Green Patents: Evolution, Results and Challenges of Brazilian Experience

Author: Ana Graziele Lourenço Toledo

Filiation: Universidade Federal de Mato Grosso do Sul (UFMS)

Summary

Since 2012 Brazil has an acceleration program in the examination of applications for patents from green technologies called the Green Patents Program. The objective of the program is to reduce the *backlog* of analysis by enabling agility in obtaining patents, stimulating the production of sustainable innovations and, in the long term, serving as a subsidy to Brazilian inventors who claim international patents. The analysis of the data provided by the National Institute of Intellectual Property shows that the time of analysis has decreased throughout the program, but other issues seem to arise in the research and development of green technologies. Thus, this study examines the development, the results and challenges of the Brazilian experience regarding the intellectual property of sustainable innovations and features points that dev and m being discussed for optimization of current policy.

Key words: green patents, sustainable innovation, Brazilian patents.

1. Introduction

Concern about competitiveness is inherent in the life of organizations. Within the business strategy field, traditional approaches are used to competitive frameworks based on theories focused on the market and its structure. However, the understanding that other elements would influence competitive dynamics is not new in strategic management studies. Hart (1995) suggests that at some point business would be dependent on natural resources and thus competitive advantages would be rooted in capabilities that would facilitate environmentally sustainable economic activity. Porter and Linde (1995) identify the increased demand for green products and how this feature affects the premium price of innovations, demonstrating the increasing value products market with energy efficiency and low emission of pollutants.

Sustainable innovations - also called eco innovations - consist in the production, assimilation or exploitation of a product, process, service or technology which reduces environmental risk, pollution and other negative impacts of resource use, such as energy (KEMP and PONTOGLIO, 2007). They are innovations with the potential to become environmental and strategically unique, increasing the competitiveness of those who have them.

It is common understanding among developed countries that sustainable growth refers to economic growth from the efficient use of natural resources (BALKYTE and TVARONAVICIENE, 2010). But adopting sustainability as a competitive orientation breaks with traditional approaches that, despite theoretically recognize the scarcity, use the resources as if they were inexhaustible. It is, therefore, to adopt

a new consumption base, to develop new technologies and to practice reengineering to build a business model that can be characterized as an extreme transition (TEECE, 2018).

This new model is based on sustainable innovation and entrepreneurship that promotes m income growth and better quality of life for society. However, it is observed that the main determinants of sustainable innovation refer to compliance with regulatory issues more than the targeted strategy for sustainable goals (BOSSLE, BARCELLOS, VIEIRA and SAUVÉE, 2016).

In the case of sustainable innovations, green patents are understood as a proxy *for* this type of innovation (PETRUZELLI et al, 2011); hence the relation of the eco-innovations with the programs of acceleration of obtaining of patents implemented in some countries and that in Brazil became known as Green Patents Program (PPV) .

This study aims to analyze to what extent the Brazilian PPV has contributed to the stimulus in the development of green technologies in the country. In this sense, it is necessary to analyze the results obtained by the program throughout its implementation, besides discussing the challenges that still must be overcome in order to make the gains more effective.

The question orientation of the study is: what are the results of the Brazilian experience of accelerating green patent examination since the implementation of the program? Guided by this reflection, the study discusses the evolution of program goals and the challenges that are posed to minimize the times of analysis and maximizing the interest of individual or organizational inventors in developing green technologies.

2 Theoretical Framework

2. 1 Sustainable Innovation

Integrated to the idea of competitiveness based on environmental sustainability, is the discussion about sources of competitive advantage that emerge from the efficient use of natural resources and the reduction of environmental impacts. The creation of the new competitive differentials finds in the process of innovation the instrument to be feasible.

The competitive context is marked by drastic reductions in environmental impacts, induction by environmental regulations, transition / adaptation processes from traditional technologies to clean technologies, the need to develop organizational practices that are favorable to sustainability, and the importance of innovation for all types company. These are some of the reasons that motivate the process of environmental innovation (RENNINGS, 2000).

The product of this process is sustainable innovation reduces the effect is going environmental risk, pollution and other negative impacts of resource use natural - including energy use - compared to the alternative products (KEMP and PONTOGLIO, 2007).

Three are the types of sustainable innovation: process innovation, which includes production methods and eco-efficiency in the management of natural resources, among others; which covers eco-design actions and sustainable technologies; and organizational, which develops methodologies of clean production and sustainable consumption (CHENG and SHIU , 2012; HORBACH, 2008, TRIGUERO , 2013).

