What do patent examiner inserted citations indicate for a region with low absorptive capacity?

JOAQUÍN M. AZAGRA-CARO,[a,b,*] IGNACIO FERNÁNDEZ-DE-LUCIO,[a] FRANÇOIS PERRUCHAS,[a] PAULINE MATTSSON[b, c]

[a] *INGENIO, CSIC-UPV, Valencia (Spain)*
[b] *JRC IPTS, European Commission, Sevilla (Spain)*
[c] *UBE-LIME, Karolinska Institutet , Stockholm (Sweden)*

Most studies of patents citations focus on national or international contexts, especially contexts of high absorptive capacity, and employ examiner citations. We argue that results can vary if we take the region as the context of analysis, especially if it is a region with low absorptive capacity, and if we study applicant citations and examiner-inserted citations separately. Using a sample from the Valencian Community (Spain), we conclude that (i) the use of examiner-inserted citations as a proxy for applicant citations, (ii) the interpretation of non-patent references as indicators of science-industry links, and (iii) the traditional results for geographical localization are not generalizable to all regions with low absorptive capacity.

Introduction

Citations in patents can be seen as knowledge footprints and can be used to trace the information sources on which the invention is built. Further, they can illustrate the relations with other inventions e.g. geographic, sectoral and technological linkages. Many existing citation studies use citing-cited patents to analyse knowledge flows from company to company, or from other sectors, e.g. research institutes and academia to companies (Meyer, 2002, Leydesdorff and Meyer, 2003).

When a researcher or a company applies for a patent, it has to provide a description of the invention, proving its novelty and utility. Many applications include 'prior art' in the form of previous inventions or other relevant scientific information, information aimed at defining the differences from existing patents. A patent that includes reference to prior art, from hereon referred to as a citation, within a specific document can be said to build on the knowledge in the document(s) it cites.

Existing studies mainly analyse citations from the perspective of what we might call the 'research-intensive environment', i.e. leading world zones or countries, or high technologies, such as nanotechnology, pharmaceuticals, chemicals, etc. In this study, we focus on the regional dimension, which is a crucial unit of observation in terms of its capacity to implement science and technology policies and embed an idiosyncratic culture (Cooke, 1992).

[*] *Address for correspondence:*
JOAQUÍN M. AZAGRA-CARO
European Commission - Joint Research Centre, Institute for Prospective Technological Studies (IPTS)
Edificio Expo, C/Inca Garcilaso, s/n, E-41092 Sevilla, Spain
E-mail: joaquin-maria.azagra-caro@ec.europa.eu

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Consideration of the regional dimension allows us to question some of the findings from earlier studies.

When the country is the unit of analysis, the results reflect the aggregated outputs of regions. Some regions may display a higher propensity than others to include citations. The aggregated result will thus tend to reflect the properties of these regions. What kinds of regions are likely to include greater numbers of citations? Our assumption is that regions with high absorptive capacity are more likely to cite,[1] because one of the characteristics of production of goods and services in such regions is that it relies on a larger explicit knowledge base, which is relatively easy for firms to identify and absorb.

Therefore, when we examine patent citations at national or international level, what we are really observing is the pattern in regions with high absorptive capacity. Would the pattern be the same in regions with low absorptive capacity?

Similarly, the results from studies of advanced technologies may not be the same as the results from studies of low technology levels, or regions where low levels of technology predominate, i.e. regions with low absorptive capacity. Thus our interest in focusing on the latter type of region. Whereas the results from studies of high-tech regions are coherent, this provides the motivation to conduct similar studies on regions with low absorptive capacity in order to understand the relevance of citations as an indicator of science-industry relations.

The first concern in this paper is on the regional dimension of patent citations; the second is on the incipient, but increasing debate on the differences between applicant and examiner citations in patents, and we will argue that it is intrinsically linked to the interpretation of findings at regional level.

