Intellectual property rights and in particular patents provide a link between innovation, inventions and the marketplace. Applying for a patent makes an invention public, but at the same time gives it protection. A count of patents is one measure of a country’s inventive activity and also shows its capacity to exploit knowledge and translate it into potential economic gains.

In this context, indicators based on patent statistics are widely used to assess the inventive and innovative performance of a country. This article sketches the context and methodology of statistics on patent applications and grants in the European Union (EU) and some other European countries.

An analysis of the most recent EU data can be found in the Statistics explained dedicated to patent statistics.

**What is new?**

**Eurostat methods for the production of patent statistics**

Over the last decade, Eurostat regularly increased and improved the dissemination of patent data with the production of new indicators on economic activities. The core of the work is linked to the European Research Area (ERA), and to the priorities of the Europe 2020 strategy. There is therefore a need to enhance the information available in patent databases.

In that context Eurostat, in collaboration with the Katholieke Universiteit Leuven (K.U. Leuven), developed and implemented several innovative methodologies to be applied on PATSTAT data. They relate to regionalisation of patentee and inventors addresses (according to the NUTS classification), sector allocation and name harmonisation of applicants as well as patenting by SMEs.

**Patenting by SMEs** *Technology development in the EU-27: in search of SMEs contribution*

The development of sector allocation methodologies has allowed to discern the large contribution of the business sector in the development of new technologies (measured by means of patent indicators). Given the wide acknowledgement of the importance of entrepreneurship – and hence the role of small and medium sized enterprises (SMEs) – for economic growth, additional exploration of patenting by SMEs is high on the policymakers’ agendas. At the same time, mapping and monitoring the contribution of various firm types in technological activity is a cumbersome exercise: it requires the introduction of additional data pertaining both to the size of firms and their (in) dependency status.

A number of recent studies have matched patent databases with financial directories in order to discern firm types among patent applicants. These studies have either limited themselves to a number of countries and/or have defined SMEs only in terms of size (and not dependency). The current study complements these recent efforts by outlining and applying a methodology that assesses the participation of SMEs in (patented) technology development on the level of the EU-27, based on both firm size and dependency information.
Patent Statistics at Eurostat: Name Harmonisation

Patent Statistics: Eurostat quarterly review of the literature on patent statistics
For creating reliable indicators with respect to the contribution of SMEs in corporate patenting, a methodology was developed that consists of two steps. In step 1, harmonized patent applicant names from a patent database (PATSTAT) were matched to harmonized company names from a financial database (Amadeus). Based on the financial information that hence became available for applicants, the patents of the matched firms were classified according to their firm size using the SME definition specified by the European Commission in 2003. Step 2 was introduced because of the large volume of applicants for which no financial data were available, either because no matching firm was retrieved in the financial database or because insufficient information – especially with respect to ownership – was available in the financial database. This second step consisted of the consultation of additional external information sources in order to address missing data.

Patent statistics at Eurostat: methods for regionalisation, sector allocation and name harmonisation

This compendium of methodologies developed by Eurostat in the field of patent statistics contributes to the further development of indicators that are instrumental for analysis and policy development. It presents several methodological enhancements to deal with limitations in patent data sources. First, until now, no exhaustive sector allocation was available for identifying the nature of the applicant: individual, firm, university, public research organisation... Eurostat has bridged this gap by developing an exhaustive sector allocation methodology that is now made available for research and policy analysis.

Second, regarding applicant names in existing patent data sources, non-uniformity is the rule rather than the exception. Therefore, name harmonisation algorithms have been developed with a considerable impact in terms of coverage, resulting in highly improved indicator accuracy. Third, regionalization methodologies have been developed to better capture the regional dimension of technology development within the European Research Area (at EU-27 level).

These enhancements allow greater efficiency and accuracy in patent indicator extractions at regional, sectoral and institutional level, and are hence a considerable step forward in monitoring innovation systems in terms of technological activities.

Regionalisation of patent data

Until recently, economic geography has played only a minor role in economic theory, despite the obvious fact that economic activities are not equally distributed over space. Relatively little empirical attention has been paid to the emergence and growth of regional clusters of technological activities. The existing evidence is mostly based on case study research, while large-scale empirical evidence or verification is rather scarce.¹ One reason for this lack of large-scale empirical evidence on the phenomenon of technology clusters is the low availability of quantitative data at the region-technology level, covering regions worldwide over longer periods. Patent data, which provide information on the date and geographic location of technological development and on the organisations and institutions involved, have become increasingly available at regional level. However, in order to be able to construct patent indicators from them, addresses of inventors and patentees need to be allocated to regions. This section outlines a methodology for achieving this.

Regional patent statistics build on the allocation of inventor and patentee addresses to regions. This allocation or [9+2015] regionalisation exercise requires first of all an exhaustive list of postcodes and city names and their respective regions. Within Europe, the NUTS classification is a hierarchical system used to divide the economic territory of the EU4. It is used in the collection, development and harmonisation of EU regional statistics; in socio-economic analyses of the regions; and in the framing of EU regional policies.

