Trademark patterns of the top R&D-driven innovators

The trademark patterns of R&D-driven innovators confirm the role of trademarks as a key intangible asset in the corporate strategies of innovative firms.

Leading innovation extends well beyond a commitment to R&D. A recent report published by the European Commission’s Joint Research Centre (JRC) and the Organisation for Economic Cooperation and Development (OECD) demonstrates that the top R&D-driven innovators around the world tend to complement their investments in R&D with key IP rights and other intangibles, in order to protect, signal and value their innovation investments (see H Dernis, M Doiso, F Hervás, V Millot, M Squicciarini and A Vezzani (2015), World Corporate Top R&D Investors: Innovation and IP Bundles, a JRC and OECD common report. Luxembourg: Publications Office of the European Union at http://iri.jrc.ec.europa.eu/other-reports.html). This article draws on the report to give a brief overview of trademark application patterns among R&D-driven innovator companies.

Trademarks are distinctive signs – including words, pictures, logos, shapes, colours, sounds and any combination of these – through which companies distinguish their goods and services from those of competitors. Their legal status can be supported by actual use or intent to use in commerce, depending on the jurisdiction. The importance of trademarks lies in their dual role, as they allow consumers and competitors to identify the origin of a product (informational role) and to differentiate that product from the goods or services of other organisations (differentiation role). From an economic perspective, trademarks address the market failure of the ex ante asymmetry of information between buyers and sellers with regard to a product’s quality (this informational asymmetry and its implications was described by G Akerlof in “The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism”, Quarterly Journal of Economics, vol 84, no 3, 1970, pp 488-500). In other words, trademarks reduce search costs by clearly identifying a product’s origin.

They may also incentivise the production of higher-quality goods in order to maintain the reputation of the associated brand.

In recent years a growing number of studies in the field of economics of innovation have paid more attention to trademark-based indicators as a proxy for companies’ innovative activities. There are many reasons for this, including trademarks’ importance in the commercialisation phase of innovations, their wide use across different sizes of firms and types of industry, their direct links with products and the fact that they can be used to protect innovations that are not always patentable (see European Patent Office (EPO) and Office for Harmonisation in the Internal Market (OHIM) (2013), Intellectual property rights intensive industries: contribution to economic performance and employment in the European Union, September 2013, joint project between EPO and OHIM).

Pharma-biotech companies are among the most active in terms of trademarks in the group of top 20 R&D-driven innovators.

Recent evidence of the link between trademarks and innovation suggests that trademarks play a significant role in the actual reference to innovation, particularly in knowledge-intensive business services and in reference to non-technological forms of innovation, such as marketing and organisational innovations (see MJ Flikkema, AP de Man and C Castaldi (2014), Are Trademark Counts a Valid Indicator of Innovation? Results of an In-depth Study of New Benelux Trademarks Filed by SMEs. Industry and
**R&D-DRIVEN INNOVATION**


**Dataset**

The data used in this article was collected from the EU Industrial R&D Investment Scoreboards (http://iri.jrc.ec.europa.eu/scoreboard.html) and the recently released EC-JRC/OECD COR&DIP Database (http://survey.oecd.org/Survey.aspx?s=7d4769b2122d4afa811e5f3b4351c379).

For the 2015 scoreboard, the world’s top 2,500 R&D investors investing more than €17.9 million in 2014/15 were ranked by their R&D investments. Together, they account for €607.2 billion – equivalent to about 90% of the R&D expenditure financed by the business sector worldwide.

The COR&DIP Database provides information on the R&D activity and inventive output (ie, patents and trademarks) of the top 2,000 corporate R&D performers worldwide. Information about the R&D investors is taken from the 2013 EU Industrial R&D Investment Scoreboard, while the trademark-related information is taken from selected IP offices. The indicators are based on new trademark applications at OHIM and the US Patent and Trademark Office (USPTO) for the period 2010 to 2012.

Figures 1 and 2 show the upper distributions of the top R&D-driven innovators by the country location of headquarters (HQ) and by the main industry affiliation of companies. The industries are defined according to the industry classification benchmark (ICB).

**FIGURE 1:** Top 10 headquarters locations of R&D-driven innovators*

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>829</td>
</tr>
<tr>
<td>Japan</td>
<td>543</td>
</tr>
<tr>
<td>China</td>
<td>302</td>
</tr>
<tr>
<td>Germany</td>
<td>206</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>161</td>
</tr>
<tr>
<td>Taiwan</td>
<td>92</td>
</tr>
<tr>
<td>France</td>
<td>85</td>
</tr>
<tr>
<td>South Korea</td>
<td>72</td>
</tr>
<tr>
<td>Switzerland</td>
<td>46</td>
</tr>
<tr>
<td>Sweden</td>
<td>41</td>
</tr>
</tbody>
</table>

* Number of companies by country location of headquarters – United States: 829 companies
Source: 2015 EU Industrial R&D Investment Scoreboard, European Commission, JRC/DG RTD