The types differ in technological significance, cost and benefits for the company and impact on the environment. Thus, different *driver* drivers of sustainable innovation are also perceived (DEMIREL and KESIDOU, 2012, CHENG and SHIU, 2012).

Whereas the theoretical foundations more used in research on sustainable innovation are the resource-based view and the institutional theory, the effect of regulations, market factors, cost and size of the firm are also the most frequent determinants in the scientific literature on the subject. It is observed also that depending on inovation stage, there is the influence of different determinants: risk and economic uncertainty the, efficiency/productivity act in the adoption stage/ dissemination; collaboration with external partners is most striking at the stage of development/innovation (GHISETTI, MARZUCCHI and MONTRESOR, 2015; PENG and LIU, 2016; HOJNIK and RUZZIER, 2016; DEL RIO, CARRILO-HERMOSILLA and KONNOLA, 2018; KIEFER, GONZÁLEZ and CARRILO-HERMOSILLA , 2018).

As companies generate more value, the performance of the country where they are located is also enhanced (KEMP and HORBACH, 2007, BRAZIL, ABREU, FILHO and LEOCÁDIO, 2016, CHENG, YANG and SHEU, 2014). However, the recognition of eco innovations as a competitive differential is still slow due to the traditional models of competitiveness that have been elaborated and disseminated in managerial practice, but also in the academic literature. This situation exemplifies in the *framework* of competitiveness of Michael Porter of nations in which, originally, the author has not entered sustainability as one of the structured elements of the competitive dynamics of the countries. Later, it is admitted that competitiveness must consider the relationship with the environment (PORTER and LIND, 1995).

It is important to consider that both *drivers* and the effects of sustainable innovation also differ from country to country given the set of public policies that encourage innovation as well as the conditions to do business. Emerging countries such as Brazil rely on political

instability, legal uncertainty and economic policy as elements that affect the country's competitive differentials, diverting potential investments and affecting the dynamics of innovation (BALKYTE and TVARONAVICIENE, 2010).

Public policies show the alignment of governments with the concept of an innovative ecosystem that considers an interconnected network of public and private organizations to foster innovation through interaction between suppliers and demanders for innovation (COUNCIL OF COMPETITIVENESS, 2004). In this sense, there is a need to develop more effective government instruments to promote eco - innovation to the extent that s companies are responsible for creating and sustaining competitive advantage, but need government support (HOJNIK and RUZZIER, 2016; KIEFER, GONZALEZ and CARRILO-H ERMOSILLA , 2018). In this line, the Green Patents Program appears.

2. 2 Green Patents in Brazil

The stimulus to sustainable innovation is more related to instruments dedicated to market externalities - pollutant emission rates, patent certificates, environmental regulations, policies to encourage innovation, knowledge networks / open innovation - than to non-market instruments - emission limits of pollutants, public investment in renewable energy research, eg. Thus, it develops the discussion about the importance of having instruments of intellectual property for the registration of products imbued with green technology (FABRIZI, GUARIN and MELICIANI, 2018).

The Summit Rio 1992 presents itself as the event that initiated the discussion on green technologies, but in 2008, from a request from the United Nations to create technological

development of mechanisms that do not incur environmental damage, is that countries like UK, Australia, South Korea, Japan, United States, Israel, Canada, China and Brazil initiated moves to encourage research on green technologies. These incentives reveal themselves as way that s signatories to environmental agreements found to assist in compliance of commitments (REIS, OSAWA, and MOREIRA; MARTINEZ SANTOS, 2013).

The discussion on green patents deals with the ownership of intellectual property products that are recognized by stakeholders. Patents are titles that grant the possessor temporary ownership of an invention or utility model under the condition of full disclosure of materials, processes, steps and other features. This is a temporary competitive advantage, as it constitutes monopoly to the inventor for a certain period, but then becomes easily imitable due to the publicity of the information provided by the inventor when the patent application record (NITTA, 2005B; 2007; REIS, OSAWA, MARTINEZ MOREIRA and SANTOS, 2013).

Patents protect the inventor against the abuse of intellectual property rights, but in developing countries this protection is not effective. Many of these countries are not signatories to international intellectual property agreements. The explanation of this behavior is perhaps related to the fact that these countries have as competitive advantage the low costs of production mainly related to labor and, in this sense, there is no stimulus for the development of innovation nor the right of property constitutes as a strategic concern of companies (HELPMANN, 1992) .