The basis of this debate is that citations can be included by the 1) inventor, 2) the legal expert, 3) the applicant, and 4) patent examiner. In studies based on patent citations, the assumption is made that all citations were included by the inventor, and thus they are an indicator of the knowledge that he/she possesses. However, in the course of a patent application, citations can be added first by the applicant, who is not necessarily the inventor, but might be the company that owns the property rights and/or second by the applicant's legal advisers. It is not possible to distinguish among these citations.[2] These citations are reviewed by the patent examiner to determine the novelty of the invention and to decide whether to accept or reject the application. The examiner compares the invention with the prior art and can insert on the front page of the patent application, what in his/her opinion are other relevant references. Of course, an applicant can choose to leave out some of the knowledge base to make the invention appear more novel. It is the examiners' responsibility to identify whether this has been done and to add relevant information and remove non-relevant citations. Therefore, the references on the front pages of patent applications are not necessarily the same as in the original application. In a study carried out by Schmoch (1993) only 8.4% of all the citations included on the front page of EPO originated from the inventor.

In the next section we describe how the literature on patent citations has given rise to frequently reproduced findings and how the debate on the differences between applicant and examiner citation makes sense in a regional setting, and especially regions with low absorptive capacity. Some hypotheses are proposed. The third section describes the context in which they are tested - Spain's Valencian Community - and the methodology employed. The presentation of the results follows and the last section provides some conclusions.

[1] We follow Cohen and Levinthal's (1990) definition of absorptive capacity: "a limit to the rate or quantity of scientific or technological information that firm can absorb". To justify the extension of the concept of absorptive capacity from firms to regions, see Niosi and Bellon (2002) and Azagra et al. (2006).

[2] This is why in this paper we use the term 'applicant citations' rather than the more common, but imprecise 'inventor citations'.

What we can learn from patent citations at regional level, in a low-tech context, based on full-text citations and a stronger European focus

Citations as an indicator of the inventor's knowledge base: applicant vs examiner citations

Patent citations have been criticized by several scholars as being 'noisy' when used to measure knowledge transfer, with the examiner added citations producing most of the 'noise'. In a study by Alcácer and Gittelman (2006), however, these criticisms were rejected; the authors concluded that the changes implemented by examiners are numerous and non-random. Jaffe et al. (2000) differentiated between applicant and examiner added citations and found that one-third of applications included a high level of the knowledge from cited works, one-third learned more about related knowledge during completion of the application and one-third had no prior knowledge about the cited information. Both these studies indicate that examiners add an important proportion of the citations included, and that aggregated citations can be a misleading measure of inventor knowledge transfer. We prefer to differentiate between applicant and examiner citations and to analyse them separately. Alcácer and Gittelman (2006) tested whether applicants and examiners cite similar patents, analysing forward citations in highly cited patents. They found that inventors are most likely to cite highly cited patents but that examiners also cite a large group. However both inventors and examiners forward citations, converge over time.

When comparing citation patterns among patents issued in Europe/Japan compared to the US, care is needed in the interpretation of results. Since 2001, the applicant and/or its attorney for a US Patents and Trademark Office (USPTO) patent have a 'duty of candour', which implies that they must, by law, include any prior art of an invention. This is not the case in Europe and Japan. Applicants to the USPTO, therefore, tend not to limit their references, but rather to include citations that are in any way relevant to their invention in order to minimize the risk of their application being rejected. Therefore, USPTO patents on average include more citations than Japanese or European ones (Alcácer and Gittelman, 2006). In a study carried out by Michel and Bettels (2001), American patents include three times as many patent references and half as many non-patent references as the EPO patents. Thompson (2006) found, using USPTO data, that examiners added 41% of all citations and that examiner added citations accounted for all of the citations made by 38% of the citing patents, compared to 8.5% in the case of applicants. In applications to the European Patent Office (EPO), examiners rather than applicants add the majority of citations (Criscuolo and Verspagen, 2005; Alcácer and Gittelman, 2006). Meyer (2000) discusses other differences between the US and European systems, such as the generally lower education levels of US examiners, which results in the inclusion of citations that are not always directly relevant to the patent. In addition, the heavy workload of US examiners and the focus on English language documents could have a negative impact on the search for relevant documents. EPO patents' citations are more focused towards a limited number of fields and therefore EPO applicant citations might be closer to real knowledge transfer than USPTO applications. This has further been supported by Michel and Bettels (2001) that argue that the general coverage of underlying technology in the US search report is much broader than in the EP. These differences should be taken account of in choosing the most suitable data set.

