Regional Initiative

PATENTS FOR DEVELOPMENT

Indicators of Technological Innovation by Regions

2015
Indicators of Technological Innovation by Regions. 2015
Editor: CAF

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PRESENTATION

CAF identified the need to promote the generation of patentable innovative technologies that could be exportable. Latin America and the Caribbean have the potential to generate advanced technologies that may contribute to the sustainable development of the region and other regions around the world. To release this potential, we have started the Technological Patents Regional Initiative. CAF’s initiative intends to establish a regional platform for the generation of patentable technological concepts through international patent applications originating in Latin America and the Caribbean with the purpose of contributing to increase the exports of high technology from the region.

In the framework of this program, CAF is pleased to present the document 2015 Technological Innovation Indicators by Regions. This document compiles the main data and indicators that will be used throughout the implementation of CAF’s initiative. The methodology used for the indicators is accepted and used internationally, based on previous works by the OECD and the World Bank.

The text is divided into 3 parts. The first describes the methodology and indicators that will be presented, as well as the primary data sources. In the second section we find all the data in tables, organized by subject, and separated between those aimed at presenting an analysis and those that will be used as a baseline for the initiative’s evaluation. The third section shows comparative graphs prepared from the data found in the second section, over which part of the analysis regarding technological innovation in the region will be constructed.

We expect this study to fulfill its fundamental objective of offering readers of different backgrounds the necessary data and figures for the evaluation of the status of technological innovation in CAF’s member countries in Latin America and

www.caf.com/patentes
the Caribbean, and increase interest regarding CAF’s Patents for Development Regional Initiative.
EXECUTIVE SUMMARY

The following study is one of the results of CAF’s Technological Patents for Development Initiative carried out between 2013 and 2015. Among the main objectives of this Initiative is the development of a preliminary evaluation of the status of technological innovation in the Latin American and Caribbean region. The objectives are twofold: the first is to present to readers, independently of their background or profession, an easy to understand material that reflects, with empirical data, the technological status in the region through indicators defined by CAF. The second objective is to prepare a baseline for the initiative’s impact evaluation, which will allow CAF and its partner institutions to evaluate its importance in the region. In the first phase, this evaluation will be carried out through its outputs, that is, an improvement in the countries’ performance both in the generation of invention patent applications, as well as the concessions of patents through these applications. In a second phase, in the medium and long term, the initiative’s impact evaluation will be carried out through its outcomes, that is, the generation of resources originating in royalties, licensing and sale of intellectual property in international markets in the short term, and an increase of high technology exports from the region to other regions in the world in the long term. This baseline will be adapted to include parameters that are more associated to industrial property during its following phases.
## ACRONYMS

**WB.** The World Bank Group  
**CAF.** Development Bank of Latin America  
**EPO.** European Patent Office  
**IMF.** International Monetary Fund  
**OECD.** Organization for Economic Cooperation and Development  
**WIPO.** World Intellectual Property Organization  
**PCT.** Patent Cooperation Treaty  
**UN COMTRADE.** United Nations Commodity Trade Statistics Database  
**UNSTATS.** United Nations Statistics Division  
**USPTO.** United States Patent and Trademark Office
GLOSSARY OF TERMS

**Intellectual Property**: Intellectual Property Rights refer to all those exclusivity rights over intellectual creations which are recognized by a legal system. Intellectual property rights guarantee the owner of an intangible asset the right to use it, distribute it, and sell it, as well as exclusive licensing. These rights are usually divided into two types: Industrial Property, and Copyright, with the first ones referring to creations that are related to a product or service process (such as patents), and the latter to artist works (musical, literary, etc.) or institutional creations.

**Patent**: A patent is an exclusive right granted for an invention, that is, a product or procedure which in general contributes to a new way of doing something or a new technical solution for a problem. For it to be patentable, the invention must satisfy the determined requirements: it must be legal, it must have an element of novelty (that there is no similar concept in prior art), to have a practical use (industrial application) and it must not be obvious considering prior art (that the logic of the invention cannot be directly deduced from prior art).

