Inventions, public subsidies and market launch: opportunities and limits of patenting support in Argentina

Invenciones, subsidios públicos y llegada al mercado: oportunidades y límites del apoyo al patentamiento en Argentina

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Abstract

ANR Patentes is an Argentinean program that gives grants for patents applications to innovative firms, entrepreneurs and researchers. Throughout the period 2007-2017, 83 projects (out of 195) were funded. Based on secondary sources and a survey conducted to beneficiaries, this study reconstructs the progress made by the patent applicants. The results show, on the one hand, that a high percentage of the patents have been granted, and, on the other hand, a group of projects are facing difficulties to reach the market. Thus, the study suggests the necessity to complement ANR Patentes with other instruments oriented to foster entrepreneurship and productive development.

Key words: *Public subsidy, patent, market.*

JEL Classification: *O30 O32 O34.*

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Resumen

El ANR Patentes es un instrumento que otorga subsidios al patentamiento de desarrollos innovadores en Argentina. Entre 2007 y 2017 se financiaron 83 proyectos de 195 postulaciones. A partir de información secundaria y de una encuesta a beneficiarios se pudo reconstruir el camino de las solicitudes de patentes financiadas. Los resultados revelan una alta tasa de otorgamiento de las patentes solicitadas y, que un conjunto de proyectos ha enfrentado dificultades para llegar al mercado. Esto indica la conveniencia de articular este instrumento con programas orientados al emprendedurismo y con fuentes de financiamiento para el desarrollo productivo.

Palabras clave: *Subsidio público, patente, mercado.*

Clasificación JEL: *O30 O32 O34.*

1. Introduction

Promoting the protection and exploitation of the intellectual and industrial property (IP) of locally generated knowledge is part of the public agenda in many countries. This promotion is implemented in at least four ways (Xu and Munari, 2016): i) measures promoting patent-filings; ii) measures promoting patented technology maturation; iii) measures promoting patent exploitation; and iv) measures promoting patent leverage to access external financing. This paper focuses on an instrument called Aporte no Reembolsable Patentes (ANR Patentes), managed by the Argentine Technological Fund (FONTAR), which falls into the first category insofar as it finances the preparation and filing of patent applications (or utility models) in Argentina and elsewhere. Its ultimate purpose is to protect innovative results generated by the Argentinean scientific, technological and productive sector.

ANR Patentes differs from other programs in the world that provide patent fillings subsidies since there is a fairly rigorous selection and evaluation process of the beneficiaries before granting the funds. On the contrary, other countries such as Italy and mainly China, provide subsidies almost automatically based on the chronological order of applications after a check of formal requirements (Xu and Munari, 2016; Lei, et al, 2013). Due to its scale, these schemes have resulted in a rise of the aggregate number of patents in those countries but have raised concerns about the quality (measured by the number of forward citation and concession) and economic value (measured by economic performance after the subsidy) (Li, 2012; The Economist, 2010).

ANR Patentes partially covers expenses associated with the patent application of those projects that surpassed the instrument ex-ante evaluation. The subsequent results such as the actual granting of the patent and its commercial exploitation are beyond the scope and control of FONTAR. The program does not provide additional support to maintain the validity of the patent in the event that it is granted, nor for the investments required to transform the protected invention into an innovation. However, the instrument implicitly assumes that the stages following the application will be effectively carried out in all cases. In accordance with this expectation, subsidy candidates must demonstrate not only their product or process's "inventive step" to be deemed as patentable, but also its further commercial potential.

The objective of this paper is twofold. Firstly, it aims to make a methodological contribution to trace and evaluate the path followed by patent applicants after their requests. Secondly, it aims to find out what has happened to the patent applications financed by ANR Patentes. On the one hand, it verifies to what extent the projects assisted have effectively achieved market performance expectations. On the other hand, it analyzes those aspects of the instrument that could be reformulated to improve its functioning and expected results. In addition, given that this type of financing in other countries is given almost automatically to all applicants through large-scale programs, both the methodological strategy for gathering evidence and the results of Argentina's ANR Patentes constitute a contribution to the debate of how to evaluate small-scale and niche instruments.

