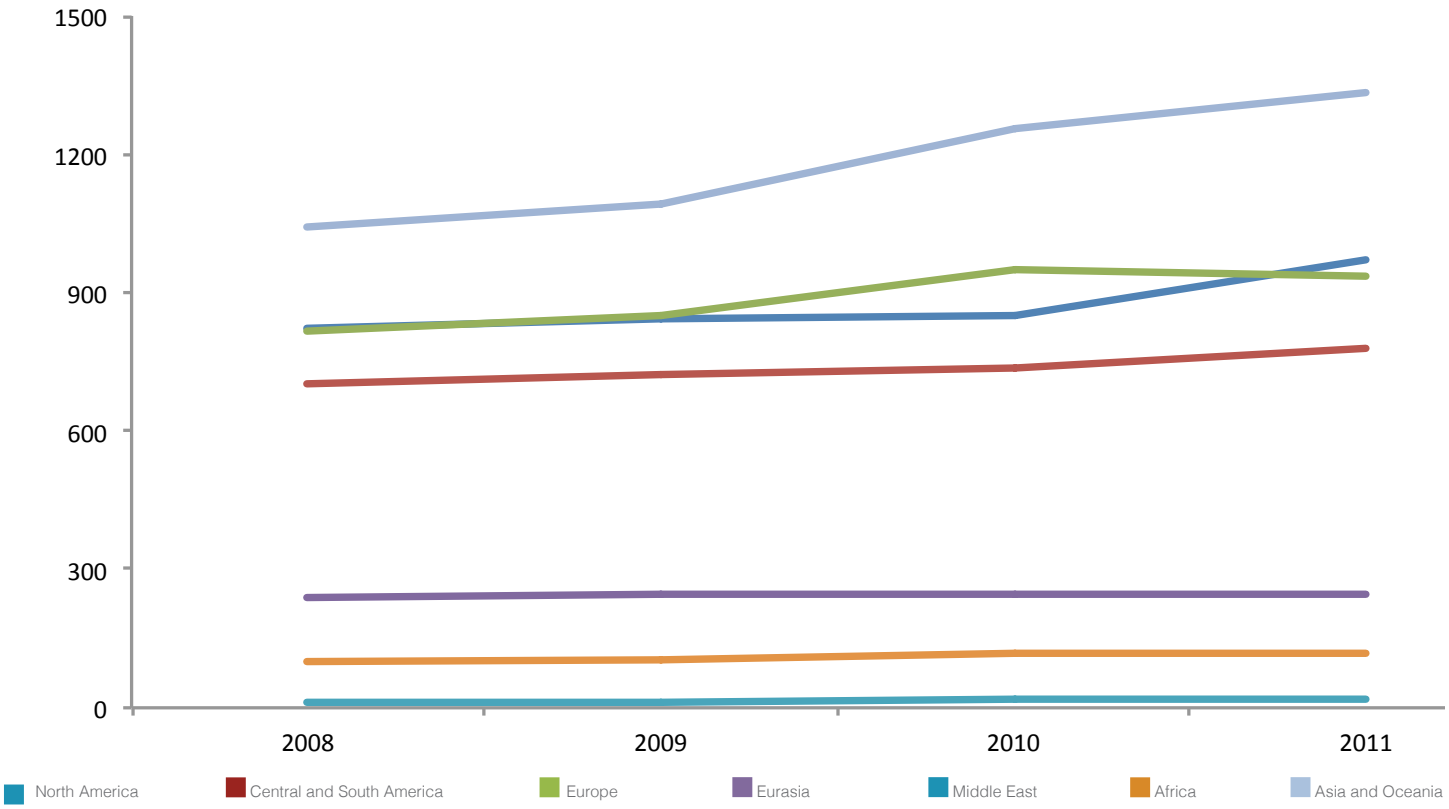
The Renewable Energy Network for the 21st Century (REN21) is a global public-private, multi-stakeholder network connecting international organizations, governments, industry associations, science institutes academia, and NGOs working in the field of renewable energy. As the pursuit of renewable energy innovation policy is distributed across all of these diverse stakeholders, policy options are consequently influenced by a multitude of actors.

Simultaneously, innovation in renewables is growing. The number of patents issued for renewable energy technologies has risen sharply over the last decade (MIT 2013). Overall, renewable energy patents in the US increased from fewer than 200 per year from 1975 to 2000, to more than 1,000 annually by 2009. Examples range from solar air conditioners to liquid metal batteries.

In the coming years, the pace of innovation in renewables will continue. There are three main drivers behind this rise in innovations (van Lierop 2014):

1 See http://www.c40.org/about

Figure 12.2 - Total Renewable Electricity Net Generation (Billion Killowatt Hours)



Source: US Energy Information Administration (2012)

1	The massive volume of high quality engineers graduating from top institutions located all around the world;
2	The eagerness to find interdisciplinary breakthroughs;
3	The trend in open innovation.

Renewables in Developing Economies

Developing countries are investing more in renewable energy, at almost the same levels as developed countries. In 2012 investments were at USD 112 billion in developing countries, versus USD 132 billion in developed countries (REN21 2013). According to the IEA, emerging markets have become leaders in deploying low-carbon energy technologies.

In China and India, investments in renewables grew considerably in 2013, despite global reductions in renewables investments (REN21 2014). Solar power is the most prevalent sector in regards to investments. While renewable power growth in Europe and the US has slowed down, the Asia-Pacific region will account for approximately 50 percent of all new solar photovoltaic (PV) demand in 2014 (Meza 2013).

Furthermore, China's new renewable power capacity surpassed new fossil fuel and nuclear capacity for the first time (REN21 2014). China is on its way to become the largest solar power investor globally, and is currently surpassed only by Japan. China has also been one of the leading applicant countries for PCT filings related to renewables.

In Africa, although there has been tremendous progress over the past decade, two-thirds of Africa's population is not grid-connected. The continent has one of the highest solar irradiation levels in the world, up to 200kW m²/year. National government efforts are underway to harness these tremendous solar resources. For example in Senegal, the government has allocated 120MW of independent power producer PV capacity to be commissioned before 2017. The Nigerian government is looking to establish a 'Silicon Valley' style science park to develop a domestic PV manufacturing industry.

In the private sector of developing economies, commercial or quasi-commercial renewable energy efforts are growing in Latin America (e.g., CONDENSA in Colombia, CEMAR in Brazil), Africa (e.g., COMASEL in Senegal, One-PPP in Morocco), and India (e.g., North Delhi Power Limited, Ahmedabad Electricity Company). Large renewable energy companies located in the Global North such as Enel Green Power are looking at developing countries as an investment opportunity, as population growth will likely spur demand for energy.