**GDP (Nominal Gross Domestic Product)**: “At a current price, the GDP is the sum of the gross value added of all the products in an economy plus all the taxes on the products, minus any subsidy which is not included in the value of the products.” In the GDP graphs that have been prepared, it will be expressed in billions of USD (1.000.000.000 USD = 1 Billion USD)

**Patent Cooperation Treaty (PCT)**: This is an international treaty managed by the World Intellectual Property Organization (WIPO) and subscribed by more than 148 countries in the Treaty of Paris. The PCT allows the simultaneous application for a patent to protect an invention in a large number of countries by presenting a sole international patent application without the need to present several national or regional patent applications. The competence to grant concession of patents
belongs to national or regional patent offices in what is called the “national phase”. WIPO Website.
METHODOLOGY

When addressing the subject of technological innovation, CAF will use the terminology inputs, outputs, and outcomes to define the parameters used in the construction of indicators to measure these activities. The inputs define the resources allocated to innovation activities which come from different sources (public or private), and have different classifications. The outputs are the specific result (material or immaterial) of the innovation process over which an evaluation process is generated to compare with the estimated results. At the same time, the outcomes describe the final effects targeted during the planning process; the global result expected from the implementation of the Initiative. For the purpose of the Initiative we will only define the indicators of inputs and outcomes:

i) **Output Indicators**: The parameters used to establish a baseline to evaluate the starting phase of the Initiative will be the following: patent applications via PCT, USPTO applications and concessions, and EPO patent applications and concessions. These parameters will be compared with the nominal GDP by millions of inhabitants of the country of residence of the applicants for the construction of technological performance indicators.

ii) **Outcome Indicators**: Different performance parameters will be used for these indicators, which will help construct an image of the status of the technological innovation in the region. Among the parameters used are High technology exports and Royalties from the use of intellectual property. As with the aforementioned, indicators will be constructed based on these parameters in order to facilitate the understanding of the subject.

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2 This definition was partially taken from NYCEDC Innovation Index, New York City Economic Development Corporation 2011, and http://www.huffingtonpost.com/steven-strauss/managing-innovation_b_3375149.html
OUTPUT INDICATORS

**Patent Applications via PCT:** The application process of a patent via PCT (Patent Cooperation Treaty) has two main phases: the international phase and the national phase. In this case the applications via PCT will be used as a reference in the international phase. These applications are only considered as a petition, and they do not guarantee the granting of the patent in the national phase. However, it has been proven that there is a relationship between the increases of patent applications via PCT as a reference of the performance of technological innovation in a country. The indicators defined by CAF for this parameter are: *i)* Patent Applications via PCT/million inhabitants; and *ii)* patent applications via PCT/GDP. The first one establishes a relationship between technological innovation measured in numbers of patent applications via PCT and the population related with innovation activities, while the second reveals the importance of the patent applications via PCT in comparison with the dynamics of the national economies. As CAF’s Technological Patent Regional Initiative has among its main objective to generate patent applications via PCT, these will be one of the output indicators.

**Concessions of USPTO patents:** The United States Patent and Trademark Office (USPTO) is the federal entity in charge of granting invention patents in that country, in compliance with the four basic requirements: be legal, new, useful, and not obvious. The USPTO is one of the main intellectual property offices in absolute terms in the world, and the concession of invention patents by this office implies the protection of high technology products exported to one of the main commercial markets in the world. The indicators defined by CAF for this parameter are the following: *i)* concession of USPTO patents/million inhabitants; *ii)* concession of USPTO/GDP patents; and *iii)* patent applications via USPTO/concession of USPTO patents. The first one reveals the share of USPTO concessions by inhabitants, which shows the capacity for technological innovation in the applicant country. The second indicator relates the level of economic activity of each country.
with the technological innovation patented in the United States, and the third reveals the rate of mortality of applications via USPTO.\(^3\)

**EPO Applications and Patent Concessions:** European patents may be obtained for all the countries that signed the European Patent Convention by presenting a sole regional application before any European patent office (EPO) in any of the three official languages (English, French, or German). The EPO concessions are considered regional patents as they force all national office where a concession is presented, to grant a national patent. This process may only be conditioned to a translation to the official language of the country which is a member of the EPO. The indicators defined by CAF for this parameter are the following: i) EPO patent concessions/million inhabitants, and ii) Patent applications via EPO/EPO patent concessions. The first shows the relative importance of the technological innovation patented in Europe considering the total number of inhabitants, and the second shows the rate of mortality of the applications via EPO.\(^4\)