See: ‘Regionalisation of patent data’

Sector allocation

A corollary of this conception of innovation dynamics is the need for refinements in patent indicators. Sector assignment — i.e. identifying whether patentees are companies (private business enterprise), universities and higher education institutions, or governmental agencies — becomes a necessary condition for further analysis of the dynamics underlying technological performance.

¹ Lecocq, 2013
This section outlines an updated version of the sector allocation methodology that was developed in 2006.² It starts with an overview of previous efforts in sector assignment of patentees, indicating the relevance of additional development efforts. After that, the currently developed methodology and its outcomes are outlined. Conclusions are drawn on the performance of the current sector allocation methodology, and future avenues for further improvement are delineated.

See: ‘Sector allocation’

Name harmonisation

The development of patent indicators on the micro-level of specific entities like companies, universities and individual inventors is faced with specific concerns stemming from the heterogeneity of patentee names that appear in patent documents within and across patent systems. Whereas this poses no challenge to the functioning of the patent system itself, it does complicate analyses at patentee level: the analyst is confronted with inconsistencies such as spelling mistakes, typographical errors and name variants, which often also reflect idiosyncrasies in the organisation of R&D and/or IPR activities within a single organisation.

With the objective of reconciling completeness and accuracy, a comprehensive methodology was developed to obtain harmonised patentee names in an automated way. The methodology consists of several harmonisation layers. In a first layer, which emphasised accuracy or precision’, the number of unique patentee names was reduced by approximately 20% and the average number of patents per patentee increased from 5.5 before to 6.8 after harmonisation. In a second layer, emphasis was placed on recall’(a high coverage in terms of patent volumes). This layer covers the top 500 most active patentees, as well as university patentees. For the top 500 patentees, this additional harmonisation layer resulted in allocating over 30,000 patentee names to the top organisations, raising their aggregated patent volume by almost 70%.

See: ‘Name harmonisation’


This report has been prepared in the framework of Eurostat’s work on patent statistics. It consists of an extensive targeted review of the existing and currently developed methodological, analytical and scientific material and of the most recent relevant literature in the following domains:

- PATSTAT data quality
- name harmonisation and gender;
- existing information and databases at institutional or company level or business surveys: comparison and possible integration and matching of data for analytical purposes;
- development of methods on patent data based on technical fields: biotechnology, nanotechnology, environmental technologies, energy, measurement of climate change, eco-innovation, technological innovation, other emerging fields;
- development of methods for compiling information on patent families and citations;
- regionalisation.

The report essentially consists of a collection of electronic articles, working papers and other publications available free of charge. An update of the report will be made available every three months.

²Van Looy, du Plessis & Magerman, 2006
Conferences on patent statistics

This year’s IP Statistics for Decision Makers (IPSDM) conference will be hosted by IP Australia and takes place in Sydney, Australia, 15-16 November 2016.

The event is organised by the IP Australia, the Organisation for Economic Co-operation and Development (OECD) and the European Patent Office (EPO) in co-operation with Eurostat, Japan Patent Office (JPO), Korean Intellectual Property Office (KIPO), National Science Foundation (NSF), United States Patent and Trademark Office (USPTO) and World Intellectual Property Organization (WIPO).

The IPSDM conference aims to discuss how intellectual property data, statistics and analysis are used and can be used to inform decision-makers in both the public and private sectors, and to identify key information needs and possible shortcomings. The conference invites submissions on all empirical research relating to intellectual property. Submissions will be particularly welcomed with respect to the following topic areas:

- IP rights and firm performance;
- The role and value of trade marks;
- Collaboration and IP;
- Geographical Indications and Regional IP policies;
- IP and start-ups;
- IP, trade and global value chains;
- IP and the digital economy.

The event is targeted at decision makers, academics, analysts, practitioners and other experts dealing with innovation, intangible assets, academic entrepreneurship, enterprise dynamics, and science and technology-related issues.

https://www.oecd.org/site/stipatents/
Data sources

From 2007 onwards, Eurostat’s production of European Patent Office (EPO) and United States Patent and Trademark Office (USPTO) data has been based on the EPO Worldwide statistical patent database. This was developed by the EPO in 2005, using their collection and knowledge of patent data.

European patent applications refer to applications filed directly under the European Patent Convention or to applications filed under the Patent Co-operation Treaty (PCT) and designated to the EPO (Euro-PCT), regardless of whether the patents are granted or not. For patent applications to the EPO all direct applications (EPO-direct) are taken into account, but among the PCT applications (applications following the procedure laid down by the PCT) made to the EPO, only those that have entered into the regional phase are counted. Patent applications are counted according to the priority date (the year in which they were filed anywhere in the world) at the EPO and are broken down according to the International patent classification (IPC). Applications are assigned to a country according to the inventor’s place of residence, using fractional counting if there are multiple inventors to avoid double counting. To normalise the data, the total number of applications at the EPO is divided by the national population and expressed in terms of patent applications per million inhabitants.
A patent application to the EPO can be valid in several countries and at most in all of the Contracting States of the European Patent Convention. In July 2009, the Convention was in force in 36 countries (all EU Member States plus Switzerland, Iceland, Liechtenstein, Norway, Monaco, San Marino, Croatia, the former Yugoslav Republic of Macedonia and Turkey). In addition to the Contracting States, three other countries (Albania, Serbia and Bosnia and Herzegovina) have concluded an 'extension agreement' with the EPO, by which these states can also be designated in a European patent application.

