VALUES MATTER: PATENT OFFICE, INNOVATION AND THE SOCIAL CONTRACT*

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Values matter: patent office, innovation and the social contract

Abstract. According to the social contract theory of patents, States grant commercial exclusivity to inventors in exchange for the disclosure of the technology, with the aim of enabling future innovations. The argument I will defend is that, under the rationale of the social contract theory, not being guided by certain epistemic values can contribute to a scenario in which disclosure of inventions does not enable technological innovation. First, I explain how the visibility and accessibility of the information disclosed can be affected by problems in databases and patent search engines. Second, I analyze how patent offices may not be encouraging searches and the training of the examiners. This study mainly relies on twelve in-depth interviews with Spanish patent examiners. The information analysed suggests situations that may affect the way in which the contract thesis explains: (1) the dissemination of information and (2) the epistemic values that lead to technological innovation.

Keywords: Epistemic values, innovation, social contract, databases, incentives; JEL O31, O34, K39

La importancia de los valores: la oficina de patentes, la innovación y el contrato social

Resumen. Según la teoría del contrato social de las patentes, los Estados otorgan una exclusividad comercial a los inventores a cambio de la divulgación de la tecnología, con el objetivo de facilitar futuras innovaciones. El argumento que defenderé es que, bajo la lógica de la teoría del contrato social, la falta de orientación por ciertos valores epistémicos puede contribuir a un escenario en el que la divulgación de invenciones no promueva la innovación tecnológica. Primero, explico cómo la visibilidad y accesibilidad de la información divulgada pueden verse afectadas por problemas en las bases de datos y los motores de búsqueda de patentes. Segundo, analizo cómo las oficinas de patentes pueden no estar fomentando la búsqueda ni la formación de los examinadores. Este estudio se basa principalmente en doce entrevistas en profundidad con examinadores de patentes españoles. La información analizada sugiere situaciones que pueden afectar la forma en que la tesis del contrato explica: (1) la difusión de la información y (2) los valores epistémicos que conducen a la innovación tecnológica.

Palabras claves: valores epistémicos, innovación, contrato social, bases de datos, incentivos; JEL O31, O34, K39

A importância dos valores: o escritório de patentes, a inovação e o contrato social

Resumo. Segundo a teoria do contrato social das patentes, os Estados concedem uma exclusividade comercial aos inventores em troca da divulgação da tecnologia, com o objetivo de facilitar futuras inovações. O argumento que defenderei é que, segundo a lógica da teoria do contrato social, a falta de orientação por certos valores epistêmicos pode contribuir para um cenário em que a divulgação das invenções não promova a inovação tecnológica. Primeiro, explico como a visibilidade e acessibilidade das informações divulgadas podem ser afetadas por problemas em bases de dados e motores de busca de patentes. Em segundo lugar, analiso como os escritórios de patentes podem não estar incentivando a busca nem a formação dos examinadores. Este estudo baseia-se principalmente em doze entrevistas em profundidade com examinadores de patentes espanhóis. As informações analisadas sugerem situações que podem afetar a forma como a tese do contrato explica: (1) a difusão de informações e (2) os valores epistêmicos que conduzem à inovação tecnológica.

Palavras-chave: valores epistêmicos, inovação, contrato social, bancos de dados, incentivos; JEL O31, O34, K39

INTRODUCTION

The *"social contract of patents"* or *quid pro quo* is one of the most common arguments called upon when both explaining and justifying patents. According to this argument, patents are exclusive rights that inventors obtain from the state in exchange for publishing certain technological and commercial information. One of the main aims of this bargain is to stimulate technological innovation through that disclosure (Nordhaus 1969; Eisenberg 1989, 1022-1025; Abramovitz 1989, 39-40; Gallini and Scotchmer 2002).

The objective of this article is to defend that the social contract of patents presupposes some epistemic values. Traditionally, values are called epistemic because they are followed in the quest for new knowledge (McMullin 1982; Silvast 2020). To avoid disputes over the nature of knowledge as true belief and to better adapt to the interest of this article, I will maintain a less restricted view by following this other definition: "an epistemic value is one which will, if pursued, help towards the attainment of at least one of the epistemic goals of science or engineering" (Diekmann and Peterson 2013, 211); in the case of the *quid pro quo* argument, the primary goal is innovation[2].