**FIGURE 2:** Top 20 industries of R&D-driven innovators (main affiliation)

- Technology hardware and equipment
- Pharmaceuticals and biotechnology
- Software and computer services
- Electronic and electrical equipment
- Industrial engineering
- Automobiles and parts
- Chemicals
- Healthcare equipment and services
- General industrials
- Construction and materials
- Food
- Aerospace and defence
- Personal goods
- Industrial metals and mining
- Leisure goods
- Household goods and home construction
- Oil and gas
- Electricity
- Banking

Note: sectors are classified according to the industry classification benchmark (three-digit level of aggregation)
Source: 2015 EU Industrial R&D Investment Scoreboard, European Commission, JRC/DG RTD

**FIGURE 3:** Average number of trademark applications per company, main affiliation at ICB 3 digit, 2010-2012

- Leisure goods
- Household goods and home construction
- Personal goods
- Food
- Pharmaceuticals and biotechnology
- Healthcare equipment and services
- Chemicals
- Fixed-line telecommunications
- General industrials
- Aerospace and defence
- Automobiles and parts
- Electronic and electrical equipment
- Software and computer services
- Construction and materials
- Banking
- Oil and gas
- Electricity
- Industrial metals and mining

Note: Industries are defined following the ICB and ranked according to USPTO data. Only industries with more than 20 companies in the top 2,000 corporate R&D investors (Scoreboard 2013) are shown. Trademarks are based on fractional counts
Source: EC-JRC/OECD, IP bundle of top corporate R&D investors, COR&DIP database v0, 2015
Top R&D-driven innovators mainly come from three world regions represented in the top 10 HQ countries: North America, Western Europe and East Asia. As for the number of firms, R&D investment is also highly concentrated across the most representative countries. The top countries in terms of R&D investment are the United States (38.2%), Japan (14.3%), Germany (10.3%), China (5.9%), France (4.6%), the United Kingdom (4.2%), Switzerland (4.1%), South Korea (3.9%), the Netherlands (2.8%), Taiwan (2%) and Sweden (1.5%). The first 100 firms (respectively of the top 500 firms) account for more than half (respectively 80%) of the total €607.2 billion (EU Industrial R&D Investment Scoreboard 2015).

The sectoral concentration is also high. The top four sectors account for more than 200 companies each, altogether equivalent to more than one-third of the world’s top 2,500 companies. In terms of R&D investment, the divide is even more striking, as three industries – pharmaceuticals and biotechnology (about 18%), technology hardware and equipment, and automobiles and parts (about 16% each) – account for about half of the total investment made by the scoreboard companies (EU Industrial R&D Investment Scoreboard 2015).

**TABLE 1:** Number of trademark applications and R&D investment of top 20 R&D-driven innovators, 2010-2012

<table>
<thead>
<tr>
<th>Top 20 R&amp;D investors *</th>
<th>Headquarters location</th>
<th>Main industry affiliation (ICB 3 digit)</th>
<th>R&amp;D investment average 2010-12 (€ millions)</th>
<th>R&amp;D intensity *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volkswagen</td>
<td>Germany</td>
<td>Automobiles and parts</td>
<td>7659</td>
<td>5%</td>
</tr>
<tr>
<td>Microsoft</td>
<td>United States</td>
<td>Software and computer services</td>
<td>7394</td>
<td>13%</td>
</tr>
<tr>
<td>Samsung Electronics</td>
<td>South Korea</td>
<td>Electronic and electrical equipment</td>
<td>7341</td>
<td>6%</td>
</tr>
<tr>
<td>Roche</td>
<td>Switzerland</td>
<td>Pharmaceuticals and biotechnology</td>
<td>7056</td>
<td>19%</td>
</tr>
<tr>
<td>Toyota Motor</td>
<td>Japan</td>
<td>Automobiles and parts</td>
<td>6765</td>
<td>4%</td>
</tr>
<tr>
<td>Novartis</td>
<td>Switzerland</td>
<td>Pharmaceuticals and biotechnology</td>
<td>6322</td>
<td>14%</td>
</tr>
<tr>
<td>Pfizer</td>
<td>United States</td>
<td>Pharmaceuticals and biotechnology</td>
<td>6145</td>
<td>17%</td>
</tr>
<tr>
<td>Intel</td>
<td>United States</td>
<td>Technology hardware and equipment</td>
<td>6265</td>
<td>18%</td>
</tr>
<tr>
<td>Merck US</td>
<td>United States</td>
<td>Pharmaceuticals and biotechnology</td>
<td>5758</td>
<td>5%</td>
</tr>
<tr>
<td>General Motors</td>
<td>United States</td>
<td>Automobiles and parts</td>
<td>5657</td>
<td>12%</td>
</tr>
<tr>
<td>Johnson &amp; Johnson</td>
<td>United States</td>
<td>Pharmaceuticals and biotechnology</td>
<td>5373</td>
<td>5%</td>
</tr>
<tr>
<td>Daimler</td>
<td>Germany</td>
<td>Automobiles and parts</td>
<td>4698</td>
<td>14%</td>
</tr>
<tr>
<td>Sanofi-Aventis</td>
<td>France</td>
<td>Pharmaceuticals and biotechnology</td>
<td>4672</td>
<td>13%</td>
</tr>
<tr>
<td>Nokia</td>
<td>Finland</td>
<td>Technology hardware and equipment</td>
<td>4576</td>
<td>6%</td>
</tr>
<tr>
<td>Honda Motor</td>
<td>Japan</td>
<td>Automobiles and parts</td>
<td>4525</td>
<td>7%</td>
</tr>
<tr>
<td>Panasonic</td>
<td>Japan</td>
<td>Leisure goods</td>
<td>4439</td>
<td>14%</td>
</tr>
<tr>
<td>GlaxoSmithKline</td>
<td>United Kingdom</td>
<td>Pharmaceuticals and biotechnology</td>
<td>4364</td>
<td>6%</td>
</tr>
<tr>
<td>Siemens</td>
<td>Germany</td>
<td>Electronic and electrical equipment</td>
<td>4359</td>
<td>13%</td>
</tr>
<tr>
<td>Cisco Systems</td>
<td>United States</td>
<td>Technology hardware and equipment</td>
<td>4330</td>
<td>9%</td>
</tr>
<tr>
<td>Robert Bosch</td>
<td>Germany</td>
<td>Automobiles and parts</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: companies are ranked according to their R&D investments in 2012 (Scoreboard 2013) European Commission JRC-IPTS calculations Source: EC-JRC/OECD, IP bundle of top corporate R&D investors, COR&DIP database v0, 2015.