Case Study: South African Renewable Energy Technology Centre

Figure 12.3 - Rendering of the Future SARETEC Campus

Source: SARETEC www.cput.ac.za (2014)

The South African Renewable Energy Technology Centre (SARETEC) project is a government-funded initiative to support the development of the renewable energy industry through training and education. SARETEC ultimately answers to the government; however, industry is extensively involved with evaluating the quality of training and gives invaluable guidance on their needs.

SARETEC will offer training specifically tailored to meet industry needs, with a full range of programs in various the renewable energy areas offered on multiple levels. Any individual, regardless of their education level, will have options to further their career in the renewable energy space. Long term courses are for wind turbine and solar PV technicians, energy efficiency auditors, bachelor degrees and post-graduate qualifications. A range of short courses or workshops will also address specific topics.

Industry collaboration is key in determining these needs. With support from government departments, associations, NGOs and entrepreneurs, the necessary legitimacy was given to this project. Prospective investors and governments conducted multiple studies to determine the potential of the renewable energy market in South Africa. These studies, along with knowledge exchange with countries whose renewable energy industries are developed, enabled the estimation of potential demand and identified immediate needs. Consideration was also given to which of these training needs required the most infrastructure and investment.

SARETEC's facilitation extends to research and patent matters. SARETEC has formed partnerships with academic and research institutions that allow any private, corporate or governmental body to access up-to-date research, research capacity and patent services via direct involvement with these institutions, or by referral.

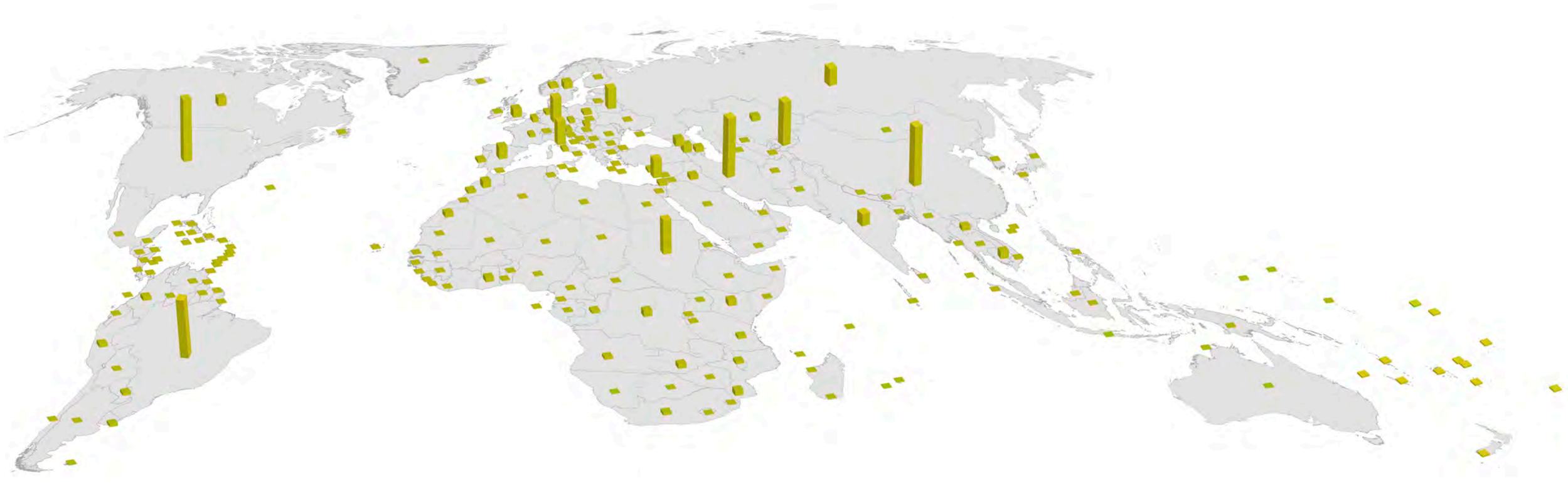
Companies need to protect their IP in relation to specific proprietary technology. As most training is generic, the 'brand specific' technology training is provided by the use of private, secure and fully equipped training areas and lecture venues. SARETEC can deliver the required training on these proprietary technologies or facilitate private sessions.

SARETEC endeavors to function as a facilitator and a hub to encourage higher education and research institutions to collaborate on renewable energy research. As SARETEC has a strong relationship with industry, it is anticipated that any renewable energy related research requirements from industry will be voiced and addressed via academic and research links. SARETEC has partnerships with academic and research institutions and will collaborate through conferences, academic exchange programs, undergraduate exchange programs and collaborative research work.

Africa has the opportunity to develop its energy market with a diverse mix of technologies while considering environmental impact and social development. SARETEC hopes to become one of many renewable energy training and education facilities on the African continent and to help address South African skills and research needs. A long-term objective is to assist other countries in establishing similar centers to support their renewable energy skills and industry needs, contributing to economic growth, innovation, industry development and social progress. SARETEC is a flagship renewable energy education project and the first of its kind for South Africa. If the center is successful, others will be created along the same model.

-- Contribution by SARETEC

Figure 12.4 - Percent Growth of Total Renewable Electricity Net Generation (Billion Kilowat Hours)



Source: US Energy Information Administration (2012)

The Business Argument

Renewables provide the most cost-effective means for off-grid and mini-grid electrification in remote areas without electricity. “The renewable energy sector can become an integral part of local economies, integrated both through upstream supply chain, such as production of equipment components, and downstream energy-related services such as maintenance” (IRENA 2013).

The International Year of Sustainable Energy for All (SE4ALL) in 2012 engaged governments, the private sector and civil society partners worldwide to ensure the doubling of renewable energy’s share in the global energy mix by 2030. Overall, in the past few years, public and private sectors are increasingly coming together to advance R&D and investments in renewables.

Summary Findings

Renewable electricity generation (including hydropower, biomass, geothermal, wind and solar) has grown worldwide from 2008 to 2012. The increase was highest in Asia and Oceania, where it grew by a little under 300 billion Kilowatt Hours, followed by North America (around 150 billion Kilowatt Hours), Europe (116.69 billion Kilowatt Hours), Central and South America (79.01 billion Kilowatt Hours), Africa (15.12 billion Kilowatt Hours), Middle East (8.85 billion Kilowatt Hours), and Eurasia (6.23 billion Kilowatt Hours. The BRICS countries have a varied percent growth of renewable electricity net generation, ranging from a 92 percent growth in Brazil to a 69 percent growth in China and 12 percent growth in Brazil. The only countries in Africa with a significant percent increase are Sudan and South Sudan (note: South Sudan gained independence in 2011) at 33 percent, going from around 2 billion Kilowatt Hours in 2008 to 7 billion Kilowatt Hours in 2011. This can most likely be attributed to the Sudan Renewable Energy Master Plan, an effort to promote the use of renewable energy sources. Sudan is one of Africa’s largest oil producer and is increasing its number of hydroelectric projects.