The social pressure for corporate environmental responsibility induces the development of green technologies involving clean production, eco design and development of

sustainable materials. In this sense, the right to property should suit to meet a new demand needs of inventors (NITTA, 2005; MAXWELL and VAN DER VORST, 2003).

The legal framework guiding green patents in Brazil is given by Resolution No. 175 of November 5, 2016 which governs the priority examination of green patent applications currently in force. The charter obtained by the examination of applications submitted to the National Institute of Intellectual Property - INPI - has national validity and is expected to be obtained within 2 years after registration of the application. This solution is based on the Laws 9279 of May 18, 1996 - Intellectual property law - and 5648 of December 11, 1970 - creating the INPI - and Resolutions No. 283/2012 and 83/2013 of the PPV.

In Brazil the green patents were initially designed for a PPV pilot program in 2012. The PPV enables the priority examination of applications that address sustainable innovations characteristics, that is, to develop technologies including alternative energy, transportation, and energy conservation, waste management and sustainable agriculture. The objective is to use policies that encourage investment in research and development of green technologies as well as a decrease in the *backlog* of patent applications (INPI, 2019).

Applications can be sent physically or digitally, and each request receives a definitive numbering that must be mentioned throughout the analysis process. Applications previously referred to the program and that have characteristics of green technologies can be re-routed as green patents. In this case, a review of the adequacy of the conditions to participate in the program and payment of fees such as the priority examination of green patents, advance publication, examination of invention and product analysis using genetic resources or associated traditional knowledge are required (INPI, 2016).

This pilot program was developed in three different periods - 2012, 2013 and 2015 - called phases. At the end of the third stage were about 337 requests. The first patent was granted to green "Vorax" a waste of technology that reduces the environmental impact and generates electricity.

The analysis of a green patent is the fast track system in which the request is sent, received and passes through an analysis requirements. It n then the patentability of the application is reviewed and, if accepted, issued a charter which ensures the property intellectual and commercial exploitation rights for 15 or 20 years according to the type of innovation - invention or utility model, respectively.

Pinsky and Kruglianskas (2014) identified the main barriers faced by eco-innovations in Brazil: low market demand, lack of government subsidies to ensure product competitiveness, and lack of public policies that encourage sustainable innovations were the elements cited by companies in the study. Note that at the time of publication of the work, was in effect the PPV which is constituted as a public policy to encourage eco - innovation, reinforcing the perception of ignorance about the green patents.

3 Analysis and Discussion of Results

The study collected data in the Industrial Property Magazine - RPI - which is the publication of INPI, which discloses in a simplified way the activities of the agency in the form of acts, orders and decisions. The first edition of the publication is April 4, 1972 and currently RPI has weekly numbers.

The survey covered the publications made in the period between 02/17/2012 and 12/31/2018, totaling 3 50 numbers. In the face of all the content of

the magazine, the search for acts related to green patents that had the dispatch code 27 was systematized. The number and date of the journal, the number and date of the patent application, the IPC code, the inventor and the solicitor of the application, as well as the status of each request forwarded, are identified. Subsequently, pePI - Intellectual Property Research - was consulted to complete information related to the depositor.

Thus, there are 661 applications for green patents, 548 concessions, 131 applications denied, 10 canceled publications, 1 republished, 3 rectified and 34 events that accrued different application situations were submitted (eg applications that were granted and subsequently canceled).

The situation of green patent application is the dad on the basis of Resolutions Nº 283 the encoding it as: 27.1 Notification to participate in the Patent Green Program; 27.2 Application Granted, which deals with the request apt to participate in the program; 27.3 Request Denied, which does not meet program requirements; 27.4 Surplus Request, that is, the request that exceeds the limit of requests granted by the program; 27.5 Republishing, appropriate situation when the publication is made with inaccuracies , but without prejudice of identification; 27.6 Rectification, when requests have inaccuracies m which prevents the identification requiring rectification without change in the date of original publication; 27.7 Publication Annulled, which occurs when a green patent is improperly granted and is therefore annulled.

The figure 1 shows the evolution of applications during the investigation period. The number of previous applications (164 requests in total) to the year 2012 refers to requests first forwarded as common patents and which, upon the assumption of the program, requested re-routing as green patents. It is noticed that although the number of applications has

increased, there are a fall in applications from 2013 onwards. However, considering Table 1, the decrease in requests occurred uniformly among the ten countries with the highest number of green patents - except in South Korea and Sweden.