In terms of analysing the differences between applicant and examiner citations, there are only a few existing studies, and, to the best of our knowledge, only one for the European case, i.e. Criscuolo and Verspagen (2005). There is a need for more empirical evidence, especially for Europe where the obligation to reveal information is not as compelling as in the US; Criscuolo and Verspagen (2005) found a much lower share of applicant citations over all

front-page citations than in the US (9% vs 63%). Also, all these studies analyse only front-page citations, so the applicant citations are only those that patent examiners consider relevant. The patent examiner's criteria for applicant citation relevance may not reflect actual knowledge flows and we would argue that full-text citations are a better indicator. Acosta and Coronado (2003) justify this emphasis on full-text citations to avoid possible under-estimation of science-technology links, but they do not compare them with front-page citations. In a related paper, Acosta and Coronado (2002) show that only 31% of Spanish patents include applicant full-text citations of patent references (PRs) and 10% of Spanish patents include applicant full-text citations of non-patent references (NPRs), i.e. a small number compared to front-page citations, which appear in all patents.

Hence, we would make another plea for the inclusion of the regional dimension and the notion of absorptive capacity in the analysis of citations in patents. If we study a region with low absorptive capacity, we can expect a relatively low number of applicant citations in patents because of the argument previously applied to NPRs – citations require qualified human capital able to decode the information embedded in another source, not just academic publications but also other firm patents. If there are fewer applicant citations in EPO patents and in full-text citations, then in any study of a region with low absorptive capacity in Europe through full-text citations, there will necessarily be a very small number of applicant citations.

Hypothesis 1. Patent examiner's citations in patents are a weak indicator of an applicant's knowledge flows, in regions with low absorptive capacity.

Non-patent references are useful to trace science-industry links

A patent can contain both PRs and NPRs. The latter can include books, articles in scientific journals, newspaper articles, etc. Callaert et al. (2006) and Harhoff et al. (1999) found that in most cases, NPRs are references to scientific journal articles. NPRs in the form of scientific references in patents, have been argued to reveal a direct influence of science on technology (Narin et al., 1997), while Meyer (2000) does not claim such a strong link. Narin and Noma (1985), in an investigation of the science-technology links, introduced the concept of NPRs. While in the literature, PRs are considered to be indicators of the technological knowledge embodied in patents, NPRs are mainly seen as indicating scientific proximity and a measure of the knowledge flow between science and technology. However, this link is dependent on the geographic context, e.g. Callaert et al. (2006) found that EPO patents are more likely to include NPRs, suggesting that European patents have a closer linkage with science.

Sampat (2004) studied the differences between applicants' and examiners' tendencies to cite patents vs NPRs. He found that examiners were less likely to include NPRs than applicants. When only patents including NPRs were considered the majority of the citations came from the applicants. The explanation given was that applicants have a better state-of-the-art knowledge and keep track of developments in the field.

So, are NPRs a useful indicator of science-industry links in a region with low absorptive capacity? We should take into account the fact that science-industry links take a variety of forms, and have different costs, e.g. having a R&D department or engaging in a research cooperation agreement tends to be more costly for a company than outsourcing a prototype design or having an informal conversation. We assume that patents resulting from more costly links will contain a higher number of NPRs because such investment will increase the firms' capacity to use the science base and codify it through a citation. Implicit in this is the assumption that if the average type of firm in the region engages into less costly links with

science, we may not observe NPRs although the links exist. Therefore, NPRs would not be useful to trace science-industry links in a region with low absorptive capacity.

Hypothesis 2. NPRs are a less valid indicator of science-industry links in a region with low absorptive capacity than in a more research-intensive environment (region, nation or technology).