Although patents are territorial rights, a common thread among national legislations is that patentability requirements are related to the quality of inventions, and that other factors do not matter when granting or denying patents. The reason why quality examiners are required is not only that the bargain commits the State to avoid inequalities or arbitrariness, but also because poor-quality inventions do not generate innovations. Similarly, it is assumed that the disclosure of technological information in databases, if it truly aims to contribute to the creation of new technologies or inventions, must be visible and accessible. This is because, in the absence of a way to segregate information with search engines, disclosure will not achieve its goal of promoting innovation.

In other words, the thesis I will defend is that, under the rationale of the social contract theory of patents, not being guided by certain epistemic values (i.e., the knowledge of the examiners or the visibility

[2] The fact that patents actually enable technological innovation is not a matter of discussion in this article, as this will be assumed to be the rationale of the *quid pro quo* theory. For the purpose of this article, "innovation" will be defined, in accordance with the *Oslo Manual*, as: "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD 2005: 146).

of information) can contribute to a scenario in which the disclosure of inventions does not enable further innovations. Since both granted patents and rejected applications are usually published, the idea of epistemic value is a useful tool to address situations in which States do publish technological information, but in a way that does not promote innovation. That is to say, inventions are not accessible because they are not available in databases, or because quality inventions are rejected due to an examiner's gender biases, etc.

In this paper, I describe two types of problems that affect the social contract model and the epistemic values it presupposes. First, there is the problem related to databases, in which I explain how the visibility and accessibility of the information disclosed is affected by issues in databases and patent search engines. The second is a problem related to incentives, in which I analyze how patent offices may not be encouraging searches or the review and training of examiners.

To my knowledge, this paper is the first to examine the epistemic role of the Office and the examiners within the social contract framework. Previous research mainly focuses on the breach of contract by patent applicants. In this regard, it is often said that many inventors seek to hide their applications to simultaneously obtain the economic benefits of exclusivity and commercial secrecy (cf. Boldrin and Levine 2013; Sáiz and Amengual 2018, 975).

METHODOLOGY

In order to present these two cases, I mainly rely on information gathered from informal conversations, the analysis of internal documents, information obtained at conferences and meetings, and twelve in-depth interviews the author held with examiners from the Spanish Patent and Trademark Office (OEPM).

The reason an interview was chosen as the method to obtain information is not only because there are many limitations in quantitative analysis (cf. Griliches 1990), but also because interviews allow for the collection of narrative versions of individual experiences, the relevance of which for this article will be justified in the following pages. Interviews with the examiners were conducted face-to-face in October 2021, with prior informed consent, and were subsequently transcribed. The study group was selected based on the criteria of gender equality (seven women and five men), examiner work experience ranging from two to twenty-five years, and representation of all technological areas within the Office (general mechanics, applied

mechanics, electrical, and chemical—the four areas into which they currently divide their staff).

This paper is structured in two sections. In these two chapters, I develop my own proposal. I will follow a similar structure: first, I present contributions from economists and social scientists on the topic; then, I relate this information to the social contract theory of patents and the epistemic values that this theory presupposes; and finally, I add relevant information from the interviews and document analysis.

DATABASES AND SOCIAL CONTRACT THEORY

Each patent document contains a range of commercial and technical data, but only when combined does it allow us to obtain an overview of the state of the art, the most cutting-edge lines of research, or economic competitiveness. Without the use of powerful software capable of categorizing all this information, the data end up mixing together, like a puzzle.

Under social contract theory, the State is ultimately responsible for making this information public, not only in each patent document but also when it is later added to databases, where it can be analyzed by universities and industries. If a State fails to transfer this information to databases and search engines, values necessary for the process of innovation, such as visibility and accessibility of the information, can be affected.

My argument is simple: since the social contract requires making inventions public with the final goal of stimulating innovation, if this information is opaque, difficult to access, poorly segmented, or poorly translated, the State's commitment in the bargain could be contravened. Below, I give examples of this, first by pointing out translation problems, and then by reviewing certain difficulties in accessing patent search engines. I will then conclude by highlighting the problem of information overload.