Figure 1

Even with less analysis time over time as shown in figure 2, the decrease in the number of requests may be related to other public policies and regulations as well as the establishment of private agreements and financing for sustainable development, acting as alternatives to the maximization of environmental-based competitiveness. Otherwise, although it was created to stimulate echoes innovations, overall green patent programs are used to ensure the right to innovations of high impact and complexity; low impact, tend not to be registered and thus subject to competitive rules (NESTA, 2014).

Other causes for declining applications may be related to the lack of knowledge of PPV - potentially green patents may be referred to as common patents if depositors do not know the PPV, making requests that could be expedited, are not - and to the greater interest of inventors to publish their findings in specialized *journals* of which it refers them to the patent register , considering the delay in the publicity of the discovery to when comparing these two vehicles - *journals* and letter- patent (SCHIERMEIER , 2010).

Figure 2

Figure 2 shows the average time for the analysis of patent applications during the period studied. It is observed that this time decreased approximately 6 times considering the period between 2004 and 2018: before the implementation of the program, the average time of analysis of patent applications was approximately 2668 days; after the implementation of the program, green patent analysis on average takes 443 days.

It is noteworthy that PPV began operating in 2012, however, as required by law, patent applications made before that date, but having characteristics that fit them in Resolution 175, could request the review in the category of Green Patents. Thus, we have, for example, applications that were originally forwarded to INPI as a common patent in 2004 but requested a review in 2014 and in the same year they had the green patent application granted.

In relation to green patent depositors, it is noted that companies are still the ones that most submit requests for analysis, according to Table 1. The number of registered applications differs from the sum of other patent situations, since there are requests that go through more than one situation, that is, after being registered they can be granted and republished through observation of some inconsistency in the publication. Thus, in Table 1 this application is counted as "granted" and as "republished", for example.

Table 1

Of requests made through an intermediate in general consultancies providing business services and guidance on property rights, 82% has given green patent; however, it cannot be said that the use of a consultancy ensures that the applications are granted since of the total of requests denied, 91.6% used the consultancy service .

The development of green technologies depends on the green knowledge the inventor possesses. So, note that this feature is not concentrated in large companies: individual inventors also show has this knowledge possibly obtained through research networks, databases made possible by open innovation models or innovative ecosystem (STUCKI and WOERTER, 2012).

The presence of several multinational companies that hire local consultancies to send the requests is observed: there were 188 requests from foreign companies and all of them used the consulting service. Foreign companies accounted for about 28% of green patent applications in the period under review; this result is greater than previous studies that pointed to a lower representation of green patents originating from multinationals (NOIAILLT and RYFISCH, 2015). Rigor in environmental regulation, market size of green technologies and green research and development intensity in the host country are pointed out as the determinants of green patents originated in multinational companies and, in this sense, the increase in these events may represent an increase in *backlog* (SAMAD and MANZOOR,2015, NESTA 2014).

It is understood that the order of analysis time is related to s internal matters of INPI as steps of the procedures, number of forwarded requests and number of employees assigned to the specific analysis of green patents. According to the agency (2018), 210 new employees were hired, and R $ 40 million invested in information technology equipment for the analysis. Positive results from these actions are noted in the 2018 Activities Report, however, with the expectation that with the continuity of investments in labor, infrastructure and information technology, the growth rate of the *backlog* but not the reduction of it.

It is understood that as the patent submission flow is continuous, will always be ordered to be analyzed. However, by referring to the requests in Pepi, note that requests are denied due to events such as: a) are suitable for PPV - the requester requested a green patent, but are you able to participate after the program; b) non-compliance with deadlines for lodging appeals - did not file an appeal within the he lost the possibility of having recourse to the order initially given; c) non-delivery of documents necessary to compose the patent application process . Such events outside the INPI also affect the deadlines for the analysis and granting of green patents.

These situations refer to the applicant's knowledge of the PPV, to the knowledge of the system of submissions of applications in the INPI , but also to the internal structure of the company or the inventor who submits the request - and larger companies tend to have greater knowledge on intellectual property Quality and smaller companies or inventors - individual. One way to minimize or solve this problem is to use specialized consulting services. Matias-Pereira (2011) reported in their study that, although consider the important and strategic value, the right of property is unknown for much of the Brazilian business community. Although seek foreign market, the entrepreneur will not be attentive to intellectual property issues required abroad. In general, companies do not have departments, that care exclusively for intellectual property.

