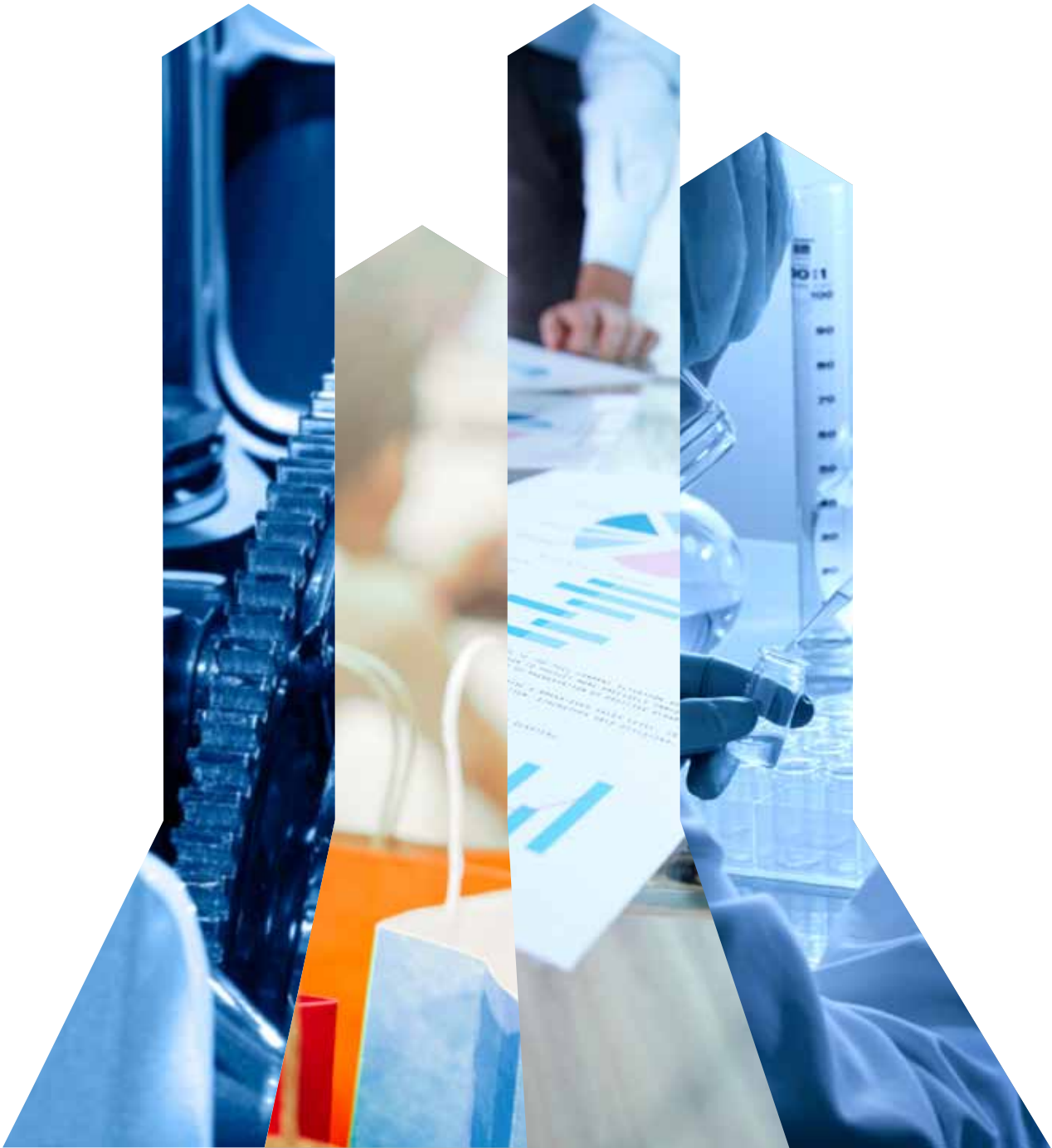


# Intellectual property rights intensive industries: contribution to economic performance and employment in the European Union

Industry-Level Analysis Report, September 2013

A joint project between the European Patent Office and the  
Office for Harmonization in the Internal Market

## Executive Summary





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# Foreword

Innovation is one of the areas covered by the five key targets set in “Europe 2020”, the ten-year growth strategy adopted by the European Union with a view to creating a more competitive economy with higher employment. It has never been so important to foster the “virtuous circle” leading from R&D investment to jobs - via innovation, competitive advantage and economic success - as in today’s world of increasingly globalised markets and the knowledge economy. This process depends on several different factors, but an efficient system of intellectual property rights (IPR) undoubtedly ranks among the most important, given IP’s capacity to encourage creativity and innovation, in all its various forms, throughout the economy.