**OUTCOME INDICATORS**

**Exports of High Technology Products:** The data used for the calculation of high technology products was obtained from the statistics of the World Bank Group. They are based on a methodology developed by the OECD and Eurostat to define what high technology exports are. Using a “goods approach”, the importance of expenditures on R&D on the total value of sales is measured to establish a classification (high, medium, low technology). Examples of these sectors include the aeronautical industry, information technology, scientific instruments, and pharmaceutical industry, among others. The indicators defined by CAF for this parameter are the following: i) high technology exports/total value of exports; and ii) high technology exports/inhabitants. The first indicator reveals the relationship

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\(^3\)To determine the mortality rate of USPTO and EPO applications, the total number of patents granted was divided

\(^4\)Ibid.
between the high technology sector and the total export guideline, which has implications in the external insertion of the countries. The second indicator reveals the importance of high technology sectors in terms of the total population of the countries.

**Royalties from the Use of Intellectual Property:** Royalties and licensing rates are payments and charges between residents and non-residents for the authorized use of intangible assets, non-financial, not-manufactured, and intellectual property rights (such as patents, copyrights, registered trademarks, industrial processes, and franchises). In the beginning, work will be carried out with the World Bank Group data, which encompasses all the incomes derived from any form of intellectual property, taken from data from the balance of payments of each country, in USD at current prices. Further on, it is expected that this disaggregated data will be presented discriminating between the receipts for the use of patents of other types of intellectual property. The indicator defined by CAF for this parameter is royalties/million inhabitants that reveals the share of the royalties for intellectual property with respect to the total.
DEFINITION OF THE REGIONS

LATIN AMERICA AND THE CARIBBEAN
Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Ecuador, El Salvador, Granada, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Dominican Republic, Saint Kitts and Nevis, Saint Vincent and the Grenadines, Trinidad and Tobago, Uruguay, and Venezuela.

ASIA
China, South Korea, Philippines, Hong Kong, India, Indonesia, Japan, Macao, Malaysia, Singapore, Thailand, and Vietnam.

EUROPE
Germany, Andorra, Austria, Belgium, Bosnia and Herzegovina, Croatia, Denmark, Slovakia, Slovenia, Spain, Estonia, Finland, France, Greece, Ireland, Iceland, Italy, Latvia, Liechtenstein, Lithuania, Luxemburg, Norway, Netherlands, Poland, Portugal, United Kingdom, Check Republic, Serbia, Sweden, and Switzerland.

NORTH AMERICA
Canada and the United States.
## Table 1. Exports of high technology products (Millions of US$). 2004-2012

<table>
<thead>
<tr>
<th>Countries/Years</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAC</td>
<td>41.327</td>
<td>44.999</td>
<td>49.480</td>
<td>48.367</td>
<td>50.044</td>
<td>44.035</td>
<td>51.754</td>
<td>60.523</td>
<td>59.570</td>
</tr>
<tr>
<td>Asia</td>
<td>571.377</td>
<td>651.419</td>
<td>752.652</td>
<td>764.753</td>
<td>795.430</td>
<td>713.026</td>
<td>907.111</td>
<td>967.904</td>
<td>1.012.633</td>
</tr>
<tr>
<td>Europe</td>
<td>513.625</td>
<td>568.022</td>
<td>641.913</td>
<td>573.216</td>
<td>605.171</td>
<td>533.742</td>
<td>596.266</td>
<td>678.253</td>
<td>665.263</td>
</tr>
<tr>
<td>North America</td>
<td>197.808</td>
<td>216.089</td>
<td>245.761</td>
<td>244.426</td>
<td>247.796</td>
<td>155.617</td>
<td>169.461</td>
<td>170.290</td>
<td>172.811</td>
</tr>
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</table>


## Table 2. Total Exports (Millions of US$ at current prices). 2004-2013

<table>
<thead>
<tr>
<th>Countries/Years</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
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<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<tr>
<td>LAC</td>
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<td>565.991</td>
<td>670.289</td>
<td>752.075</td>
<td>867.188</td>
<td>678.573</td>
<td>860.706</td>
<td>1.072.535</td>
<td>1.090.000</td>
<td>1.064.339</td>
</tr>
<tr>
<td>North America</td>
<td>1.135.067</td>
<td>1.264.892</td>
<td>1.425.208</td>
<td>1.582.420</td>
<td>1.755.531</td>
<td>1.371.889</td>
<td>1.663.689</td>
<td>1.930.160</td>
<td>1.998.946</td>
<td>2.034.397</td>
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</tbody>
</table>