Is this sense, hypothesis tests were carried to check possible differences in analysis time / grant / denial of green patent and considering:

- us or not use from a specialized consultancy to forward the request;
- the routing be done by individuals or companies;
- and inquiries made by an individual or legal entity using or not a specialized consultancy.

The results of the tests are shown in Table 2. To perform the analyzes, the Stata *software* was used, initially performing the t test uni and two-tailed once it was assumed that the variances were different; the results were compared with the unicaudal F test using when the variances are unknown but assumed to be different. We tested the effects on the time of analysis / concession / denial of green patents considering 7 treatments that are:

- (T1): patents granted;
- (T2): patents denied;
- (T3): patents granted and denied;
- (T4): patents granted to legal entities;
- (T5): patents denied to legal entity;
- (T6): patents granted to individuals;
- (T7): patents denied to individuals.

Table 2

According to the results expressed in Table 2, the null hypotheses of difference between the variances in T2, T6 and T7 are rejected. In this way, statistically significant differences between patent applications that used, or not specialized consultants are observed in the times of analysis / concession / denial of green patents granted, patents granted in addition to denied patents, patents granted to legal entities and patents denied for legal entities. In other words, when it comes to requests made by individuals, whether or not to use specialized consultancies , does not imply a significant difference in the time for the analysis of applications ; in the case of legal entities, the consultancy has an important role both in granting applications and in reducing the period of analysis. It should be noted that the number of denied

patents is lower than that of patents granted, which may explain r rejection of the null hypothesis in T2 and T3 non-repudiation; in the same way, the number of requests sent by individuals is less than the number of requests from legal entities, and is an explanation for the non-rejection of the null hypotheses of T6 and T7.

Also, if you compared the performance of domestic and foreign companies used consulting. In both the t-test and the Z-test, the null hypotheses were rejected, that is, there is no significant difference in the variance of the patent analysis / grant / deny time when comparing Brazilian companies with those from other countries that apply for patent registration in the Brazil.

Sherwood (1992) mentions that the literature on intellectual property is insipid in developing countries. Otherwise, the speed with which the technology is developed is not accompanied by legislation that guarantees the right of ownership nor by the judicial sphere that analyzes denunciations of violations of these rights. The emergence of new technology takes time to be assimilated by the government and thus the very knowledge of responsible agencies is also constantly updated. Such dynamics generates knowledge of the inventor or depositor about the process and, in this sense, the use of consultancies is valid.

Two other challenges are imposed to PPV before data showing the number of environment s innovation. Table 3 shows the different innovation environments that currently exist in the country, according to a survey by the National Association of Entities Promoting Innovative Enterprises - ANPROTEC.

Table 3

The growth in the number of room’s innovation encourages entrepreneurs and inventors to invest time and money in research and development. The states of São Paulo - SP, Minas

Gerais - MG - and Rio Grande do Sul - RS - that stand out in the amount of entrepreneurial environments also have the largest number of *startups* , according to data from the Brazilian Association of Startups - ABSTARTUPS- (2019) : 3736, 1090 and 973, respectively. These states also stand out in the number of *startups* in potential segments for generating green patents such as agribusiness, industry and the environment: there are 245 startups in São Paulo, 113 in Minas Gerais and 111 in Rio Grande do Sul.

In addition to innovation environments, Brazilian universities also play an active role in innovation. The Brazilian Confederation of Junior Companies - BrasilJunior - (2019) elaborates an annual ranking on the index of entrepreneurship in universities. When comparing the data in this ranking with Table 4, it can be noticed that SP, MG and RS, which have many innovation environments, present the highest rates of university entrepreneurship: 6,33,57 and 5,14, respectively.

Given this context, it should increase the knowledge and awareness of the importance of intellectual property in the country. In this way, the trend is that the number of patents, in general, increase. In the case of green patents, the increase in registrations should also grow due to: a) the great biodiversity of flora and fauna present in the country, which supplies inputs for the development of new natural-based products; b) the increasing participation of the country in international trade, in which non-tariff barriers, such as pressure for non-use of agrochemicals, pressure companies to develop new production technologies based on environmental sustainability; c) the pressure exerted by civil society to develop environmentally sound regulations.