The falling trend in patent applications in the last years is linked to the length of patenting procedures and should not be interpreted as a real decline in patenting activity. For this reason the 2009 figures in Eurostat’s reference database are flagged as provisional or as estimates.

Patent indicators provide a measure of the innovative performance at country, firm or region level. Nevertheless, indicators are criticized as being “outdated”. This is due to the fact that information on patent applications is disclosed to the public 18 months or more after priority date. This issue is known as “timeliness”. In order to overcome this, Eurostat carried out a study where nowcasting methods have been discussed and developed.

The main purpose of this study it was to do the presentation of the existing methods for nowcasting of patent data to the European Patent Office (EPO) and the proposal of improved methods. An evaluation of these methods has been performed and conclusions regarding the most adequate methods for most of the countries have been drawn.

Moreover, an attempt to apply econometric models for nowcasting patent applications to the EPO was attempted as well as a comparison analysis. The existing econometric models are presented and 6 new models are detailed. A comparison analysis is performed and the strengths and weaknesses of each model is outlined.

In contrast to EPO data, the USPTO data refers to patents granted. Patents are allocated to the country of the inventor, using fractional counting in the case of multiple inventor countries. Comparisons between EPO and USPTO patents data should be interpreted with caution.
Today, (technical) inventions can be protected in Europe either by national patents granted by the competent national authorities or by European patents granted centrally by the European Patent Office (EPO). Member States have their own patent authorities which deal with applications for national patents. The protection conferred by a national patent is limited to the territory of the state concerned.

In 2012 Member States and the European Parliament agreed on the “patent package” – a legislative initiative consisting of two Regulations and an international Agreement, laying grounds for the creation of unitary patent protection in the EU. The patent package implements enhanced cooperation between 25 Member States (all Member States except Italy and Spain). Following the adoption of the two Regulations in December 2012, the contracting Member States will proceed with the signature and ratification of the Agreement on a Unified Patent Court – the third and last component of the “patent package” setting up a single and specialised patent jurisdiction. Once the Agreement and the Regulations enter into force, it will be possible to obtain a European patent with unitary effect – a legal title ensuring uniform protection for an invention across 25 Member States on a one-stop shop basis, providing huge cost advantages and reducing administrative burdens.

If the applicant chooses to apply for a European patent, the application will be dealt with by the EPO, having its headquarters in Munich and a branch in The Hague. The EPO is a body of the European Patent Organisation, an international organisation comprising 38 members (27 EU Member States + 11 other European countries). The Organisation was established in 1973 following the signature of the European Patent Convention (EPC).

The unitary patent – which is the object of today’s EU regulations - will be a third option for companies or inventors seeking patent protection in Europe. It will be a further tool in the inventor’s toolbox in addition to national patents and ‘classical’ European patents (i.e. without unitary effect).

A unitary patent is a European patent with unitary effect. The procedure up to the grant of the patent will be the same as for (‘classical’) European patents without unitary effect. After grant, European patents will fall into one of the two categories. A ‘classical’ European patent needs to be validated in each State for which it has been granted. It has the same effect as a national patent granted in the respective territory and its fate in these States may be different, depending e.g. on any court proceedings which take place in these States. The ‘classical’ patent is therefore often compared with a bundle of national patents which is centrally granted.

In contrast, the unitary patent will ensure uniform protection for an invention in 25 Member States (all Member States except Italy and Spain) on a one-stop shop basis.

The Unified Patent Court (UPC) will be the future centralised patent jurisdiction of the participating Member States. It will be a court common to the participating Member States and thus subject to the same obligations under Union law as any national court of the participating Member States, in particular refer, where necessary, questions on the interpretation of European Union law to the Court of Justice of the European Union. The UPC
will have exclusive jurisdiction especially in respect of civil litigation related to infringement and validity for both the “classical” European patents and the European patents with unitary effect. It will also have competence in respect of supplementary protection certificates issued for a product protected by a European patent with or without unitary effect.

Publications

- Patent Statistics at Eurostat: Methods for Regionalisation, Sector Allocation and Name Harmonisation

External links

- European Patent Office (EPO) — Statistics
- PATSTAT — the EPO Worldwide Patent Statistical Database (Information flyer)
- Innovation Union Information and Intelligence System (I3S)
- European Commission — I3S — Commitments types — Commitment 14
- Japan Patent Office (JPO)
- Korean Intellectual Property Office (KIPO)
- The EU Single Market — Industrial Property — Patent
- The Organisation for Economic Co-operation and Development (OECD)
- Unified Patent Court
- US National Science Foundation (NSF)
- US Patent and Trademark Office (USPTO)
- World Intellectual Property Organisation (WIPO)

See also

- Innovation statistics
- Patent statistics
- Science, technology and digital society statistics introduced