## Table 3. Royalties for the use of intellectual property (Millions of US$). 2005-2013

<table>
<thead>
<tr>
<th>Countries/Years</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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</thead>
<tbody>
<tr>
<td>LAC</td>
<td>530</td>
<td>653</td>
<td>915</td>
<td>1.081</td>
<td>1.023</td>
<td>1.048</td>
<td>1.342</td>
<td>1.039</td>
<td>1.096</td>
</tr>
<tr>
<td>Europe</td>
<td>39.084</td>
<td>40.777</td>
<td>47.728</td>
<td>53.964</td>
<td>56.821</td>
<td>61.532</td>
<td>70.777</td>
<td>65.980</td>
<td>70.469</td>
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<tr>
<td>North America</td>
<td>77.321</td>
<td>86.909</td>
<td>101.637</td>
<td>106.256</td>
<td>102.007</td>
<td>110.336</td>
<td>126.681</td>
<td>129.237</td>
<td>132.933</td>
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## OUTPUTS INDICATORS TABLES

## Table 4. Patent applications via PCT. 2002-2014

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<tr>
<td>LAC</td>
<td>562</td>
<td>672</td>
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<td>804</td>
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<td>1.278</td>
<td>1.385</td>
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<td>Asia</td>
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<tr>
<td>Europe</td>
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<td>44.288</td>
<td>47.636</td>
<td>50.335</td>
<td>53.372</td>
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<td>52.839</td>
<td>53.112</td>
<td>54.897</td>
<td>56.663</td>
<td>56.328</td>
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<tr>
<td>North America</td>
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<td>49.202</td>
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<td>54.596</td>
<td>60.280</td>
<td>64.165</td>
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Own preparation. Source: OMPI (March 2015)
Table 5. Patent applications USPTO. 2002-2013

<table>
<thead>
<tr>
<th>Countries/Years</th>
<th>2002</th>
<th>2003</th>
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<th>2008</th>
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<td>750</td>
<td>748</td>
<td>787</td>
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<td>1.105</td>
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<td>1.503</td>
<td>1.670</td>
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<td>Asia</td>
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<td>150.457</td>
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<tr>
<td>Europe</td>
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<td>50.166</td>
<td>52.583</td>
<td>54.293</td>
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<td>68.556</td>
<td>71.676</td>
<td>78.205</td>
<td>79.683</td>
<td>84.502</td>
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Own preparation. Source: USPTO (March 2015)

Table 6. USPTO patent concessions. 2002-2014

<table>
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Own preparation. Source: USPTO (March 2015)
Table 7. Patent applications EPO. 2004-2014

<table>
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<tr>
<th>Countries/Years</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>LAC</td>
<td>887</td>
<td>940</td>
<td>1.066</td>
<td>1.288</td>
<td>1.271</td>
<td>1.098</td>
<td>1.144</td>
<td>1.297</td>
<td>1.413</td>
<td>1.482</td>
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<td>58.502</td>
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<td>88.987</td>
<td>92.460</td>
<td>86.657</td>
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<td>92.859</td>
<td>92.449</td>
<td>93.623</td>
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<td>North America</td>
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<td>60.254</td>
<td>64.303</td>
<td>67.017</td>
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<td>64.288</td>
<td>67.353</td>
<td>70.664</td>
<td>75.279</td>
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</table>

Own preparation. Source: EPO (March 2015)

Table 8. EPO patent concessions. 2004-2014

<table>
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<tr>
<th>Countries/Years</th>
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<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
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<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAC</td>
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<td>247</td>
<td>241</td>
<td>232</td>
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<td>260</td>
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<td>192</td>
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Own preparation. Source: EPO (March 2015)
## Table 9. GDP (Billions of US$). 2002-2013

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<tr>
<th>Countries/Years</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
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<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
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<tbody>
<tr>
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<td>5.169</td>
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<tbody>
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<td>539.7</td>
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<td>586.0</td>
<td>592.7</td>
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<td>3,132.8</td>
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<td>3,220.1</td>
<td>3,248.6</td>
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<tr>
<td>Europe</td>
<td>470.6</td>
<td>472.9</td>
<td>475.3</td>
<td>477.7</td>
<td>479.9</td>
<td>482.3</td>
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<td>489.3</td>
<td>489.2</td>
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<tr>
<td>North America</td>
<td>319.0</td>
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<td>324.8</td>
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<td>343.3</td>
<td>345.9</td>
<td>348.6</td>
<td>351.3</td>
<td>354.3</td>
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</table>