The insertion of environmental standards can lead to innovations that provide lower costs and increase the added value of the product. Real environmental benefits such as labor training, inventory reduction, and value mapping are also noted (PORTER AND LINDE 1999, SOBRAL, JABBOU R AND JABBOUR, 2013). However, the effect of green patents on

environmental protection, waste reduction and reduced use of natural resources must be considered controversial, with studies showing that sustainable innovations do not play a dominant role in the efficiency of these situations (WEINA ET AL, 2015). Thus, another barrier to be overcome by the PPV is identified so that more requests are forwarded.

4 Final Considerations

Data OCDE (2018) point to the growing total world population exposed to pollution levels above those acceptable. This number should be, in part, to the rapid growth of urban areas with consequent loss of arable land, and biodiversity changes in the water cycle. It is estimated that to produce USD 1,000 of gross domestic product, about 420 kg of energy-generating inputs will be consumed and 260 kg of CO2 emitted in the air will be generated.

It is considered that according to the data presented in this study, the objective of the green patent program was reached to the extent that the time of analysis of applications decreased over the period studied. However, some challenges are also posed so that PPV can be more efficient. One is the need to increase the knowledge of inventors, depositors and consultants on intellectual property and green patents: to the extent that they are not protected, companies must invest in measures against imitation and other elements that guarantee their competitiveness as distribution, marketing and production. Maintaining patent monitoring system and specific personnel for this task can assist in the research and development of innovations in a cooperative way not only with competitors as with other participants of the innovative ecosystem.

Another challenge is to continue investments in infrastructure, labor, work and informational technology in INPI through the expected growth in the number of

applications for green patents given the effervescent innovation environments and entrepreneurship in the country and the demands of foreign trade and civil society.

Future studies can analyze the relationship between green patents and green bonds that are fixed income securities that finance actions of a positive environmental or climatic impact (FEBRABAN, 2016). In this case, we can study how captures fundraising to deploy, finance or refinance long-term green projects affecting the delivery of green patents.

Also, the relationship between green patents and other priority examination applications accepted by INPI. The office of the PPV is concerned, in addition to green patents with deliberations on trademarks, industrial designs, geographical indications will you stay, computer software, integrated circuit topography, technology transfer and information technology. Thus, it is assumed that in view of various activities and priorities, the office structure to meet the objectives of reducing *backlogs* should be adequate for this.

The limitation of the study is not incorporated in the analysis data for 2019. It was found that only one request made in 2018 had not been examined in the same year - the completion of the analysis was done in 2019. However, given the information provided are the INPI (2019) on the contracting d and more examiners who work in flexible working day , it is inferred that the speed in analyzing the analysis may be greater from 2019 with the data of the period studied in this work.