Geographic distribution of citations indicates regional concentration of knowledge flows

The geographic location of a citation can be used to trace the origin of a knowledge source and to determine how far awareness of an invention has diffused. Several authors have studied the differences between national and international citation patterns. Jaffe and Trajtenberg (1996) found that knowledge spillovers are geographically localized but that disparities fade over time. Almeida and Kogut (1999) concluded that local knowledge spillovers are more likely in high-tech regions such as the Silicon Valley, the Boston area and Austin in Texas. The idea is that local innovations are stimulated by nearby technology developments. Thompson (2006) tested the correlation between technology classes and geography and found national citations were more common when both the patent and the cited patent belonged to the same technology class.

When applicant and examiner added citations are studied separately, significant differences are found. Thompson (2006), using USPTO data, concluded that applicants are more likely than examiners to include national citations. He argued that localization of knowledge transfer decreases over time, but that national borders constitute more impermeable barriers to international knowledge outflow. These results are not surprising as researchers tend to move more frequently within national than international borders. Criscuolo and Verspagen (2005) studied intra-European patent citations. They, like Thompson and others (Sampat, 2004; Alcácer and Gittelman, 2006), found that applicant citations were more geographically concentrated.

We would expect the results for regions with low absorptive capacity not to be similar to those found by the studies mentioned above. In regions with low absorptive capacity, physical proximity will not be a reason for accessing explicit knowledge, since firms within the region will use explicit knowledge incorporated in capital goods, mainly from other regions. We could hypothesize that in regions with low absorptive capacity citations will not present high geographical localization in the region.

Hypothesis 3. Patent citations will not be geographically localized in regions with low absorptive capacity, contrary to very research-intensive environments (regions, nations or technologies).

A low absorptive capacity regional sample

The research context: the Valencian Community

In an earlier study (Azagra et al., 2006), the Valencian Community was characterized as a region with low absorptive capacity. The main features of the region are:

- The low-tech profile of its economic structure (predominance of microfirms in services and traditional manufactures).
- The weaknesses of its innovation activities (innovation occurs, but it is mostly incremental and through machinery and equipment acquisition, with little expenditure on R&D).
- The scarcity of qualified personnel at firms, even in knowledge-intensive sectors.
- Policy emphasis on enhancing technology transfer (similar to high-tech regions or countries).

We would stress that this context is compatible with the existence of important academia-industry links. A report for the Valencian R&D Council (ACCID, 2005), showed that 3% of Valencian firms' sales were due to product innovations that could not have been developed in the absence of academic research. This result is similar to the findings from other studies based on US and German data (Mansfield, 1998; Beise and Stahl, 1999). It also showed that industry funding of Valencian university R&D (6%-8%) was similar to the Spanish average and higher than the EU and OECD average and that Valencian firms tend to contract out to Valencian universities for low-tech, short-term oriented R&D. In other words, academia-industry links exist, because universities to an extent have adapted to the regional absorptive capacity level.

More specifically, we showed that most faculty members strongly support university-industry interaction (Azagra et al., 2006), that firms do not show the same propensities to interact with universities and that some faculty members prefer to interact with firms outside the region (Azagra, 2007a) because this provides access to higher technology and larger firms (Azagra, 2007b). Moreover, for science-dependent sectors we found an 'alocalization' effect in terms of university-industry links (Todt et al., 2007), in contrast to current regional R&D policy, based on a linear vision of innovation and spillover effects of local knowledge production.

Finally, we should mention that the Valencian Community has been a pioneer in the establishment of a network of technology centres, focused on development rather than research, but at some point contributing to science-industry links.

It is important to keep this in mind to provide a context for some of the results in the next section.

Methodology and data

The source of patent application information for the Valencian Community is the Spanish Patent and Trademark Office (OEPM), which selects patents through the field 'province', and includes the codes for the three Valencian NUTS 3 regions: Alicante, Castellon and Valencia. We recovered patents from 1999 to 2003.[3]

The OEPM database includes a field for the name(s) of the patent applicant. To identify their correspondence with firms is not straightforward and involved checking each patent to classify and standardize it. We classified the 1,382 patents of the Valencian Community registered between 1999 and 2003, distinguishing between firm applicants and other types of applicants based on an acronym for firm type in the name of the applicant, i.e. SL - limited society, SA - anonymous society, etc.