The remainder of this paper is organized in four sections. The next section introduces the instrument under analysis in terms of its objectives, characteristics and general results. The third section develops the methodology used to collect information about the path followed by the applications financed by ANR Patentes after receiving the subsidy. The fourth section is devoted to presenting and analyzing the evidence generated. Finally, the fifth section is devoted to conclusions and policy recommendations derived from the study.

2. ANR Patentes in Argentina

ANR Patentes is a subsidy aimed at protecting R&D results by supporting the preparation and/or filing of invention and utility model patent applications.[1] The subsidy covers up to 80% of the project, up to USD 5,000 for applications in Argentina and USD 75,000 abroad. The maximum duration of projects is

[1] The translation of Aporte no Reembolsable (ANR) is non-refundable funding, but strictly speaking it is a subsidy.

36 months. It is aimed at: a) national SMEs; b) individuals; c) public and/or private non-profit scientific and technological institutions.

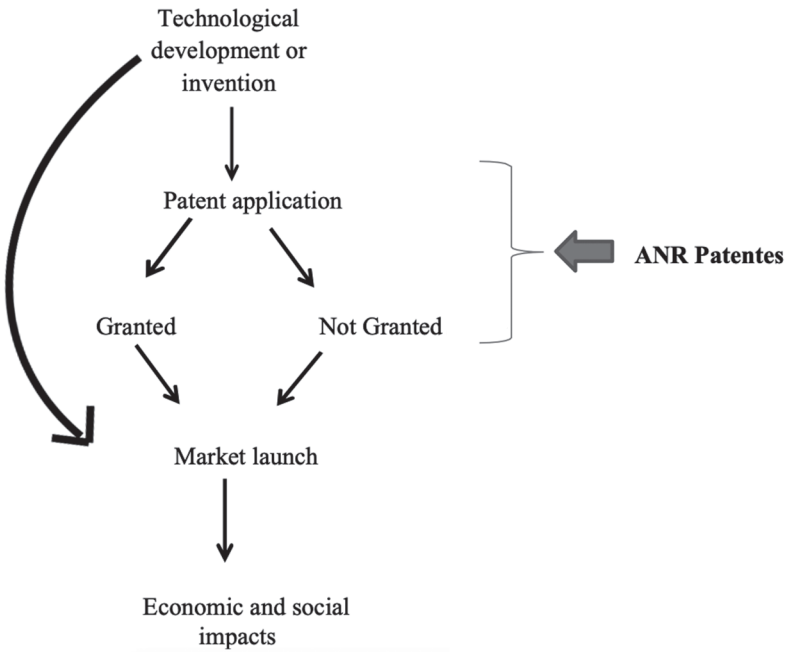
Diagram 1 shows a stylized illustration of a complete cycle of an innovative project and where ANR Patentes makes its contribution. It starts with a research and development phase that may be driven by the search for a technological solution to a problem and/or by the identification of a market opportunity. The duration of this stage varies according to the type and complexity of the project and in some cases it also receives public funding. When the results obtained are positive, the development or invention takes place. When this milestone is sufficiently inventive it becomes patentable in order to, among other things, prevent copying and/or generate income through the licensing of the patent.[2]

After that, regardless of whether or not a patent is granted, the innovation is completed when the development is taken to a productive scale, reaches the market and is commercially exploited. Finally, these projects can be associated with broader potential socioeconomic impacts in different aspects. In economic terms, the potential is to: i) increase productivity; ii) develop new (niche) markets, iii) substitute imports, iv) generate exports and/or new jobs, among others. Socially, these projects can potentially improve the quality of life of the population (for example, through health) and generate greater inclusion in disadvantaged or relatively less developed groups or regions of the country.

[2] The patent guarantees the private appropriation of the innovation through the exclusive rights granted to the inventor. At the same time, it allows a certain diffusion of knowledge by requiring the description of the invention or development to be made public (Griliches, 1990). Several studies show that patents are more widely used to protect product innovations than process innovations and, that their use and effectiveness vary according to the industrial sector (Mansfield, 1986; Levin et al., 1987). Among the limitations of this instrument are the difficulty in demonstrating the novelty of the invention, the disclosure of information to potential competitors and the high costs of application and defense (Levin et al., 1987; Cohen et al., 2000).

DIAGRAM 1

INNOVATIVE PROJECT CYCLE AND ANR PATENTES' CONTRIBUTION



Source: Own elaboration based on Verre et al (2020).