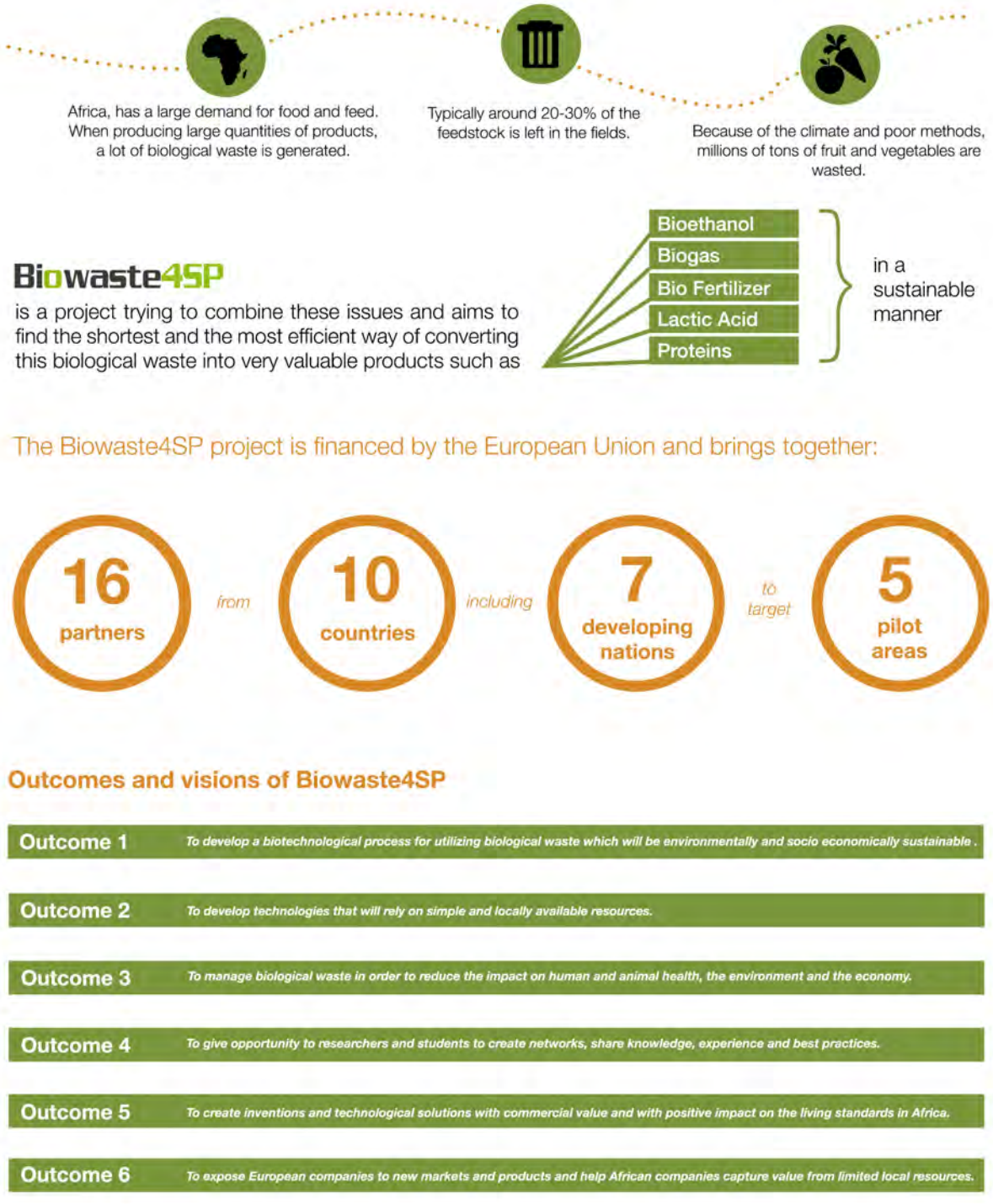
As the population approaches nine billion by 2050, the demand for energy will continue to rise while nonrenewable energy sources become more scarce and costly.

"It is only by staying abreast of emerging market trends and competitor actions that organizations and open innovation ecosystems can pro-actively adjust their product and service offerings and reconfigure their internal resources and operating routines" **- Kohli and Jaworski 1990**

Case Study: Biowaste4SP

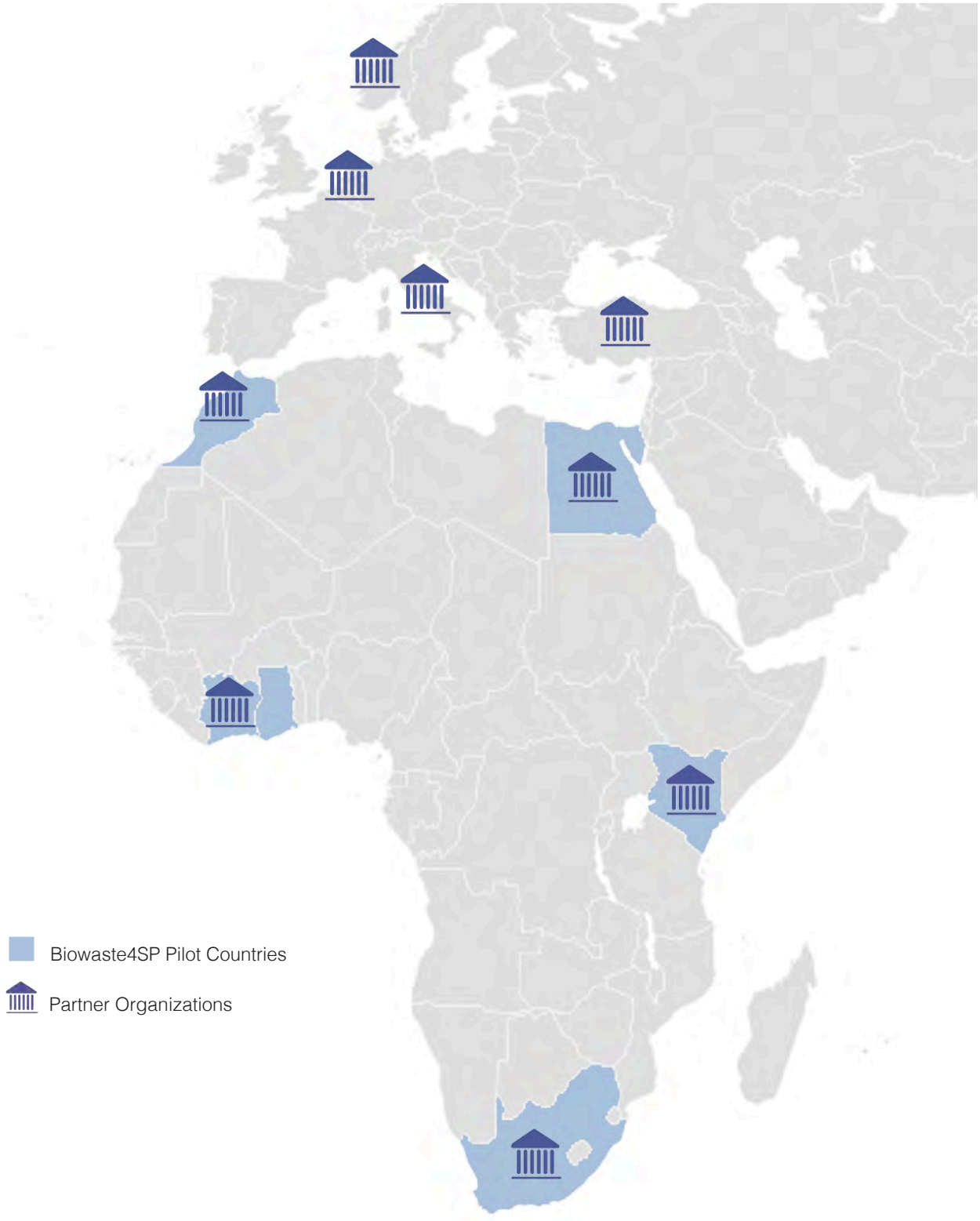
The Biowaste4SP project is financed by the European Union and brings together 16 partners from Africa, Asia, Europe and the Middle East. All participants share their knowledge and best practices on how to utilize biological waste.