STATUS OF THE REGIONAL TECHNOLOGICAL INNOVATION

GRAPHS BY REGIONS
TOTAL EXPORTS VS. EXPORTS OF HIGH TECHNOLOGY PRODUCTS
Graphic 1. Total Exports vs. Exports of high technology products - Latin America and the Caribbean

![Graphic 1](image)


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Graphic 2. Total Exports vs. Exports of high technology products - Asia

![Graphic 2](image)

Graphic 3. Total Exports vs. Exports of high technology products - Europe


Graphic 4. Total Exports vs. Exports of high technology products - North America

Graphic 5. Percentage of Exports of high technology products on total exports - Regional

EXPORTS OF HIGH TECHNOLOGY PRODUCTS
Graphic 6. Exports of high technology products (Millions of dollars) - Regional


Graphic 7. Exports of high technology products per capita - Regional

ROYALTIES FOR THE USE OF INTELLECTUAL PROPERTY
Graphic 8. Royalties for the use of intellectual property - Regional


Graphic 9. Royalties for the use of intellectual property per capita - Regional

PATENT APPLICATIONS VIA PCT
Graphic 10. Patent applications via PCT - Regional

[Graph showing trend lines and data points for different regions: Asia, North America, Europe, Latin America and the Caribbean.]

Own preparation. Source: WIPO Website (March 2015) (www.wipo.int)

Graphic 11. Patent applications via PCT per million people - Regional

[Graph showing trend lines and data points for different regions: North America, Europe, Asia, Latin America and the Caribbean.]

Graphic 12. Patent applications via PCT /GDP nominal - Regional

Years

Patent applications via the PCT /GDP (Billions of dollars)

Asia
North America
Europe
Latin America and the Caribbean

USPTO APPLICATIONS AND CONCESSION OF PATENTS
Graphic 13. USPTO patent applications – Regional


Graphic 14. USPTO patent concessions per million people – Regional

Graphic 15. USPTO patent concessions - Regional


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Graphic 16. USPTO patent concessions per million people - Regional

Graphic 17. USPTO patent concessions per GDP nominal - Regional

USPTO RATE OF PATENT MORTALITY
Graphic 18. Application vs. USPTO patent concessions - Latin America and the Caribbean

Own preparation. Source: USPTO Website (March 2015) – Concession
http://www.USPTO.gov/web/offices/ac/ido/oeip/taf/cst_utlh.htm and Application
http://www.USPTO.gov/web/offices/ac/ido/oeip/taf/appl_yr.htm

Graphic 19. Application vs. USPTO patent concessions - Asia

Own preparation. Source: USPTO Website (March 2015) – Concession
http://www.USPTO.gov/web/offices/ac/ido/oeip/taf/cst_utlh.htm and Application
http://www.USPTO.gov/web/offices/ac/ido/oeip/taf/appl_yr.htm
Graphic 20. Application vs. USPTO patent concessions - Europe


Graphic 21. Application vs. USPTO patent concessions - North America

Graphic 22. Percentage of USPTO patent concessions- Regional

EPO APPLICATIONS AND CONCESSION OF PATENTS
Graphic 23. Patent applications EPO - Regional

<table>
<thead>
<tr>
<th>Years</th>
<th>Asia</th>
<th>Europe</th>
<th>North America</th>
<th>Latin America and the Caribbean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>94,528</td>
<td>93,623</td>
<td>75,279</td>
<td>1,557</td>
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</tbody>
</table>


Graphic 24. Patent applications EPO per million people - Regional

<table>
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<th>Years</th>
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<th>Asia</th>
<th>Latin America and the Caribbean</th>
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<td>2,6</td>
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Graphic 25. EPO patent concessions - Regional


Graphic 26. EPO patent concessions per million people - Regional

Graphic 27. Application vs. EPO patent concessions - Latin America and the Caribbean


Graphic 28. Application vs. EPO patent concessions - Asia

Graphic 29. Application vs. EPO patent concessions - Europe


Graphic 30. Application vs. EPO patent concessions - North America

Graphic 31. Percentage of EPO patent concessions - Regional

[Bar chart showing percentage of EPO patent concessions by region (Europe, North America, Asia, Latin America and the Caribbean) over the years 2004 to 2011.]