One of the most recurrent complaints mentioned in the interviews, when the examiners were asked about the quality of the databases, is the number of errors found in translations. Although patents still have a strong national character, as they are rights that Offices protect within a territory, the search conducted by examiners is based on the international state of the art, because an invention is considered novel when it has not been used or published in any other part of the world. Hence, examiners use many translations, most often into English.

Although it remains underexplored, research on translation errors in technical or legal texts includes some precedents for patents. Huby and Schenk (1994) have written about the problems translators face when transcribing different scripts, emphasizing business information. For example, they found that the name of the large pharmaceutical company Takeda had been translated in many documents as Takeda Pharmaceutical and in others as Takeda Chemical (1994, 156)[3]. More recently, machine translation errors resulting from the translation of Asian languages into English have been detected, such as in expressions, nouns translated as verbs, and even words that were translated multiple times (cf. Wang 2009; Ying et al. 2021). However, regarding automatic translation, there are differing perspectives. Larroyed (2018) obtained a sample of 100 patents translated by machines that were then subjected to personal review. The author found that a large part of the information (80 percent) between Western languages had been disclosed, although that percentage dropped ten points when translated from Chinese to English.

Information gathered from the interviews regarding translation errors highlights the difficulty in searching for information due to translation problems, as well as when attempting to read the complete document or part of it once it appears in the search engine. In any case, Chinese patents frequently appear in conversations with examiners as being the ones that are most problematic, in accordance with the literature.

In addition to the most common technical errors, regarding the translation of words, double meanings, syntax, etc., some of which were highlighted by the examiners interviewed, new problems concerning patent information were also detected. For example, issues related to the way in which machine translation affects the appearance and interface of the search. One of the interviewees, who had experience preparing reports on the state of the art (in Spanish, *IETs*), commented that in her reports she always specifies that the information is cited "according to machine translation" to avoid conflicts with applicants. Another examiner added: "There are difficulties in making the reports because citing the paragraphs of Asian patents is difficult due to the structure of these languages" (Interview6). Some interviewees also mentioned that the standards in classifications made

[3] Problems of this type can even be caused by minor typographical errors like these: "US patent titles use gold club(s) turn up 26 times (and 9094 times as golf club(s)). On QWERTY keyboards the *d* and *f* are next to each other, so they can easily be transposed" (van Dulken 2014, 39).

their job much easier, because "working with the databases that the Chinese and Japanese have is very complicated" (Interview9).

Despite the fact that abstracts in patents usually include a version provided by a human translator, the previously mentioned difficulty is becoming more problematic as full-text searches are becoming increasingly common, combined with the fact that the number of patent applications is growing globally (this issue will be discussed later in the section on information overload). By contrast, if the search is carried out using the title of a document, examiners have found that some databases, like Patsnap, do not translate it. In addition, the political dispute at the European Patent Office (hereinafter, EPO) concerning official languages has caused Spanish-speaking examiners to learn French and German, in addition to English. By doing so, they have a greater chance of working as professionals for the EPO, and it also seems necessary when it comes to understanding the documents that Franco-German countries add to the system with no translation, under the pretext that they are also written in an official language.

With respect to more general problems, not just those related to translation, other challenges were also detected. One of the main difficulties was that, although the databases that patent examiners use to obtain information are the same ones used by the general public, there is a significant difference in *accessibility* via the search engines. The search engines available to examiners are more powerful, as all the interviewees admitted when asked about this issue. The reason is not that these engines are reserved by the State for their use only, but that, like many translation programs, they require payment, which can be quite costly. In fact, it was frequently mentioned in the conversations that many of the search engines are products of the same academic publishers that usually publish scientific articles. *Mutatis mutandis*, access to databases that allow searches of non-patent literature is also done by subscription. Thus, the perception that "in search engines open to the public everything appears" (Interview8) or that "except for Google Patents, the other free ones do not seem very intuitive" (Interview2) is understandable.

Unfortunately, even searching through paid platforms is not trouble-free, as illustrated by the searches carried out by chemists. In this sector, searches are not only focused on full texts, as in other areas, but can also involve searching for chemical structures. Usually, this data is obtained by mining texts and images. As with so many translations, it is not hard to imagine that the transfer of such

information may present certain deficiencies[4]. This results in overly broad searches, where the examiner often has to perform some of the screening manually. Furthermore, text mining processes seem to extract information primarily from the main body of the text, but not from figures and other annexes, which are especially relevant in chemistry.