Figure 12.5 - Infographic on Biowaste4SP Biological Waste for Sustainable Products



This project is managed centrally from the Danish Technology Institute (DTI). Below is a map of partner organizations and pilot countries. Note: two research organizations are located in Malaysia (the only ones in Asia).

Figure 12.6 - Biowaste4SP Partner Organizations in Pilot Countries



Source: Case Studies on Cooperation and Exchange between R&D Institutions in Developed and Developing Countries

References

Frankfurt School-UNEP Centre/BNEF (2013). Global Trends in Renewable Energy Investment 2013. Frankfurt am Main. Retrieved from http://fs-unep-centre.org/sites/default/files/attachments/gtr2013keyfindings.pdf

Frankfurt School-UNEP Centre/BNEF (2014). Global Trends in Renewable Energy Investment 2014. Frankfurt am Main. Retrieved from http://fs-unep-centre.org/sites/default/files/attachments/14008nef_visual_12_key_findings.pdf

Heiden, Bowman (2014). Case Studies on Cooperation and Exchange between R&D Institutions in Developed and Developing Countries

IEA (2014). World needs $48 trillion in investment to meet its energy needs to 2035. Retrieved from http://www.iea.org/newsroomandevents/pressreleases/2014/june/name,72035,en.html

IRENA (2013). Africa's Renewable Future: The Path to Sustainable Growth. Abu Dhabi. Retrieved from http://www.irena.org/DocumentDownloads/Publications/Africa_renewable_future.pdf

Meza, E. (2013). Asia Pacific to account for 50 percent. *PV Magazine.* December 19. Retrieved from http://www.pv-magazine.com/news/details/beitrag/asia-pacific-to-account-for-50-of-global-pv-demand-in-2014_100013777/#axzz368iHXMNz

MIT (2013). Innovation in renewable-energy technologies is booming. Press Release. Retrieved from http://mitei.mit.edu/news/innovation-renewable-energy-technologies-booming

National Science Foundation (2014). Retrieved from: http://www.nsf.gov/news/mmg/index.jsp?s=0&page=1

REN21 (2014). Renewables 2014 Global Status Report. Retrieved from http://www.ren21.net/Portals/0/documents/Resources/GSR/2014/GSR2014_full%20report_low%20res.pdf

UNEP, Bloomberg New Energy Finance (2013). Table: Global new investment in renewable energy: developed v developing countries, 2004-2012 $bn. Global Trends in Renewable Energy Investment 2013.

US Energy Information Administration (2012). Table: Total Renewable Electricity Net Generation (Billion Kilowatt Hours). Retrieved from http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=6&pid=29&aid=12

van Lierop, (2014). VC Chrysalix Predicts 5 Sustainable Energy and Cleantech Trends for 2014. *Greentech Media.* January 10. Retrieved from http://www.greentechmedia.com/articles/read/vc-chrysalix-predicts-5-sustainable-energy-and-cleantech-trends-for-2014

Projections

Projections

The last section of the Report provides short and medium term projections for sectors relevant to global knowledge flows, such as South-South Cooperation and open innovation platforms. Experts from around the world share their insights on how the emergence of new, Internet-enabled collaborations is (and will continue) changing global development. In his TEDx talk, "Foresight in Hindsight: A History of Predictions," the architect Reinier de Graaf brilliantly describes how patterns of past predictions are critical in informing us about the future. One can hope that the IT revolution described in the previous sections will indeed keep on providing opportunities for enhanced equity around the world.

South-South Cooperation

Source: UNDP

Dr. Xiaojun Grace Wang is the Lead Adviser on South-South Cooperation in UNDP. She coordinates South-South Cooperation work within UNDP and with the UN Office for South-South Cooperation (UNOSSC). She recently organized the UNDP solutions forum on poverty eradication and environmental sustainability at the 2013 Global South-South Expo in Nairobi.

"The UN's future engagement in South-South Cooperation (SSC) will be shaped by the changing global development cooperation context and by the dynamics of the Global South. The latest UNDP Human Development Report, "The Rise of the South: Human Progress in a Diverse World" projects that by 2020, only three Southern countries, Brazil, China and India, will account for more world output than Canada, France, Germany, Italy, the UK, Northern Ireland and the US combined. More importantly, on development terms, through addressing common challenges, the developing countries have innovated on public policies and technologies, developed expertise, shared rich and diverse experiences with their peers, and promoted leadership, particularly at local levels, to demonstrate and scale up practical development solutions. They have also been increasingly active in the regional and global policy fora to form a common agenda.

The contributions of South-South and Triangular Cooperation (SSC/TrC), as a complementary mechanism for development cooperation rather than a substitute to the traditional modalities, have been increasingly acknowledged by the international community. In recognition of the growing prominence of SSC, the most recent UN Quadrennial Comprehensive Policy Review of 2012-2016, the General Assembly's main policy mechanism to define the way the UN development system operates, has encouraged all entities of the UN system to continue to scale up support to SSC/TrC through operational activities as well as further improvement in research and analysis on SSC.

Despite the impressive MDG gains, extreme poverty, hunger and inequality persist. The world is reaching environmental and social tipping points and a post-2015 development agenda will have two main tasks: (a) completing the MDG's unfinished business; and (b) placing the world on a more sustainable development path. The agenda would thus be 'unified' in its substantive focus, and 'universal' in its applicability to all countries. This will have major ramifications for development cooperation. Silos will have to be broken down to guarantee an integrated action on economic, environmental and social dimensions of sustainable development, particularly to support poor and vulnerable communities. A new agenda must have poverty eradication, promoting equality, and achieving sustainable development, including addressing climate change, at its heart.