**FIGURE 4:** Top 20 product classes, Nice classes, 2010-2012 (number of trademark applications)

Note: Nice classes are ranked according to USPTO data* Services classes - Short labels for Nice classes are taken from Dernis et al (2015) European Commission JRC-IPTS calculations Source: EC-JRC/OECD, IP bundle of top corporate R&D investors, COR&DIP database v0, 2015.

**Trademarks of top R&D-driven innovators: an industry perspective**

Figures 3 and 4 present the level of trademark activities at the industry level considering the industries defined.
FIGURE 5: Number of trademark applications and R&D intensity of top 20 R&D-driven innovators, 2010-2012

Notes: companies are ranked according to their R&D investment in 2012 (Scoreboard 2013)

by the ICB (Figure 3) and the products or Nice classes (Figure 4).

The average number of trademarks per company in each industry reveals no systematic relationship between the size of the industrial groups and the relative level of trademark applications. Both smaller and larger groups of top R&D investors appear all the way along the distribution. However, the highest ratios can be found in business-to-consumer industries such as leisure, household, personal goods, food and healthcare. This supports the rationale suggesting that trademarks constitute a key corporate asset, particularly in consumer-oriented end markets.

The high concentration of trademark applications can also be found at the product class level. The top 20 classes represent more than 80% of all trademark applications of top R&D investors. The most targeted classes in both offices include instruments and computers (about 20% of applications) and pharmaceutical products (more than 12% of applications). Among the service classes, R&D and software (Class 42) appears as a primary target in the trademark portfolios of the top 2,000 R&D investors worldwide. It mainly relates to scientific, technological and research services, and industrial analysis, as well as to the design and development of computer hardware and software.

Trademarks and R&D investments of top 20 R&D-driven innovators

Table 1 and Figure 5 break down the statistics at the company level and compare the trademarks and R&D activity of the top 20 R&D investors. As expected from the previous aggregated figures, most companies record much higher trademark activity at the USPTO than at OHIM for the period 2010 to 2012. With the exception of German automobile firm Volkswagen, this is the case for large EU-based R&D innovators such as French pharmaceutical company Sanofi-Aventis and the United Kingdom’s GlaxoSmithKline.

Pharma-biotech companies are among the most active in terms of trademarks in the group of top 20 R&D-driven innovators. These companies are also among the most R&D intensive, with ratios of R&D to net sales above 10%. Among these top companies and in terms of trademark activity, Johnson & Johnson is ranked second at the USPTO and fifth at OHIM, while Novartis is respectively ranked sixth and second (Dernis et al, 2015). Other highly R&D-intensive companies, such as Intel and Nokia, show relatively low trademark activity; while lower R&D intensity values can also be associated with quite high trademark activity (eg, Samsung Electronics, Siemens and Volkswagen).

The trademark patterns of R&D-driven innovators confirm the role of trademarks as a key intangible asset in the corporate strategies of innovative firms. Although trademarks entered into the scope of innovation studies only recently, their link with innovation is already widely recognised: “It is the mark through which a business can attract and retain customer loyalty, and create value and growth. The mark works as an engine for innovation and has a favourable impact on employment” (Council of the European Union, Press Release ST 12130/14, Presse 425, Brussels, July 23 2014).

Further research on trademarks and their links with innovative activities would benefit from systematic data collection and from the establishment of international database(s) at the company level. In this regard, the EC-JRC/OECD’s recent initiative to match the patents and trademarks of the top 2,000 R&D investors constitutes a relevant basis on which to foster our knowledge of the (combined) use of trademarks, patents and other IP rights by innovative companies. Similar exercises should be conducted on a more regular basis for a wider set of firms, industries and economies in order to better characterise the links between innovative properties, innovation and economic performance. WTR

80%

Percentage of applications from top 20 product classes

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