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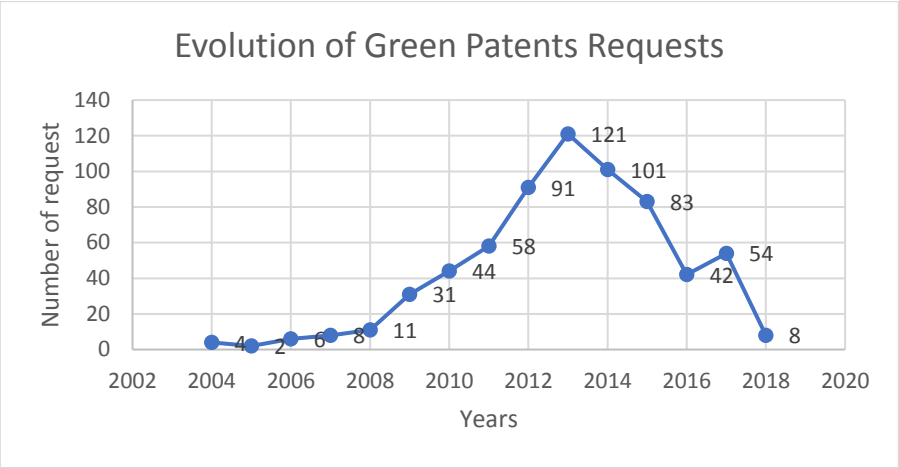
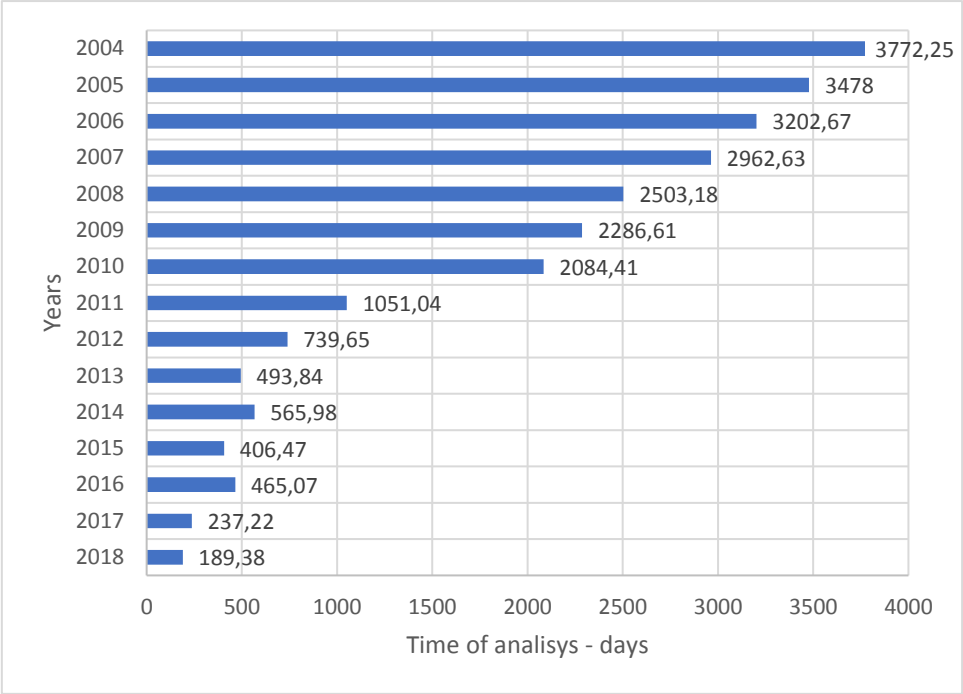
Appendix

Figure 1: Orders forwarded as Green Patent



Source: the author (2019)

Figure 2: Average Order Analysis Time



Source: the author (2019)

Table 1 : Status of green patent applications according to the type of applicant

Characterization of the depositor	Number of	Number of applications granted	Number of	Number of orders	Number of	Number of requests

	registered orders		canceled orders	republished or rectified	requests denied	using consulting
Companies	378	299	7	2	93	363
Teaching and Research Institutions	76	71	0	2	7	43
Physical persons	207	178	3	0	31	144

Source: the author (2019)

Table 2: results of hypothesis tests

P-value of tests / Treatments	T 1	T2	T3	T4	T5	T6	T7
t test (unicaud al / two-tailed)	0.01 / 0.01	0.11 / 0.22	0.00 / 0.01	0.00 / 0.00	0.00 / 0.00	0.38 / 0.75	0.42 / 0.84
F test (unicaudal)	0.00	0.21	0.00	0.00	0.01	0.04	0.10

Source: the author (2019)

Table 3: Number of Environments of Innovation in the Brazilian States

Type of environment/Brazilian States	**AL**	**AM**	**AP**	**BA**	**EC**	**DF**	**EN**	**GO**	**BA**	**MG**	**MS**
accelerator		1		1		1	1			2	
innovation agency								1			

entrepreneurship center								3			
innovation center								1			
coworking		1		1				1		1	
school of entrepreneurs						1					
incubator	6	9	2	5	6	3	2	5	2	26	9
other											
science park											
technologic Park				1	2	1	1	1		5	
pre-acceleration program											
pre-incubation program											
TOTAL	6	11	2	8	8	6	4	12	2	34	9

Type of environment/Brazilian States	**PA**	**PB**	**PE**	**PI**	**PR**	**RJ**	**RN**	**RO**	**RR**	**RS**	**SC**	**SE**	**SP**	**TO**	**TOTAL**
accelerator			1		1	3				3	1		6		21
innovation agency						1				1					3
entrepreneurship center															3
innovation center											1				2

coworking						2				1					7
school of entrepreneurs															1
incubator	4	3	13	7	21	23	5	5	1	26	18	1	37	3	248
other					1	1									2
science park										1					1
technologic Park	2		1		9	7	1			8	6	1	14	1	61
pre-acceleration program													1		1
pre-incubation program													1		1
TOTAL	6	3	15	7	32	37	6	5	1	40	26	2	59	4	351

Source: ANPROTEC (2019)