During my participation in the last annual Global South-South Cooperation (GSSD) Expo in October of 2013, a host of innovative development solutions supported by UNDP were showcased including: the joint UNDP-UNEP program Poverty-Environment Initiative (PEI) and its experiences from Burkina Faso, Nepal and Rwanda; SSC on Local Economic Development: Experience from El Salvador; Energy Conservation in Tea Processing Sector in Southern India; and Social Forestry for the Development of sub-Saharan Semi-Arid Areas: Kenya Experience, supported by JICA and Kenya Forestry Research Institute (KEFRI).

[1] de Graaf, R. (2010). Foresight in Hindsight: A History of Predictions. Presentation. Retrieved from http://www.tedxhamburg.de/tedxhamburg-2013-city-20-reinier-de-graaf-foresight-in-hindsight

I would surely like to see more of these solutions that promote strong Southern leadership and ownership, supported if need be, by successful UN interagency collaborations or collaboration with multilateral agencies that complement one another's comparative advantages. Additionally, I hope to see more of a systematic approach to future dialogue on SSC as a special and important case for scaling up the impact of successful development interventions.

In terms of challenges to SSC, some practical elements still need to be strengthened to concretize the contribution of SSC to sustainable development and to improve the way they are perceived. The lack of evidence-based analysis and data has sometimes led to limited knowledge and even misunderstanding about the work of Southern providers. It has also hindered the adaptation of good practices from the South into local contexts and to meet internationally accepted social and environmental standards. Therefore, providing more support to national development cooperation agencies, sector ministries, academia and civil society organizations could further enhance mutual learning and communication in SSC. Additionally, regional and multilateral institutions have shown growing interest in supporting the delivery of SSC initiatives, often in the form of TrC. There is also a need to adjust and improve the operational procedures in these institutions to be able to suit the diverse and dynamic needs of SSC actors.

SSC/TrC is a critical pathway leading to development impact at scale. In recent years, we have seen the change in modalities, instruments, and practices of SSC. Many SSC initiatives have expanded from small-scale and ad-hoc technical cooperation or exchanges to programs with policy advice, technology transfer, and capacity development dimensions. Public-private partnerships have been central to such exchanges. Such a scaling-up momentum needs to be better understood and promoted through engaging all relevant stakeholders and leveraging all sources of support."

Open Education Resources

Source: Mariana Bittencourt, 21 June 2012, Global OER Congress, UNESCO CC BY 3.0

Dr. Cable Green is the Director of Global Learning for Creative Commons. Cable works with the global open community to leverage open licensing, open content, open policies, and the affordances of digital things to significantly improve access to quality, affordable, education and research resources so everyone in the world can attain all the education they desire. His career is dedicated to increasing access to educational opportunity for everyone around the world.

"Open Educational Resources (OER) is an idea, a set of content and a community which, properly leveraged, can help everyone in the world access free, high quality learning materials for the marginal cost of zero. We live in an age of information abundance where everyone, for the first time in human history, can attain all the education they desire. The key to this sea change in learning is OER. OER are educational materials produced by one party that are either licensed under a Creative Commons (CC) license or are in the public domain – making the resources both free and providing the legal rights to anyone to reuse, revise, remix, redistribute and retain (a copy of) the educational resources.

Because we can share high quality education materials with the world for near zero cost, I think we should. As educators, we have a moral and ethical obligation to do so. After all, education is fundamentally about sharing knowledge and ideas. I believe OER will replace much of the expensive, proprietary content used in academic courses, starting with content in highest enrolled courses. Shifting to this model will generate more equitable economic opportunities globally and social benefits without sacrificing quality of educational content.

Also important is exploring how learning can be improved with OER. When the content and pedagogies are open in learning spaces, beneficial changes happen, both for students and teachers. Students can contribute to improving the curriculum, work on complex and authentic problems, and have their work be used in the field. Since this work is more meaningful and the stakes are higher, students work harder and learn more. Teachers and professors can reuse others' OER, share their work, and form communities around programs of study.

OER will supplement, not replace, traditional degree programs, lowering the cost of learning materials thanks to their open license. As alternative models of accreditation/certification are explored (e.g., open badges), OER will likely be part of new learning pathways and new credentialing systems.

OER levels the playing field in terms of creating and accessing high quality teaching and learning resources. The CC license on OER means the resources can also be translated, localized, improved, and adapted to any regional or local need. The free nature of OER means that the Global South need no longer be encumbered by financial constraints in terms of creating or accessing educational content. Think of OER as a sustainable and renewable resource. Once an OER is built, it can be shared freely and existing systems of education can leverage those cost savings.

OER is being created in developing countries. For example, School of Open Kenya participants were inspired to create their own education videos to solve local challenges. There is an opportunity for the Global

South to form coalitions and partnerships that share a similar interest in OER of a particular type. Such partnerships can review and curate OER, coordinate their adaptation and modifications, and collaborate on the development of new resources. We may also see more OER catering to audiences in developing countries whose primary means of web access is through mobile phones.

The unanimous vote on UNESCO's Paris OER Declaration and the open access policies of international organizations like the World Bank and the Commonwealth of Learning are also promising. These IGO actions signal best practices to Member States, who can adopt them locally and lead the way towards high quality education for their citizens."

Crowdsourcing

Courtesy of Daren Brabham

Dr. Daren Brabham is an assistant professor in the Annenberg School for Communication & Journalism at the University of Southern California, teaching and conducting research in the areas of strategic communication and new media. He is also the founding editor of Case Studies in Strategic Communication. He is the author of the upcoming book "Crowdsourcing in the Public Sector," "Crowdsourcing," and has authored multiple articles in Communications Journals.

"Crowdsourcing seems to have become much more mainstream and taken for granted in the past few years, moving away from the new or novelty stage. It seems there are more organizations turning to crowdsourcing on an ad hoc basis to get things done, and more businesses emerging that are built entirely on crowdsourcing. I think it will even become more normalized in both the public and private sectors. I predict crowdsourcing will be a lot like printing/copying services or management training/consulting services in that it will be seen as run-of-the-mill work that outside vendors and specialists can provide to a business. A lot of organizations maintain contracts with Xerox for copying and printing needs, and a lot of organizations occasionally bring in management consulting companies like McKinsey or specific HR training consultants to tackle difficult organizational problems. I think crowdsourcing will be like this long-term: an organization may have a specific problem to solve, crowdsourcing will be identified as the way to solve the problem, and they'll turn to a dedicated platform/vendor to execute the process.