Europe already has a long tradition in this area: European countries have played a major part in shaping a modern and balanced system of IP rights which not only guarantees innovators their due reward but also stimulates a competitive market. It is nevertheless vital to ensure that the system remains a useful instrument in implementing new innovation policies designed to achieve those goals. At the same time, there have been several calls from industry for indicators to measure the economic impact of IP rights. Moreover, in view of the question marks which, in public debate, have sometimes been raised over IP’s role in supporting innovation and creativity, it is essential that facts and figures be produced to ensure such debate is based on sound evidence.

That is why the Office for Harmonization in the Internal Market (OHIM), acting through the European Observatory on Infringements of Intellectual Property Rights, and the European Patent Office (EPO) decided to join forces and carry out this study in co-operation with the EU Commission, in particular DG Internal Market and Services and Eurostat.

There have already been several studies on specific IP rights, industrial sectors or countries, but the OHIM-EPO study is the first to quantify the overall contribution made by IP-intensive industries to the EU economy, in terms of output, employment, wages and trade, taking into account the major IP rights (patents, trademarks, designs, copyrights, geographical indications). Despite the conservative approach, reflected in the rigorous methodology applied, the main results are very impressive: IPR-intensive industries generate more than a quarter of employment and more than a third of economic activity in the EU.

We at the EPO and the OHIM hope this study will prove to be a useful source of information for all the target groups (e.g. policymakers, IP offices, industry and academics). We intend to update the figures regularly to enable us to monitor future trends, and also plan to expand the study to cover other, non-EU European countries. Given the interesting insights to be gained from comparison, we would very much welcome similar studies on other regions of the world.



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The statistical office of the European Union, Eurostat, provided valuable assistance in filling gaps in the published statistics, and during subsequent verification of the results.

In addition, the authors are grateful for comments on the report draft received from the Directorate General Internal Market and Services of the European Commission; Lord John Mogg, Chair of the Advisory Board of the European Observatory on Infringements of Intellectual Property Rights; Ian Hargreaves, Professor of Digital Economy, Cardiff University; Tony Clayton, Chief Economist of the UK Intellectual Property Office; and Mariagrazia Squicciarini, Senior Economist, OECD.

One of the mandates of the European Observatory on Infringements of Intellectual Property Rights (“the Observatory”)<sup>1</sup> is to provide evidence-based data on the impact, role, and public perception of intellectual property in the economy of the European Union (EU). In order to meet that objective, the Observatory is undertaking a programme of socio-economic studies. Similarly, the European Patent Office (EPO) aims to raise awareness about the economic and social importance of the industrial property system.

The present report, carried out as a joint project between OHIM and the EPO, and benefiting from input from other IP offices, the European Commission services, and international organisations, is the first major study resulting from this collaboration. It aims to provide the first broad, credible assessment of the combined contribution of industries that make intensive use of the various types of Intellectual Property Rights (IPR) to the economies of the European Union as a whole and to the individual Member States. Croatia became the EU’s 28th Member State on 1 July 2013. However, data for Croatia was not yet available to the extent necessary when the analytical work took place during the autumn 2012 and spring 2013, and therefore the study only includes the 27 pre-July 2013 Member States.

The study covers a broad range of IP rights<sup>2</sup>—trademarks, patents, designs, copyright and Geographical Indications (GIs)—and considers a variety of economic indicators, in particular Gross Domestic Product (GDP), employment, external trade and wages. It makes no policy recommendations, as this is not within its scope. Instead, it is designed to provide evidence that can be used by policymakers in their work, and to serve as a basis for raising awareness of Intellectual Property among Europe’s citizens.

The study is intended to provide results that are comparable to those for the US economy. The methodology here is therefore closely related to that used in the pioneering study published in March 2012 by the Economics and Statistics Administration in the US Department of Commerce and the United States Patent and Trademark Office (USPTO)<sup>3</sup>.

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1 - The Observatory was transferred to the Office for Harmonization in the Internal Market (OHIM) according to the Regulation (EU) No. 386/2012 of the European Parliament and of the Council of 19 April 2012, which came into force on 5 June 2012.