ANR Patentes funding is conditioned by three evaluation stages: (i) a patentability analysis, conducted by evaluators based on a state-of-the-art search provided by the applicant; (ii) an economic feasibility analysis that includes, at least, a forecast of the potential economic impact, market profile and the capacity of the holder to scale up the project, using the idea commercially or licensing the invention. As part of this, the correspondence between the export strategy, market opportunities and countries in which the patent application is intended is also evaluated; (iii) the financial capacity of the applicant to cover the counterpart contributions foreseen by the instrument.

The main eligible expenses include the fees associated with the preparation and submission of the application (drafting, preparation of drawings and figures, translations, compliance with standards and preparation of supplementary documentation required by the various offices, etc.) and the respective fees and tariffs.

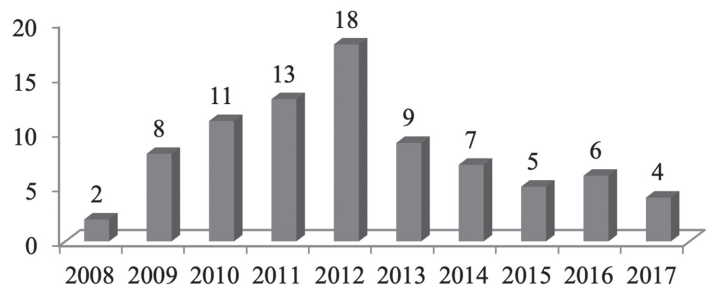
Finally, it should be noted that, as can be seen from the economic viability analysis that includes the evaluation of projects, the spirit of the instrument is not merely to increase the number of patents, but rather that the industrial prop-

erty protection conferred by these patents should facilitate the development or invention to effectively take advantage of opportunities and meet needs, with a consequent socioeconomic and competitive impact from the knowledge generated.

Up to 2017, the instrument received 195 applications, of which 83 were financed. Some beneficiaries received funding for more than one project, so the total number of beneficiaries is lower than the number of projects. In this regard, there are a total of 58 beneficiaries of which 42 obtained funding for a single project and 16 obtained funding for two or more projects.

The annual evolution shows a steady growth until 2012 and then a decline until 2017 (Figure 1).

FIGURE 1
ANNUAL EVOLUTION OF THE NUMBER OF PROJECTS FINANCED

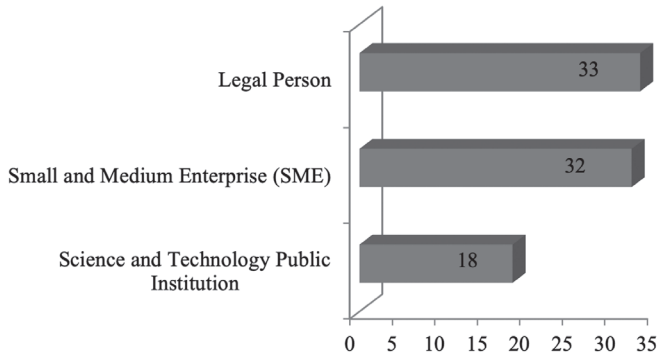


Source: Own elaboration based on information provided by FONTAR.

In terms of the types of beneficiaries, coinciding with the objectives of the instrument, legal persons and SMEs predominate, together accounting for 65 projects (78%), while public institutions were the beneficiaries of the remaining 18 (22%) (Figure 2). It should be noted that within this total, four public-private associative projects were also identified.

FIGURE 2

NUMBER OF PROJECTS FINANCED ACCORDING TO TYPE OF BENEFICIARY



Source: Own elaboration based on information provided by FONTAR.

The methodological approach and main results corresponding to the path followed by the patent applications of these 83 projects are presented below.

3. METHODOLOGY

The methodological strategy used to access information on the results of the projects was based on secondary and primary sources (see Table 1 for the coverage and type of information collected in each case).

TABLE 1

SUMMARY OF SOURCES, COVERAGE AND NATURE OF THE INFORMATION COLLECTED BY TYPE OF SOURCE

	Secondary	**Primary**
Source	Patent databases: • PatentScope • Google Patents • Espacenet	Survey of ANR Patentes beneficiaries
Coverage	83 projects (100%)	33 projects (40%)
Type of information obtained	Office(s) of application, status (granted, in force), record of other applications made by the beneficiaries.	
		Motivations and difficulties encountered in the application process. Commercial exploitation. Experience with the public sector.