Another problem that examiners commented on is related to the *visibility* of information and its connection with time. Many new documents become visible, not only for applicants but also for examiners, in search engines only once the technology has been consolidated. In fact, those conducting the searches sometimes make use of a Google Site Search[5]. The idea is that the newest technologies, those with the fewest references, tend to appear at a later stage. Similarly, delays have been detected in the updating of commercial and legal data, such as whether the applicant has paid fees or whether the version that appears in the search engine is the latest or has even become outdated (cf. Carrara and Russo 2017). Sometimes examiners have to visit national office sites to check this information. This fact in itself represents a criticism of the way in which contract theory explains the transition from disclosure to innovation. Furthermore, some data are added to databases much later than the already controversial 18-month period that most countries stipulate for the publication of documents. Examiners are also required to wait even longer to access documents obtained through search engines, since these mainly show already mature technologies.

One final drawback for databases in terms of their visibility is not so much "the structure, or the tools... but rather the fact that right now China is turning over an enormous number of patents" (Interview7). This problem of information overload (not only Chinese, of course) has also been called "infoxication", and it is an increasingly studied phenomenon in many areas. Essentially, the problem relies on a cognitive paradox: having a large amount of information also reduces our ability to screen or discern that information. As patents are instruments that make certain information public, it seems feasible to think that the mass production of technologies and unbridled

[4] The one related to the errors detecting families of patents has already been pointed out by Ohms (2021). A more exhaustive comparison of the differences between databases or search engines in general, not just those concerning translations, can be found in the blog "Intellogist" (cf. Whitman 2011).

[5] Google usually complements the review, when looking in news, forum, papers, etc.

innovation affect the way in which these inventions become *visible* on the Internet or in databases. To get an idea, it is enough to look at the pace of global patent generation, which between 2011 and 2020 has grown by almost 52%, from 2,158,000 filed applications to 3,276,700 (WIPO 2021, 12).

The pioneering study by Jeffrey M. Kuhn (2011) carefully analyzes this overload in the United States Patent and Trademark Office (USPTO). One of the most interesting results has to do with American examiners, who seem to be receiving more prior art search requests than they can handle. This implies at least two facts in relation to the *quid pro quo* argument. The first is that the examiners do not have the necessary means to deal with the study of existing technologies and, therefore, find it difficult to determine the novelty of inventions, something that affects the quality of the intellectual property system. The second fact is that it represents, for this reason, one of the many symptoms observed from the perspective of other users of the system. Thus, if even examiners cannot manage such large amounts of information, this would be even more difficult for those less knowledgeable or those who do not have access to the appropriate IT tools. Despite this, the USPTO is one of the offices that releases more data and has more databases, so we infer that this problem of "infoxication" is worse in patent systems with fewer economic resources or with outdated information technologies.

For all these reasons, Baruffaldi and Simeth (2020) suggest, among the most urgent improvements for patent systems, this policy recommendation: to make "continuous investments in databases and powerful screening tools with low access costs [that] could further increase the *visibility* of information" (italics added, p. 16).

Nonetheless, perhaps not all of the above is open to criticism. As one examiner pointed out, significant progress has been made since the years when people had to pay to get the document from the library[6], making it "impossible to see what disclosure was" (Interview11), to the current situation of apparent unbridled diffusion. However, the words of that same examiner, with more than twenty years of experience in the Office, surely summarize better than any other the deficiencies that continue to exist: "all this still being business, and that there exist

[6] In an Order dated September 22, 1995, the price in pesetas was stipulated "for each annual subscription to biweekly printed information on new published files". It can be consulted in the "Boletín Oficial del Estado", with the reference A-1995-21752.

payment engines that allow accessing the state of the art means that there are still limitations" (Interview11).

In sum, there are accessibility problems in patent systems that affect the social contract from the moment beneficiaries of this disclosure of information must pay to search for, order, or screen the inventions. The same can be said for machine translation programs, which are not only far from optimal, but also often come with costs. In addition, the possible difficulties in obtaining information in search engines—partly due to translation errors—and the growing worldwide number of patents seem to affect the value of information visibility, which is essential for understanding the transition from the disclosure of inventions to future innovation, a concept at the core of the social contract theory of patents[7].