2 - It may be helpful to define more clearly the various terms related to Intellectual Property. IP is usually, but always, a result of innovation. However, “IP” is a broader term than “IPR”, as it includes types of knowledge, such as trade secrets or business methods, that are not registered, either because the legal regime does not provide for their registration, or because the firm chooses not to protect them. In this study, “IPR” is used to refer to the five rights included in the analysis: patents, trademarks, registered designs, copyright and Geographical Indications.

3 - For ease of presentation, the study conducted by the US Department of Commerce and the USPTO is simply referred to as the “US study” or “USPTO study” in this report.

# Main findings

## IPR Intensive industries contribute 26% of EU's employment and 39% of EU's GDP

IPR-intensive industries are defined<sup>4</sup> as those having an above average use of IPR per employee. The present study shows that about half of European industries can be considered IPR intensive.

It should be emphasized, however, that all industries to some extent use IP rights. By focussing only the IPR-intensive industries, this study arguably understates the real contribution of IP rights to the European economy<sup>5</sup>.

Such IPR-intensive industries are shown to generate almost 26% of all jobs in the European Union during the period 2008-2010, with almost 21% in trade mark-intensive industries, 12% in design-intensive industries, 10% in patent-intensive industries, with smaller proportions in copyright-intensive and GI-intensive industries<sup>6</sup>. On average, 56.5 million Europeans were employed by IPR-intensive industries during that period, out of a total employment of approximately 218 million. In addition, another 20 million jobs were generated in industries that supply goods and services to the IPR-intensive industries. Taking indirect jobs into account the total number of dependent jobs rises to just under 77 million (35.1%).

Over the same period, IPR-intensive industries generated almost 39% of total economic activity (GDP) in the EU, worth €4.7 trillion. They also accounted for most of the EU's trade with the rest of the world with design-intensive, copyright-intensive and GI-intensive industries generating a trade surplus.

IPR-intensive industries also pay significantly higher wages than other industries, with a wage premium of more than 40%. This is consistent with the fact that the value added per worker is higher in IPR-intensive industries than elsewhere in the economy.

The contribution of IPR-intensive industries to the two principal economic indicators, employment and output, is summarised in the three tables below<sup>7</sup>.

4 - See Chapter 4 on "Methodology".

5 - It must, however, be noted that large parts of the economy, especially the public sector, are not considered IPR-intensive

6 - The total contribution of IPR-intensive industries is less than the sum of the contributions of trade mark-intensive, patent-intensive, design-intensive, copyright-intensive and GI-intensive industries because many industries are intensive in respect of more than one IP right. The methodology of this study ensures that double-counting of industry contributions is avoided.

7 - In order to minimise the impact of data gaps in the economic statistics and to avoid giving undue importance to one particular year, the economic indicators were calculated as an average of the years 2008-2010.

## Direct contribution of IPR-intensive industries to employment

IP right	Employment	Share of total employment
Trade mark-intensive industries	45,508,046	20.8%
Design-intensive industries	26,657,617	12.2%
Patent-intensive industries	22,446,133	10.3%
Copyright-intensive industries	7,049,405	3.2%
GI-intensive industries	374,345	0.2%
<b>All IPR-intensive industries</b>	<b>56,493,661</b>	<b>25.9%</b>
Total EU economy	218,400,733	

In addition to the direct employment contribution, IPR-intensive industries generate employment in other, non IPR-intensive industries which supply them with goods and services as inputs to their production processes. Using the EU27 Input Output Tables<sup>8</sup>, published by Eurostat, it is possible to calculate this indirect effect on employment in non-IPR intensive industries. This calculation is summarised below, showing the breakdown of the direct and indirect employment. Including the indirect jobs in the calculation implies that 35.1% of EU jobs are contributed by the IPR-intensive industries, directly and indirectly.

## Direct and indirect contribution of IPR-intensive industries to employment

IP right	Employment (direct)	Employment (indirect)	Employment (direct+indirect)
Trade mark-intensive industries	45,508,046	17,600,397	63,108,443
Design-intensive industries	26,657,617	12,121,817	38,779,434
Patent-intensive industries	22,446,133	12,738,237	35,184,370
Copyright-intensive industries	7,049,405	2,331,390	9,380,795
GI-intensive industries	n/a	n/a	374,345
<b>All IPR-intensive industries</b>	<b>56,493,661</b>	<b>20,109,003</b>	<b>76,602,664</b>

<sup>8</sup> - Input-output tables show the flows of goods and services between all the industries in the economy.