For this group of patents, we constructed a database to include citations. We studied the full-text of the patent application form for each patent, taking particular notice of the description field where the applicant includes the prior art, and counted the number of

[3] OEPM updates online data on a regular basis. The date of the extraction for this paper is 23 June 2006.

citations.[4] Then we went through the same procedure for the citations in the prior art report (included by the examiner). This task was made easier because some of the citations were already present in the OEPM database. The result was 712 applicant citations and 2,849 examiner citations, which we further classified according to two criteria:

- Scientific or technologic nature, i.e. NPRs or PRs, respectively.
- Geographic location of PRs and Thomson Scientific's Science Citation Index (SCI)-NPRs: the OEPM database does not contain a field with this information, so we had to search all the PRs and some of the NPRs. Because of cost constraints we did not search for all NPRs, but PRs plus SCI-NPRs represent almost 90% of all references.

In the case of the PRs, we searched for the location of the applicant in the Cibepat[5] database or applied to the relevant national office in the case of patents from other national patent offices. It would have been better to identify the location of all the applicants, but we assume that inventors are more likely to apply for patents in their own countries.6 In the case of the Spanish patents, we used the field 'province' to distinguish between patents from the Valencian Community and those from the rest of the Spain.

For the SCI-NPRs, we used the Thomson Scientific database to recover the geographic location of the first author to set it against the citation. It would have been better to consider all the authors, but in the case of a small international cooperation this would not have been problematic. Moreover, we assume that if the same group of authors published another paper, the names might appear in a different order, so on average the different geographical affiliations would be cancelled out.

Results

Citations used to indicate an invention's knowledge base – not in the Valencian Community

As Table 1, panel A shows, more than 70% of patent applicants have no citations. The average number of applicant citations per patent is 1.17, but the most frequent mode is zero. Moreover, the 1.17 average hides an important disparity between patents with applicant citations and patents without applicant citations. The 30% of patents with applicant citations had an average of 4.13 applicant citations per patent, with a still low mode of 1, and observable in almost one-third of cases.

{Table 1 around here}

Panel B of Table 1 shows that the average goes up to 4.83 citations per patent for examiners. The mode is 4 citations per patent, and this occurs in less than a quarter of cases. Therefore, most examiner citations originate with the examiners themselves. This is especially true for patents without applicant citations, since the difference between patents with and without applicant citations does not significantly change the average number, the mode, or the frequency for examiners.

[4] In the full-text of the application form, applicants provide a description of their invention to demonstrate its novelty, to describe it fully and to explain how it is made. Although most include a section on prior art, it is not obligatory to include citations. Consequently, a patent without citations does not mean that there is no description, but only that it is a tacit description of the prior art.

[5] For international patents, information was completed from the EPO database (*esp@cenet*) and the World International Patent Organization (WIPO) database.

[6] Other evidence from the sample reinforces this idea: the expectation that the origin of a cited EPO or PCT patent is mostly abroad, was widely confirmed, thus it confirms the existence of such a bias.

Another way of analysing the differences between applicants and examiners is to look at the correlation between the number of citations from each: the correlation coefficient is close to zero even if we restrict the sample to patents with a positive number of applicant citations.

These findings support Hypothesis 1, i.e. examiner citations are not very representative of applicant knowledge flows in a region with low absorptive capacity such as the Valencian Community.

NPRs are useful to trace science-industry links – not in the Valencian Community

As we can see from Table 2, 98% of examiner citations are PRs, implying that only 2% are NPRs. Through examiners citations, we identify a very small link between firm patents and their scientific base.