Legal and ethical concerns will emerge in the next five to ten years. Crowdsourcing opens an organization to some risk, as they have to open up some of their internal thinking or sensitive data in order for a crowd to help out. There are also opportunities for organizations to exploit crowds and take their ideas without proper attribution or payment, like by burying tricky language in a site's terms of services. This will result in lawsuits down the road. There are also labor exploitation issues. Crowds are easy to take advantage of, and crowdsourcing destabilizes the professions a bit. I would love to see a crowd worker's bill of rights come about in the next five to ten years, but I'm doubtful that will happen.

Crowdsourcing has found some success in policy-making, such as with Finland's off-road traffic law, and with Iceland's constitution, though the crowdsourced constitution ultimately didn't pass. SeeClickFix and Ushahidi enable crowdsourcing on mapping various issues. Some US agencies have used InnoCentive through Challenge.gov to solve scientific problems. And of course, famously, there's the Peer-to-Patent project with the United States Patent and Trademark Office. These efforts could play out well in developing economies, too, and Ushahidi's success in Kenya, Haiti, and elsewhere is a good start.

I think there is hope for crowdsourcing being used as a potential tool in North-South collaboration, and in resolving development challenges. Perhaps it could be a collaborative policymaking activity using Wikis or other tools. Or perhaps it could be a kind of peer-to-peer startup incubator/mentor arrangement, where entrepreneurs from the South could put calls out to online communities of mentors from the North to help refine business plans and even drum up cash through accompanying crowdfunding activities. In the crowdfunding space there are some organizations in the South that have found support online from the North. One example would be The Office in Kigali, Rwanda, run by Jon Stever. He runs a co-working space there and has used crowdfunding to raise money for capital improvements to the building and to support various events.

The digital divide persists, of course. For example, it is difficult to get people in countries without broadband to take part in a user-generated video contest that requires a ton of bandwidth. In places where SMS and mobile Internet are prominent, the technology needs to accommodate that. However, there are great examples of crowdsourcing via text or simple contributions, so it can be done where there isn't much Internet access. The other roadblock is simply culture and political atmosphere. If corruption is rampant, then the only crowdsourcing activities that may work would be those that critique and expose that corruption, but any activities that require the support of government would probably not work well. There must also be a culture of entrepreneurial thinking. For example, the new president of the Republic of Korea is trying to take a leadership role in promoting what she calls the

Innovation-Based Entrepreneurship

Source: Duke University's Fuqua School of Business (2014)

Dr. Ashish Arora is the Rex D. Adams Profess of Business Administration at the Fuqua School of Business at Duke University. Arora received his Ph.D. in Economics from Stanford University in 1992, and was on the faculty at the Heinz School, Carnegie Mellon University, where he held the H. John Heinz Professorship, until 2009.

"I associate the recent spur of innovation-based entrepreneurship in emerging markets with the following factors:

1. Market growth: Emerging markets have grown in size over the last two decades;
2. The growing prevalence of liberal economic policies: Countries are making it easier to start and run businesses;
3. The IT revolution: New opportunities and reduced cost of operation for many businesses (e.g. cloud storage, cheaper communication);
4. Globalization: It's easier to export, as well as get access to capital and expertise;
5. Role models from Silicon Valley and other innovation hubs, as well as the diaspora phenomenon.

Firms are more amenable to technology transfer when they are confident in their ability to protect it. However, there are nuances: protection may shield product sales or licenses, and can have a mixed effect depending on the IP holder. Larger firms are more likely to use protection to export, but may also invest or enter into a joint venture, while smaller firms are more likely to license or enter into a joint venture. The data from the US show that IP licensing is growing steadily, and US firms are earning substantial licensing fees, even from unaffiliated parties. The growing embodiment of technology in software makes the data harder to interpret. However, this also reduces the cost of technology transfer.

Countries have to improve the business climate for firms. IP laws are important, but a fast and efficient legal system for enforcing contracts is just as important. Basic physical infrastructure (e.g. roads, power) has to be improved. Corporations in poor countries compete based on their ability to operate in markets with poor physical and institutional infrastructure (i.e., by having a flexible organization, fast decision making, low overhead structure). However, as the home country develops, the physical infrastructure improves and the institutions develop. Unless they develop the ability to innovate, firms from poor countries will be unable to compete. Initially, these innovations will likely be improved production and organizational processes. Over time, new products may also arise based on domestic market demand. In other words, the capabilities that were initially sources of competitive advantage can turn into a trap, unless firms evolve new capabilities."

Innovation Hubs in the Global South

Source: World Affairs Council

Mariéme Jamme is a Senegalese-born/British businesswoman who runs a technology consultancy business in London. Her company, SpotOne Global Solutions, helps international technology companies selling enterprise software solutions to set a foothold in Africa, Middle East and Asia. Mariéme is best known for her role in promoting technology, good governance, transparency and a better education standard in Africa.

"Technology will play a massive role in Africa's development in the next 5 years. We now have innovators developing all sorts of apps that are solving local problems, for example in the agriculture and educational sector. People are gaining a better understanding of the importance of ICT and the change it can bring. I am mentoring young innovators and educating leaders, lobbying so they can implement policies around ICT properly and effectively.

Changing people's mindset is important in Africa, especially with leaders who sometimes don't have a clue. Sometimes they have big ideas for their countries but usually have no idea how to implement them. They may end up spending lots of money in projects, re-inventing the wheel or duplicating ideas. They don't understand that big IT projects can be simple to implement, and they make it complicated so they can get money. Corruption plays a large role and I think innovations addressing good governance, transparency and open data will be huge in the future.

Fifteen years ago when I used to write about tech in Africa, I never thought that we will have so many technology hubs where real innovations are created today, businesses built. Africa now has its position in the Global tech scenes. However, the hubs are still facing sustainability and funding challenges despite the hype around them. As long as funding is available, mentoring and support tech hubs will see massive growth."

As we approach the end of the MDGs in 2015, ICT needs to be part of the new goals that will be set. We are starting to see commitment from African governments to build infrastructure and backbones for all those innovations, but we still have long way to go. The ITU is pushing for government to adopt real policies in order for these innovations and technologies to have their place in Africa. The ecosystem is not yet strong, but with education the needs will be met."

ICT and Patenting in Africa

Courtesy of Isaac Rutenberg

Dr. Isaac Rutenberg is the Director of the Center for Intellectual Property and Information Technology Law (CIPIT) at Strathmore Law School in Nairobi, Kenya. At CIPIT, Dr. Rutenberg provides extensive IP skills training to Kenyan Lawyers, encourages suitable IP policies in government and the private sector, and conducts original research on the impact of IP in Kenya and East Africa.

"Innovation has been and is occurring in all corners of Africa, although only a fraction tends to receive much attention. There are high levels of innovation in Kenya, not just Nairobi, which tends to be the focus. Larger hubs are concentrated in the cities - Kampala, Gaborone, etc., and these are supported by physical hubs such as iHub, FabLab, and Botswana Innovation Hub. But innovation happens elsewhere, and technology is improving distribution and dissemination of such innovation.