Besides employment, IPR-intensive industries contribute to economic output, as measured by Gross Domestic Product. Overall, almost 39% of EU GDP is generated in IPR-intensive industries, with trade mark-intensive industries accounting for 34%, design-intensive industries 13%, patent-intensive industries 14%, with copyright and GI-intensive industries accounting for smaller proportions. Chapter 6 further breaks out the contributions of these industries to the national economies of the EU Member States.

### Contribution of IPR-intensive industries to GDP

IP right	Value Added / GDP (€ million)	Share of total EU GDP
Trade mark-intensive industries	4,163,527	33.9%
Design-intensive industries	1,569,565	12.8%
Patent-intensive industries	1,704,485	13.9%
Copyright-intensive industries	509,859	4.2%
GI-intensive industries	16,134	0.1%
<b>All IPR-intensive industries</b>	<b>4,735,262</b>	<b>38.6%</b>
Total EU GDP	12,278,744	

Comparing the results of the present study for the EU with those for the US reveals that the structure of the two economies<sup>9</sup> has similarities, as would be expected given their similar level of development. However, in terms of the contribution of IPR-intensive industries, the proportions of employment and GDP are somewhat higher in the EU: 26% vs. 19% for employment and 39% vs. 35% for GDP.

However, in both studies, trade mark-intensive industries were responsible for the highest shares of both employment and GDP, followed by patents and copyright in the US and by designs, patents and copyright in the EU. Similarly, the wage premiums in IPR-intensive industries compared to other industries are similar: 41% in the EU and 42% in the US, with copyright-intensive and patent-intensive industries having the highest premiums on both sides of the Atlantic.

9 - The US study did not include designs, while the present study did. Since most of the design-intensive industries are also trade mark-intensive or patent-intensive, they would have been included as IPR-intensive in any event. However, there are 13 industries, employing 3.4 million workers in the EU, that are exclusively design-intensive. If those industries were removed from the analysis in order to assure strict comparability with the US, then the employment share of IPR-intensive industries in the EU would be 24.3%, still higher than the result reached in the US study.

Given that 39% of GDP (value added) in the economy and 26% of employment is generated in IPR-intensive industries, the value added per employee is higher in IPR-intensive industries than in the rest of the economy. Economic theory indicates that, all else being equal, industries in which the average worker produces more value added can be expected to pay higher wages to their workers than other industries. It is therefore of relevance to examine whether this higher value added is reflected in the relative wages in the IPR-intensive industries.

Wages in IPR-intensive industries are indeed higher than in non-IPR intensive industries. The average weekly wage in IP-intensive industries is €715, compared with €507 in non-IPR intensive industries – a difference of 41%. This “wage premium” is 31% in design-intensive industries, 42% in trade mark-intensive industries, 46% in GI-intensive industries, 64% in patent-intensive industries and 69% in copyright-intensive industries.

#### Average personnel cost in IPR-intensive Industries, 2010

	Average personnel cost (€ per week)	Premium (compared to non-IP intensive industries)
Trade mark-intensive	719	42%
Design-intensive	666	31%
Patent-intensive	831	64%
Copyright-intensive	856	69%
GI-intensive	739	46%
<b>All IPR-intensive industries</b>	<b>715</b>	<b>41%</b>
<b>Non-IPR intensive industries</b>	<b>507</b>	
All industries (included in SBS)	589	

Finally, the role played by IPR-intensive industries in the EU's external trade is examined. The bulk of EU trade is in IPR-intensive industries. It may be somewhat surprising at first glance that such a high share of imports is IPR-intensive. This is because even industries producing commodities such as energy are IPR-intensive<sup>10</sup>, and on the other hand, many non-IPR intensive activities are also non-tradable<sup>11</sup>. For that reason, 88% of EU imports consist of products of IPR-intensive industries. However, an even higher share of EU exports, 90% is accounted for by IPR-intensive industries.

The EU as a whole had a trade deficit of approximately €174 billion, or 1.4% of GDP. Since the IPR-intensive industries as a whole account for a higher share of EU exports than EU imports, they make a positive contribution to the Union's trade position<sup>12</sup>. The EU has a trade deficit in trade mark-intensive and patent-intensive products, to some degree offset by trade surpluses in copyright-intensive, design-intensive, and GI-intensive industries.