INCENTIVES

Prima facie, we may suppose the relationship between examiner incentives and disclosure is that examiners work better with the right incentives. This means that, if offices do not initiate the necessary training, search, or assessment of examiners, the transition from the disclosure of inventions to innovation is called into question.

Although there is not much research on this topic, a recent empirical study conducted at the USPTO confirms that the incentive programs offered by different offices to their employees can benefit or harm the system depending on the regime in which those incentives are set (see Langinier and Marcoul 2020).

If so, this counterexample would seem to have more pronounced national relevance than the previous case, which included criticisms that virtually apply to many countries, given the internationalization of databases. According to Langinier and Marcoul (2020), the incentives that would most negatively affect the behavior of examiners are those that offer bonuses for patents granted. The idea is that these bonuses would promote a culture of quantity over quality. Hence, they advocate an incentive scheme for rejected patents, which would at least make examiners analyze applications further (Langinier and Marcoul 2020, 17). Without such incentives, the motivation that might influence US examiners to avoid granting more patents than they should (e.g., on obvious inventions) is the fear of ultimately

[7] All this is in line with what Peter Drahos maintains: "it is the diffusion of invention information of social value that matters, not the legal ritual of disclosure" (2010: 32).

being sent to court and losing their professional reputation (*ibid.*). The authors of this study call this prevention an "implicit incentive".

In research concerning incentives, the interview approach is highly relevant, not only because it is the first time the incentives of examiners in Spain are scrutinized (and, I am afraid, in all of Europe), which allows the interview to propose hypotheses and inspire new questions, but also because the examiners know better than anyone else the motivation behind their work and the internal policies of the Office.

Conducting the interviews, I was able to find that in Spain there are no incentives for accepted or rejected patents, beyond a minimum level of productivity. Concerning financial incentives, the existing patent law (*Ley 24/2015, de Patentes*) was set out to regulate this "professional career," but examiners are still waiting for this to happen.

Some examiners commented in their interviews that it is better not to introduce these incentives for granted or denied patents, because examiners "have been fleeing from competition" (Interview6), which is more a feature of business rationale, and that being an official embodies a different way of seeing work, in line with previous research. Another examiner, who had previously worked in teaching, believed that this lack of incentives in the Office was not as important as the salary (close to a Spanish high school teacher, around 2000€ per month), while "in the rest of the world the situation is different: examiners are better paid" (Interview9). That is why at the OEPM "many people leave or go to the EPO" (Interview8), and there were even those who suggested "that [this is why] the places in the civil servant examinations remain empty" (Interview6). These complaints made by the examiners about their salary are not limited to the interviewees but are widespread and long-standing, as evidenced by the OEPM's internal magazine (OEPM 2018, 2021).

Many of the interviewees suggested during the conversations another disincentive that seems to have been overlooked but remains relevant to the social contract of patents. This disincentive is not so much related to the assessment of patent applications but rather to language courses and refresher courses. Examiners evaluate novelty, and as such, are required to have in-depth knowledge about extremely cutting-edge sectors of technology; however, sometimes their training is outdated. Many refresher courses are offered at the Office, and although they are freely available, they are not encouraged. One examiner mentioned that these courses are not only discouraged but that "many bosses are more interested in us getting the job done

than in the courses" (Interview10), as they usually take place during working hours. Furthermore, there are language courses offered to the rest of the Spanish Administration: "So an administrative officer, who doesn't have to know English, is not the same as us... even French and German are good for us." This can be related to the situation described earlier, regarding the difficulties with official languages at the EPO.

Two other examiners stressed that the lack of knowledge at the OEPM is not so much related to updating technical knowledge or language proficiency, but rather to insufficient knowledge about the legal system. A few years ago, there was even a "social action plan" that helped examiners finance, for example, these complementary university studies, and even "medical and transportation expenses... something that has had an impact on my work" (Interview10), but government cuts in the early 2010s did away with this support. Nevertheless, there are still certain paid activities, such as talks given at universities, within the framework of the Office's plan to increase the culture of intellectual property in Spain[8].