A major challenge is that innovators often have an idealized concept of the process, and get quickly discouraged by failures, theft of ideas, lack of external interest, and other challenges that are a normal and important part of being an innovator and entrepreneur. Kenya is fortunate to have infrastructural support that goes some way in helping innovators overcome these frustrations. It's not enough to have a physical space for innovators to tinker and play with ideas. They also need localized expertise and experience that encourages at every step of the process: from R&D to bringing an innovation to the market, from keeping the product on the market to enforcing IP.

The Western-style patent regime has had very little effect on innovation up to the present time. The vast majority of innovations are not patent protected, including the most innovative and successful innovations. Over 85 percent of the roughly 650 patents issued by the Kenyan patent office are issued to foreign entities. Local entities filing patent applications tend to be individual inventors rather than large companies - in fact, very few large, local companies spend any appreciable amount on research and development that results in patent filings. Even in the ICT industry, which is arguably the largest and most innovative in the private sector, innovations are not protected by patents. In fact, many people mistakenly believe that ICT innovations are not legally entitled to patent protection, and this belief can be difficult to refute.

The situation is changing. People are talking about patents much more frequently now, and local people are applying for patents at an increased rate. Large companies are still not yet applying for patent protection, but it is only a matter of time before this becomes commonplace. It is yet to be determined whether the increase in patent activity will lead to increased innovation, or simply to increased litigation.

The Kenyan Patent Office is doing a good job enforcing the patentability and disclosure requirements, but as a result, it is critical for better drafting skills to be taught and available. The interest among entrepreneurs is small but growing, and it is almost certain that Western-style patent protection will be important in the coming years. Foreign investment in locally-held patents will only follow if the patents are drafted to high standards, and this is simply impossible without good training. Such training is not and cannot be provided in law schools, so training centers are of critical importance to the development of patent infrastructure.

I see the goal of foreign investment in African-owned patent assets exceeding foreign aid becoming reality in the medium-term future. The foundations are happening now, to a small degree. Research centers such as ICIPE and the University of Nairobi are now filing patent applications and obtaining patents at home and abroad, and are also seeking licensees from across the globe. To the extent that such patents are well drafted (i.e., provide effective protection) and that the underlying technologies are good, this activity will eventually attract the attention of multinational corporations. At the end of the day, it doesn't matter to a DuPont or a Microsoft where they find their technology, so long as it results in a marketable and profitable product. The key is that patents form the medium for international trading in innovations, and the work we are doing now to build a patent infrastructure is a critical component of the process to achieving this goal."

Connectivity in the Global South

Source: Jon Shuler

Ushahidi, which means "testimony" in Swahili, was a website that was initially developed to map reports of violence in Kenya after the post-election fallout at the beginning of 2008. Ushahidi has grown into a global non-profit technology company with origins in Kenya. Today Ushahidi's mission is to change the way information flows in the world and empower people to make an impact with open source technologies, cross-sector partnerships, and ground-breaking ventures.

"Ushahidi's role is that of a technology enabler and innovator. We often say that the people on the frontline gathering data -- journalists, activists, environmentalists, election monitors, etc -- are "Secret Agent 007" while Ushahidi is "Q," the scientist behind the scenes providing the tools to get the job done right. From our efforts developing the Ushahidi platform, one of the challenges is managing coordination, as several organizations may utilize the platform for the same purpose. We are looking to find ways for deployers and mappers to discover each other and work together. We can solve for discoverability, but spurring collaboration and data sharing are harder problems.

The maturity of truly operational crowdsourcing is shifting from providing transparency to ensuring accountability. That's happening through using systems like our Ushahidi platform as a dashboard for better situational awareness. Then teams share the information from their campaigns, not just the cleaned up data, in more strategic ways.

As connectivity increases and active mobile banking programs gain success in Kenya and Africa, more people and organizations are using mobile and open source tools to contextualize the issues they care about. They are far beyond needing to be told what crowdsourcing is, and are already wondering how to get more value from it.

Five years ago Ushahidi, among other African innovators focused on mobile and social tools for better visibility, transparency, and accountability, was still experimenting with the opportunities that increasing access and ownership of these tools could provide. Following our inaugural launch to track post-election violence in Kenya, we created drc.ushahidi.com to track reports of violence in the Eastern provinces of the Democratic Republic of Congo. Uncoupled from responders and from those submitting reports, it lacked focus and value. We put the tech first and it didn't work.

Last year, we launched Uchaguzi.co.ke to monitor the Kenyan elections once again. Our 82 percent response rate and 56 percent verification percentage -- high by crowdsourcing standards in these environments -- was a success. Not only in how far the technology and access has come, but chiefly through developing partnerships with monitoring organizations, civil society organizations, and other local initiatives.

For Ushahidi, lessons gathered from impementations and collaborations are widely shared so that others do not have to start from scratch when it comes to technology or strategy. As such, our strategy and technology development are done from a global perspective. With our newest Ushahidi Platform, we are working with the support of Google.org to implement the idea that people can also collect quantitative data from sensors to complement citizen reporting or crowdsourcing. And our first step into hardware, BRCK, contains capabilities of handling sensor data. We hope that the device can help with the challenge of addressing information flow from the bottom up.

We built BRCK to squarely address power and connectivity where it counts the most. Improving power, online connectivity, and access to technology must all be made priorities. Without these, Global South technologists and consumers will continue to be disadvantaged connecting to the globally-available information, contacts and real-time communities that support a rapidly-growing network of small businesses in places like New York.

There's a lot of raw talent in the Global South that's still locked up in uninspiring jobs because the people with that talent have to survive. However, those people are starting to connect to the beginnings of technical communities that, with a little targeted support and better connections, can form into rich networks of innovative small businesses, potentially providing services and trading globally."

Public-Private Partnerships in Brazil

Source: Cristina Porto

Dr. Hercules Neves is Life Sciences Business Line Manager at SIX Semiconductores SA, a partnership among SIX Soluções Inteligentes, Banco Nacional de Desenvolvimento Economico e Social, Banco de Desenvolvimento de Minas Gerais; IBM; Matec Investimentos; and Tecnologia Infinita WS-Intecs. They are building the most modern semiconductor factory in the Southern Hemisphere.

"There is a pool of know-how constantly being generated at universities, research institutions and small companies in developed economies. For them, being able to deploy their technology in countries with an economic, social, and environmental landscape as diverse as we find in Brazil can be the best way to demonstrate their true value; once deployed and tested here, they can be used almost anywhere.

On the other hand, emerging economies have a large number of companies that cannot be sufficiently competitive worldwide and even domestically because their technology level is still relatively low. Such partnerships therefore constitute a clear win-win situation. While in countries like Brazil there is also technology development, more mature technologies coming from abroad can lead to more immediate results and thus reduce risks. This represents an early possibility of international exposure for companies sourcing advanced technology.

