Inventiveness by numbers
- towards patent inventors statistics -

Robert J.W. Tijssen

Centre for Science and Technology Studies (CWTS)
Leiden University
Netherlands

Presentation at the WIPO-OECD Workshop
"Statistics in the Patent Field"

Geneva, 18-19 September 2003

Outline

Introduction

Context and history

Problems and possibilities

Solutions and further research

Inventors and the knowledge-based economy

Invention and innovation are the lifeblood of (new) firms in the knowledge-based economy

Evidence-based R&D and innovation policies

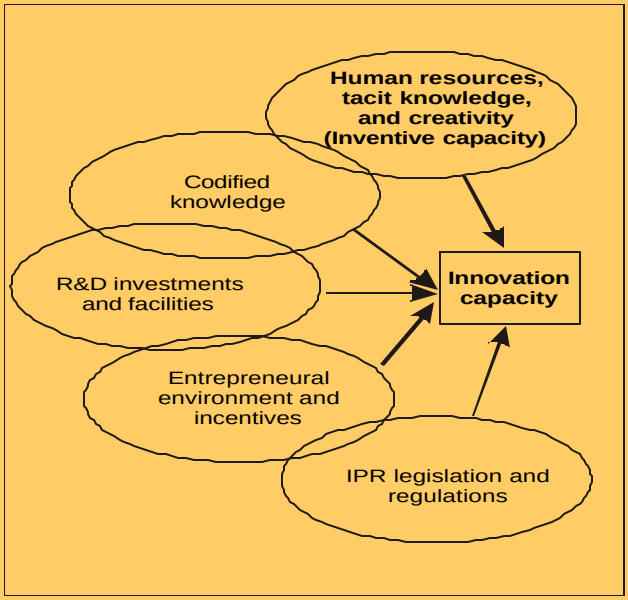
Need for more reliable and more comparable data and statistics within and across countries on people and institutions directly contributing to inventions and innovations

Concepts, models, measurement and analysis

Intellectual capital and human capital

Innovation capacity and inventive capacity

Innovation capacity and inventive capacity



Inventive capacity and inventors

Knowledge creation, inventiveness and human capital, rather than knowledge appropriation, ownership and intellectual capital

Inventor's 'micro' perspective

Explore the analytical potential and power of inventor data for:

- understanding inventiveness
- quantitative measures and indicators of relevant aspects
- country-level and sector-level systemic quantitative comparisons of inventors, inventiveness and inventive outputs

Some questions in need of reliable statistics

Who are the most prolific inventors in a country? And in specific industrial sectors?

Is there an increase in the numbers of patents produced by independent inventors?

How many institutional inventors also own private patents?

How many inventors have shifted from employers in the public sector to the private sector?

Is there an increase in internationally co-invented patents?

Is there an inventor 'brain drain' from Europe? (and a 'brain gain' by the US?)

How many industry-owned patents list university co-inventors?

Which are the most productive years of inventors? What is their average age?

And what about female inventors?

History of recent case studies

1998 USPTO/TAF's "Prolific Inventors Receiving Utility Patents, 1988-1997". Identifies prolific inventors who received a large number of USPTO utility patents during the 1988 to 1997 period.

2000-2001 Country-level case-study of Finnish university-related USPTO patents (Meyer, 2003). Concentration of (corporate) patents by (key) inventors at Finnish universities.

2002 European Commission's research project "Scientific and technological performance by gender – a feasibility study on patent and bibliometric indicators". Estimated the shares of male and female inventors in patents published by EPO in 1998 for selected EU-15 countries.

2003 Country-level case-study of corporate owned/university-(co)invented patents in Netherlands – EPO/PCT/USPTO (Tijssen; in progress). Tracking inventor names of researchers employed in universities and estimates of university-(co)invented patents in ICT and biotechnology.

2003 European Commission - call for tenders (June 2003) for FP6 Programme "Integrating and Strengthening the European Research Area" on the "Analysis of university and public research institutions' patenting activity". To develop a methodology for identifying which EPO patent applications relate to applicants or inventors from universities or other public research organizations, via tracking inventor names of researchers employed in universities in EPO/PCT patents.

Policy context **Inventors in public research organizations**

"To understand whether concerns about the scientific and economic impacts of strategic IP behavior are valid, governments, researchers and other stakeholders need more information on the quantity and quality of IP actually under management at PROs [public research organizations]"

(OECD ST&I Outlook, 2002)

"In recent years much interest has focused on the inventive activities of universities and other public research institutions, in terms of how they are able to exploit and in some cases commercialize the results of their research. In this context, increasing attention has been paid to the patenting activity of these public organizations, but precise data on their patents is still hard to come by.

One reason for this is that there is no systematic recording in the main patent office databases of the institutional affiliation of applicants or inventors (university, PRO, business enterprise…), nor is there a complete harmonization of the names of applicants/inventors.

(European Commission, 2003)

Critical parameters

Is information on inventors accessible? Is it relevant and objective?

Which information items are quantifiable? To which degree?

How reliable and valid are those measurements?

What are the possibilities and prospects for international comparative statistics, benchmarking and further policy-relevant quantitative analyses?