{Table 2 around here}

Consistent with the literature, applicants tend to include more NPRs (18%) than examiners. However, the majority of citations are still PRs (82%). Therefore, the largest part of the knowledge base of Valencian firm patents is technological rather than scientific. This result, given the existence of the academia-industry links described in section 3.1, provides evidence to support Hypothesis 2.[7]

Geographical localization – not in the Valencian Community

Table 3 reports the identification of the origin of PRs cited by Valencian patents. If we accept the total in the last column to be an approximately, 84% of the PRs cited by examiners in the A panel correspond to knowledge generated abroad.[8] A large proportion of these are from the USA (42%), which reflects the US position as technology leader, with the European Union accounting for 36%, and if we consider international patents the proportions are 53% and 24% respectively. We should emphasize that foreign patents account for 8% of total Spanish patents.

{Table 3 around here}

Of the PRs cited by examiners 15% are national patents with Spanish applicants. The majority (60%) are Valencian applicants –one-fifth self-citations (the citing and cited patent applicant is the same), so the proportion of citations to patents from other Spanish regions is 40%. Consequently, although most of the technological knowledge base of Valencian firm patents is foreign in origin, we cannot find a preference for national over regional boundaries.

In terms of the geographical origin of the PRs or patents cited by applicants, the B panel shows that proportion of foreign ones is high (71%), but not so high as for examiners. This is consistent with the studies referred to in section 2.3. Similar to the case of examiners, the

[7] As is usual in this type of study, we also identified publications in the SCI. Surprisingly, most citations – both applicants and examiners – to NPRs were publications in SCI journals. Therefore, although the link between Valencian firms and science is probably weak, it is not particularly so in terms of links with the high-quality science. However, we must take this result cautiously because it relies on a very low number of patents, concentrated in the pharmaceutical and biotechnology sectors.

[8] Strictly speaking, it is not correct to sum the second and third columns for the reasons given in the methodology: in shaded cells, patents may have some Spanish applicants. However, the ratio of foreign applicants is so large in all cases that it is doubtful whether greater refinement would change the results, even without the supposition of a national bias.

USA accounts for the largest proportion, but the distance to other regions is smaller, e.g. to the European Union.

Among the national PRs cited by applicants, the largest proportion is Valencian PRs (53%) –one-third self-citations. While applicants might overestimate the local component, we cannot find a significant preference for the national.

Because of the small number of NPRs and SCI-NPRs in our sample, we refrain from making detailed claims as to their geographical distribution. However, it seems that, similar to PRs, the foreign knowledge base is much larger than the national one, in the cases of both examiner and applicants.

The above results support Hypothesis 3. In other words, where we have a low absorptive capacity region sample, we cannot confirm the geographical localization of citations found in other studies, but rather the reverse, that there is geographical alocalization.

Conclusions

In this article, we discussed the utility of standard uses of citations in patents in regions with low absorptive capacity and presented some evidence from such a region, the Valencian Community. The results have several implications.

First, the few patents with applicant citations imply that examiner citation analyses overestimate the weight of the explicit knowledge base of patents in regions such as the Valencian Community and hide one of the region's weaknesses: the scarcity of qualified personnel at firms, which makes it more difficult for firms to use explicit knowledge. Examiner citation analyses would also overestimate the importance of knowledge flows for innovation. There is therefore a need to separate between examiner and applicant citations. In this region and, in general, in Spain, the process of innovation is mainly built on the internal capabilities of firms. In this sense, neither the externalisation of R&D nor the cooperation with scientific actors appear to be determining for innovative performance (Vega et al., 2007).

Second, the low number of scientific citations points to its lack of utility as an indicator of science-technology links in low absorptive capacity regions such as the Valencian Community, where other signs would suggest that these links exist. If the science-technology links in such region are considerable, the fact that firm patents quote only a few scientific publications may suggest that these links may be technological in nature. It may also be that universities contribute in a useful, but short-term oriented way, with low-level knowledge, which confirms the current position of Valencian firms as technology followers rather than leaders. This is coherent with the low degree of novelty of Valencian patents and with the predominance of incremental over radical innovation detected in other studies of the Valencian Community.

Third, we can see that the largest part of the knowledge base of Valencian firm patents is foreign in origin. One explanation for this may be that ideas are created in every part of the world, and to justify a certain degree of novelty, firms develop international search strategies.