Some interviewees thought that in the context of a medium-sized office, such as the Spanish one, with barely 130 examiners and where the degree of specialization is not as high as in other offices, such as the EPO, taking these courses was necessary. This is even more so when the absence of incentives may result in "many examiners who like to come at 8:00 a.m., do their four files, do their work, never work shifts, and then leave" (Interview3) [9].

Regarding the implicit incentive proposed by Langinier and Marcoul (2020) (remember: the concern that a patent invalidity in court damages professional reputation), none of the interviewees said they were aware of whose patent was rejected by the court, since apparently the communication between the Office and the holders does not go beyond the granting, except for the fees. It is therefore necessary to wait, in principle, for a judge to call the examiner as an expert, but this is not something that usually happens, since the invalidation of patents in the Spanish jurisdiction, unlike the American context analyzed by Langinier and Marcoul, is already improbable *per se*.

[8] This will can be seen in most recent "Strategic Plans" and "Activity Reports" of the Office (see e.g. OEPM 2013, 6).

[9] It should also be taken into account that the number of reports examiners produce is inversely proportional to work experience (Lemley and Sampat 2012), which seems to be another reason in itself to encourage refresher courses, especially in the case of less motivated personnel or those who finished their university education long ago.

In any case, it seems that examiners, like in any job, judge the reputation of their peers by their daily performance. When all of the interviewees were asked about the characteristics an examiner must have to be considered a respected professional, most of them answered that they must be aware of what it means to be a civil servant, an official. This opinion is in line with upholding confidence in the institution which, beyond incentives, suggests that everything seems to be resolved by this sense of public service.

In addition to incentives for training and harmonization, more general proposals have been suggested, such as implementing a random internal review of the decisions made by examiners and conditioning bonus payments on the outcome of this review (Schuett 2013). However, this is a topic to be addressed in future discussions.

Finally, it is appropriate to mention here a relationship between incentives and gender equality. Hegde and Raj (2019) found that American female examiners spend more time checking applications than their male counterparts and, as a result, end up examining more documents. Given that incentives at the American Office are awarded based on quantity over quality and thoroughness, the internal promotion of men and women is different and often unequal. As far as it has been possible to ascertain, data on the number of male and female examiners is not publicly available in Spain or in many other countries. Nevertheless, this situation seems relevant not only in relation to gender studies themselves, but also with regard to the analysis of problems associated with incentives in general.

Overall, under the rationale of the social contract, and thus also considering patent codes, it could be concluded that it is the responsibility of the State to (1) train and improve the competence of examiners; (2) monitor, for example through harmonization plans among the different offices, the granting of patents to applications that do not meet all the requirements, or to obvious inventions; and (3) offer general incentives that lead to the well-being and adequate performance of the examiners (both through laws and via internal protocols, as highlighted before). The proper functioning of a system based on innovation depends on all of the above (cf. Nelson 1989). Thus, if the assessment of the examiners and their training is not encouraged, as the facts presented here seem to suggest, the potential innovation that could be achieved through the disclosure of quality inventions, optimally examined, is called into question.

CONCLUSIONS

The cases presented here describe problems that could be explained much more extensively and in greater depth. Consider this research as a tentative note on the possible challenges that the *quid pro quo* thesis may face on several fronts, especially from the perspective of qualitative research. In each case, limits, challenges, or open lines of research have been presented.

The social contract of patents is a theory that, as an explanation of how patent systems operate, presents certain challenges. In this article, a brief annotation of some of these challenges has been made, and they have been related to certain empirical studies. This also includes the perception that some Spanish patent examiners have about, first of all, the visibility and accessibility of patents; and second, the incentives that can influence their evaluation and training.

It has been shown that epistemic values are relevant to understanding the social contract of patents, although they are often not made explicit by those who explain patents using this theory. Likewise, two types of problems that may affect the social contract argument have been discussed. However, a conclusion has not been drawn about the extent of these problems, beyond the fact that they exist in each of the patent systems, as this is a limitation that cannot be surpassed by qualitative research or philosophical discussion. Nevertheless, it can legitimately be concluded that the information analyzed suggests situations that may indeed problematize the way in which the contract thesis explains: (1) the dissemination of information and (2) the epistemic values that lead to innovation.

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