The table below summarises trade in IPR-intensive industries, based on data from 2010<sup>13</sup>.

#### EU external trade in IPR-intensive industries

IP right	Export € million	Import € million	Share of export	Share of import	Net export € million
Trade mark-intensive	1,023,981	1,158,860	75.5%	75.7%	-134,879
Design-intensive	724,292	703,586	53.4%	46.0%	20,707
Patent-intensive	957,748	1,049,795	70.6%	68.6%	-92,047
Copyright-intensive	57,051	41,727	4.2%	2.7%	15,325
GI-intensive	10,577	1,836	0.8%	0.1%	8,741
<b>Total IPR-intensive</b>	<b>1,226,015</b>	<b>1,351,890</b>	<b>90.4%</b>	<b>88.3%</b>	<b>-125,875</b>
Non-IPR intensive	130,585	178,640	9.6%	11.7%	-48,055
<b>TOTAL EU TRADE</b>	<b>1,356,600</b>	<b>1,530,530</b>	<b>100%</b>	<b>100%</b>	<b>-173,930</b>

10 - Both industries contained in NACE division 06, extraction of crude petroleum and natural gas, are patent-intensive.

11 - For example, service industries such as those included in NACE division 86 (human health activities) or 96 (other personal service activities). Such services are generally consumed at the point of production.

12 - Another manner in which this can be seen is by noting that IPR-intensive industries account for 89% of EU's total external trade but only 72% of the trade deficit.

13 - As in the case of the employment and GDP calculations, the figures for the five IP rights do not add up to the overall figure for IPR-intensive industries due the fact that many industries are intensive in more than one IP right.

# Methodology and data

A significant portion of this report, specifically Chapter 4 and Appendix 7.1, is devoted to documenting the methodology of the study, for two main reasons:

- 1) Given the complexity of dealing with a large amount of data from 27 Member States, contained in several large databases, a novel and sophisticated data-matching methodology was needed;
- 2) In the interest of transparency, it was important to provide as thorough a description of the methodology as possible.

Another distinguishing feature of this study is the very extensive variety of databases and other data sources that were used to determine which industries are IPR-intensive, and to assess their contribution to employment, GDP and other economic indicators. A full list is given in Chapter 4.

In addition, industry-specific third-country data was used where needed, in particular in connection with the estimation of trade in GI products.

In order to determine which industries are IPR-intensive, the register databases of OHIM and EPO were matched with the commercial database ORBIS<sup>14</sup>. The resulting matched database contains data on approximately 240,000 companies, with the number of Community Trade Marks, Registered Community Designs, and patents applied for by each company, along with the industry classification and various financial and economic variables for each, providing a set of data that can be used in future, more detailed studies.

Using this database, the number of trademarks, designs and patents per employee was calculated for each industry, and the industries which were above average according to this measure were considered to be IPR-intensive. This calculation was performed at the level of the EU, not taking into account national filings by the companies in the database. This approach, partly made necessary by data limitations, is nevertheless justified by the assumption that an industry which is defined to be IPR-intensive based on its registration of EU-level IP rights would also be deemed IPR-intensive if national IP rights per employee were included as well.

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14 - ORBIS is a database of financial information on European companies, provided by Bureau van Dijk and based on data obtained from company filings in company registers or similar records in the various countries.

A fundamental assumption behind the methodology employed in the present study is that the degree to which an industry is IPR-intensive is an intrinsic characteristic of that industry, independent of where it is located<sup>15</sup>. In assessing the contribution of each industry to the economy, what is being measured are the jobs and GDP generated by that industry in each Member State and in the EU, and not where the origin of the underlying IPR is.

For example, if a car company based in country A builds an assembly plant in country B, then the jobs and value added created as a result accrue to the economy of country B. Therefore, based on this study alone, one cannot draw conclusions about how innovative a particular country is. The higher contribution of patent-intensive industries may just as well be a result of production siting decisions made in a different country.

Chapter 7 shows in which countries the patents, trademarks and designs in the database used for this study originate and presents statistics on the proportion of jobs in IPR-intensive industries in each Member State that are created in companies based in other Member States or outside the EU.

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<sup>15</sup> - The exception is GI which is analysed on a country-by-country basis.

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