Public access data on inventors at patent offices

	Queries within on-line databases	***Download/print of front page of individual patents***
EPO *(www.nl.espacenet.com)*	last name	full name and (home) address
JPO *(www.ipdl.jpo.go.jp)*	last name	full name and (home) address
PCT *(www.nl.espacenet.com)*	last name	full name and (home) address
USPTO *(uspto.gov/patft/index.html)*	last name, first name, initials	full name, city, country (US inventors: US state)

Example

USPTO (application year)

1999	Jacobus Cornelis Haartsen, DK Borne (NL)
1998,1999	Jacobus Haartsen, Borne (NL)
1999	Jacobus Cornelis Haartsen, Borne (NL)
1998,1999	Jacobus C. Haartsen, Borne (NL)
1999	Jacobus Cornelis Haartsen, Hardenberg (NL)
2002	Jacobus Haartsen, Hardenberg (NL)
2002	Jacobus C. Haartsen, Hardenberg (NL)

PCT-patents (priority year)

2000	HAARTSEN, Jacobus, C. [NL/NL]; Bruchterweg 81, NL-7772 BG Hardenberg (NL)
2000	HAARTSEN, Jacobus, Cornelis [NL/NL]; Bruchterweg 81, NL-7772 BG Hardenberg (NL)
2001	HAARTSEN, Jaap; Bruchterweg 81, NL-7772 BG Hardenberg (NL)
2001	HAARTSEN, Jacobus [NL/NL]; Bruchterweg 81, NL-7772 BG Hardenberg (NL)

Inventor names

No harmonization of the names and initials of inventors

Spelling variations

The name information might be truncated by database

Inventor names with special letters such as umlauts are often problematic. Either the letters are completely missing or they are spelled in different versions

Similar names may refer to different inventors

Inventors may change their names (e.g. marriage)

Inventor addresses

The affiliate address (i.e. city of residence of inventor or employer) is not unified due to variations in the input of inventor and/or data-entry at patent office

The name of affiliation and/or address information might be truncated by the database

Inventors indicate their correspondence address (usually home address) rather than their affiliate address (name and address of employer)

No harmonization of the names of affiliations

Inventors may change their home and/or affiliate address

Inventor categories

Corporate inventors, who were employed by business enterprise, often working in R&D departments and sometimes specifically hired to invent.

Academic inventors who work in public research organizations, either universities or non-profit research labs.

Independent inventors without a corporate or other affiliation, who take out patents in their own name.

'Hybrid' inventors, who are/were employed but who also take out patents in their own name.

Inventor statistics for the future?

Ownership of patents

Inventors of patents owned by multinational companies
Inventors of patents owned by public research organizations
Inventors of patents with co-assignees
Inventors who (also) take out patents in their own name

Type of inventors

"Star" inventors (many patents and/or highly cited patents)
"Prolific" inventors (many patents)
"Principal" lead inventors (listed first on patents)
"Team" inventors (co-inventors: domestic/foreign, single/multiple affiliations/assignees)
"Researcher" inventors (also actively publishing in the research literature)

Other inventor statistics for the future?

Patent citations

Inventors of patents highly cited by other patents
Inventors of patents with references to the researchliterature ('science-based' patents)

Inventor mobility

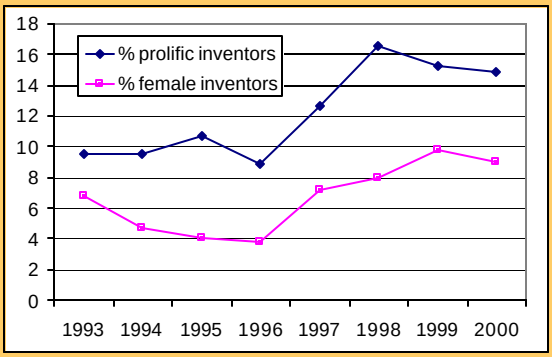
Inventors that moved from the public sector to the corporate sector (or vice versa)
Inventors that moved to another company
Inventors that moved to another region or country

Inventor background

Educational level, age and gender

Case study results

Inventors of Dutch-invented 'science-based' USPTO utility patents *,**



* Patents with (1) one or more inventors listing a residence in the Netherlands, and (2) containing one or more 'other references' to publications in international scientific and technical journals covered by the Thomson/ISI-databases
** All categories of inventors combined

Tracking down university (co-)inventors on corporate patents

Biotechnology patents published in 2002-2003 with one or more Netherlands-based inventors

method 1: linking names of Dutch inventors to the Netherlands University Research Staff Database (NOD)

Full match – 6.7%

method 2: linking inventor names to the CWTS research publications database

Full match – 44.6%

Conceptual problems

Lack of “theory of invention”

Lack of “models of inventive behaviour”

Lack of comparative empirical information on creative processes leading to patents

Technical problems

Lack of (fully) harmonized information

Information on inventors in (publicly accessible) patent files is either non complete and/or not standardized

Lack of comparability between patent offices, and within offices over time

Taking the first steps towards internationally comparable patent inventors statistics

Further studies

Mechanisms and arrangements to assign inventors to patents

Rankings within the list of inventors

Inventor's choice of residential address (home, or employer)

Patent offices

Common definitions and categorizations of inventor information

Common data-collection and data-entry protocols of inventor information across all (major) patent-granting authorities

Dedicated electronic databases with verified, and regularly updated, inventor information