This suggests that some policies to support innovation in regions with a low absorptive capacity may be less successful, e.g. supporting regional R&D through subsidies rather than the incorporation of qualified personnel at firms or the increase of local university-industry links. Policymakers have a limited vision of the process of technological development and its socioeconomic consequences and consider it as a linear, automatic and geographically localized process. In this sense, policymakers should be better informed about the determining importance of internal sources of firms, the scarce relation among the actors of the innovation system and the alocalization of knowledge that favours epistemological communities rather than local networks.

To sum up, the traditional use of patent citations in regions with low absorptive capacity to trace knowledge flows and science-technology links has many flaws, as we have shown in the case of the Valencian Community. Nevertheless, we would support the utility of patent citations to identify knowledge alocalization in such regions compared with more research-intensive environments, taking into account the separation of applicant vs. examiner citations and the study of full text reports.

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Tables

Table 1. Patents from the Valencian Community with firm applicants and their citations

Table 1a. Applicants

	Nº of patents	Nº of applicant citations	Average	Mode	Frequency
All patents	571	669	1,17	0	72%
Patents without applicant citations	409	-	-	-	-
Patents with applicant citations	162	669	4,13	1	32%

Table 1b. Examiners

	Nº of patents	Nº of examiner citations	Average	Mode	Frequency
All patents	571	2 758	4.83	4	23%
Patents without applicant citations	409	1 987	4.86	4	22%
Patents with applicant citations	162	771	4.76	4	24%

Source: Own elaboration from OEPM: Cibepat

Table 2. References in Valencian Community patents with firm applicants, according to their patent or non-patent type

Type of cited reference	Nº of examiner citations	Nº of applicant citations
PR	2 707 (98%)	547 (82%)
NPR	51 (2%)	122 (18%)
Total	2 758	669

Source: own elaboration from OEPM: Cibepat and Thomson Scientific: Web of Knowledge

Table 3. Patent references in patents from the Valencian Community with firm applicants, according to their geographic origin

Table 3a. Examiner citations

Geographic origin of cited patents	Nº of citations of other national patents	Nº of citations of other international patents	Total
Foreign	**1 811 (83%)**	**475 (92%)**	**2 286 (84%)**
European Union countries	568 (31%)	252 (53%)	830 (36%)
United States	856 (47%)	113 (24%)	969 (42%)
Japan	164 (9%)	47 (10%)	211 (9%)
China	16 (1%)	1 (0%)	17 (1%)
Rest of the world	31 (2%)	62 (13%)	93 (4%)
Spanish, with foreign applicant	176 (10%)	-	176 (8%)
Spanish	**382 (17%)**	**21 (4%)**	**403 (15%)**
From the Valencian Community	230 (60%)	10 (48%)	240 (60%)
(of which, self-quotations)	(53)	(2)	(55)
Outside Valencian Community	149 (39%)	11 (52%)	160 (40%)
Undetermined	3 (1%)	0	3 (1%)
Undetermined	**0**	**18 (4%)**	**18 (1%)**
Total	**2 193**	**514**	**2707**

Table 3b. Applicant citations

Geographic origin of cited patents	Nº of citations of other national patents	Nº of citations of other international patents	Total
Foreign	**258 (64%)**	**131 (90%)**	**389 (71%)**
European Union countries	47 (18%)	66 (50%)	113 (29%)
United States	157 (61%)	33 (25%)	190 (49%)
Japan	7 (3%)	13 (10%)	20 (5%)
China	3 (1%)	0 (0%)	3 (1%)
Rest of the world	0 (0%)	19 (15%)	19 (5%)
Spanish, with foreign applicant	44 (17%)	-	44 (11%)
Spanish	**144 (36%)**	**6 (4%)**	**150 (27%)**
From the Valencian Community	74 (51%)	5 (83%)	79 (53%)
(of which, self-quotations)	(23)	(3)	(26)
Outside Valencian Community	47 (33%)	1 (17%)	48 (32%)
Undetermined	23 (16%)	0	23 (15%)
Undetermined	**0**	**8 (6%)**	**8 (1%)**
Total	**402**	**145**	**547**

Source: own elaboration from OEPM: Cibepat