The public sector can be an important facilitator in improving knowledge flows; it can tailor training initiatives, innovation incentive programs and R&D sponsorship to better suit industrial needs. In Brazil, notably in sectors like ours, the public sector also has the important role of creating an environment that enables high knowledge content companies to thrive, not through protectionism but by offering our companies the right conditions to be competitive. This is crucially important in a country that is ranked below the world average (and also 20th out of 29 Latin American countries) in economic freedom. This can be implemented for instance by adopting a more dynamic taxation system and by streamlining the import/export process. The role of the public sector in supporting the high tech industry will certainly change over time but it is likely to continue to be important in the years to come, in the same way that it continues to be crucial in Europe, Asia, and North America. There are several examples of high tech industries being exceptionally successful in certain parts of the world thanks to consistent involvement of the public sector.

In recent years, Brazil has begun to see the importance of intervening more proactively in innovation and technology transfer. Various initiatives have been created to promote innovation in specific sectors of the economy, and financial support for R&D initiatives is increasingly geared towards the private sector. Academic institutions are also becoming more open to working with industry, and are more aware of the importance of innovation and IP. This process occurs more prominently than in most of Latin America but it is still lagging behind internationally. A much more proactive attitude is needed and there is plenty of growth potential. While Brazil ranks 14th globally in scientific research (according to Thomson Reuters), its global innovation index ranks 64th in the world (according to WIPO).

Brazilian industry is becoming more aware that it needs to increase its technological content to compete internationally and even domestically, as the influx of imported goods starts to challenge them. We now see the academic sector increasingly getting involved in the process, partnering actively with industry and the generating much needed manpower. As the process unfolds, technology transfer will be sought from abroad and industry will have to adjust accordingly. At the same time, public sector innovations are already strengthening this environment. Increasing economic freedom will also be an inevitable part of this process, be it through isolated actions that benefit specific sectors or more concerted actions to promote national competitiveness. This is likely to gather international interest, which in turn will further boost domestic companies to be competitive."

Open Innovation

Courtesy of Carolina Avila

Carolina Avila is 100%Open's Project Director for the Colombia CO4 open innovation program. She has been accompanying different local and global organizations from the public, private and social sector in the development of their innovation cultures, training internal facilitators, running focused ideation workshops and pushing things to make ideas happen.

"Colombia doesn't have the technology that other countries do, but people want to make a change and their curiosity and inquisitiveness is bigger than the resistance and barriers to innovate. There is still a very traditional and hierarchical culture that makes open innovation and collaboration difficult. Colombia, I believe, is different from other countries in Latin America because we are setting up structures that will facilitate innovation.

Four years ago, innovation was identified as a critical component of Colombia's economic development strategy. We have agencies like iNNpulsa harnessing entrepreneurship and innovation; Centro de Innovación Social, looking to reduce/eliminate extreme poverty through innovation; plus the Chamber of Commerce, Connect Bogota, RutaN, among others. On the other side, all the big companies are investing in innovation, looking to build internal capacities to do it systematically. Probably the biggest challenge is bringing them all together to work in collaboration. Colombia is gaining international recognition for having many of the ingredients of a thriving innovation ecosystem, with cities like Medellin winning "most innovative city of the year" in 2013.

Open innovation will help to spur social change in Colombia by widening participation in big challenges in both business and civil society, which require both technical solutions as well as a mindset shift towards being more collaborative in solving problems. We believe 100%Open's role will be as enabler and facilitator, sharing what we have learned about successfully implementing open innovation over the past decade. We are finding a tremendous enthusiasm and ambition for open innovation so far through the CO4 program, an open innovation project created by iNNpulsa. The name comes from promoting four principles:

- Colombia COlaborates
- Colombia COoperates
- Colombia COcreates
- Colombia COinnovates

These principles aim to develop a "culture of collaborative innovation" in Colombia.

We are starting with ten lead companies from different economic sectors that are willing to open up their doors, and asking for help to solve their main challenges. We are looking for solutions from outside the sector (universities, SMEs, independent innovators, competitors, among others), not only as a transaction, but as a long term relationship, sharing both risks and benefits.

We want to change attitudes, behaviors, and mindset. We'd like people to see innovation as more dynamic, where ideas flow within networks amongst collaborators and partners, rather than seeing innovation in static terms of competition, rules and complexity.

The shift from a hierarchical business culture to a more collaborative one is countercultural. We have tried to support this change through learning by doing, and designing and implementing the CO4 program so that as many Colombian companies as possible can participate and learn from the tools, techniques and case studies of successful open innovators. The hardest concept for people to understand is creating a collaboration model. Companies are still fixed on paying for what they need and individuals are concerned about the big ones stealing their ideas."

Acronyms

ACTA	Anti-Counterfeiting Trade Agreement
AVOIR	African Virtual Open Initiatives and Resources
AIF	African Innovation Foundation
BRICS	Brazil, the Russian Federation, India, China and South Africa
CC	Creative Commons
CEO	Chief Executive Officer
CDIP	WIPO Committee on Development and Intellectual Property
CO4	Columbia Open Innovation Program
DTI	Danish Technology Institute
DIV	Development Innovation Ventures
EU	European Union
FDI	Foreign Direct Investment
FOSS	Free and Open Source Software
FOSSFA	Free Software and Open Source Foundation for Africa
GDP	Gross Domestic Product
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IATI	International Aid Transparency Initiative
ICT(s)	Information and Communications Technology(ies)
IGOs	International Governmental Organizations
IIPI	International Intellectual Property Institute
INGOs	International Non-Governmental Organizations
IP	Intellectual Property
IPA	Innovation Prize for Africa
IPR	Intellectual Property Right
MIT	Massachusetts Institute of Technology
MDGs	Millenium Development Goals
MPEG	Motion Picture Experts Group
MOOCs	Massive Open Online Courses
NSF	National Science Foundation
NUP	Nollywood Upgrade Project
OBM	Osteogenic Bone Matrix
OECD	Organization for Economic Cooperation and Development
OER	Open Education Resources
OI	Open Innovation
OIA	Open Innovation Accelerator
PCT	Patent Cooperation Treaty
PDPs	Product Development Partnerships
PPP	Public-Private Partnerships
R&D	Research and development
REN21	Renewable Energy Network for the 21st Century
SARETEC	South African Renewable Energy Technology Center
S&T	Science and Technology
SMEs	Small and Medium-Sized Enterprises
SoS	Stars of Science
SSC	South-South Cooperation
TRIPS	Trade-Related Aspects of Intellectual Property Rights
UK	United Kingdom
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNHCR	Office of the United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
US	United States
USAID	United States Agency for International Development
USD	United States Dollars
USTR	Office of the US Trade Representative
VI	Visualizing Impact
WHO	World Health Organization
WIPO	World Intellectual Property Organization
WTO	World Trade Organization