Source: Own elaboration.

Secondary information on the status of applications was obtained from open access patent databases such as PatentScope, Google Patents and Espacenet. PatentScope, a search engine provided by the World Intellectual Property Organization (WIPO), was initially consulted to identify patent applications that met three conditions: 1) they included ANR beneficiaries as applicants; 2) they revealed lexical proximity to the respective project title; and 3) they were contemporaneous with the project in chronological terms. The PatentScope search was configured to include results from all offices while disabling the automatic separation of words into lexemes. Subsequently, for each of the applications retrieved from PatentScope, we proceeded to identify the "twin" records indexed by Google Patents that allowed us to incorporate the patent grant date. Since only entries in the national or regional phases following the Patent Cooperation Treaty (PCT) application are likely to be granted (or rejected), and this occurs according to the applicable law in each jurisdiction, in the case of applications made through the PCT, it was decided to assign the earliest grant date to the first entry at the national phases level. Cross-checking with Google Patents also made it possible to know whether granted patents are active or in force.

Likewise, in order to measure the relevance of ANR Patentes in the intellectual property management trajectory of the beneficiaries, patent applications made by the beneficiaries but not related to the financed projects were searched for and retrieved.

Finally, data cleaning was performed in terms of consistency and completeness and ex post filtering by categories and by automated identification/sorting strategies to remove duplications, outliers and anomalies from the database.

Regarding commercial exploitation and other aspects of the patenting process, a survey was conducted since such information is not available in the patent databases. The questionnaire contained five sections (see Table 2) and was managed through an online platform. As can be seen, in addition to the information on commercial exploitation, the questionnaire also asked about aspects captured by the patent databases, such as the application and granting process, both to allow the respondent to reference the subsequent questions and to corroborate the accuracy of the information obtained from the patent databases. Likewise, in each segment, qualitative aspects of the process, such as the reasons for patenting, were explored in depth. Finally, the beneficiaries were asked about their evaluation of the instrument and their general experience of the relationship with the Public Sector.

TABLE 2
MAIN SECTIONS OF THE QUESTIONNAIRE

Section title	Type of information surveyed
Basic data	Identifies the respondents and allows contact in case it is necessary to re-survey or validate any of the answers.
Information about the patent application(s)	General characteristics of the application: i) title of the invention, ii) year of application, iii) type of filing (PCT or not PCT), iv) countries where the application was initiated, iv) motivations for patenting.
Granting of patent(s)	Inquiry into the status of the application(s) made; that is, if it was granted or not in any of the offices where the application was made. In cases where it was not granted, the status of the process and the reasons for not obtaining the patent; in cases where it was granted, in which countries.
Transfer and/or arrival on the market	Aimed at finding out whether the development for which the patent was applied for is in any type of commercial use. Factors explaining the arrival or non-arrival to the market.
Experience with the Public Sector	We asked about the beneficiaries' links with other public programs and their assessment of their experience with the ANR Patentes instrument.

Source: Own elaboration.

The beneficiaries were contacted via an e-mail in which the objectives of the survey were explained. This was then reinforced with a telephone call. Consultation channels were also set up via e-mail and telephone in cases where beneficiaries had doubts or needed assistance in filling out the survey form. The field work was carried out during the month of November 2021 and complete responses for 33 of the 83 projects (40%) were obtained (Table 3). The non-probabilistic sample resulting from sending the form to all validated contacts has a composition by type of beneficiaries that has relatively minor differences with those of all projects. Public institutions are overrepresented and legal persons are slightly underrepresented.

TABLE 3
RESPONSE RATE BY TYPE OF BENEFICIARY

Type of beneficiary	Number of financed projects	Number of responses	Response rate
SME	31	12	39%
Legal Person	33	11	33%
S&T Public Institution	19	10	53%
Total	83	33	40%

Source: Own elaboration.

The results obtained are presented below. In cases where the information is derived from patent databases, it refers to the total of 83 projects, while results refer to the 33 projects for which complete responses were obtained. The combination of information gathered from these two sources allowed us to check the status of patent applications and to extrapolate the commercial exploitation of those patents to the universe of financed projects.

4. Results

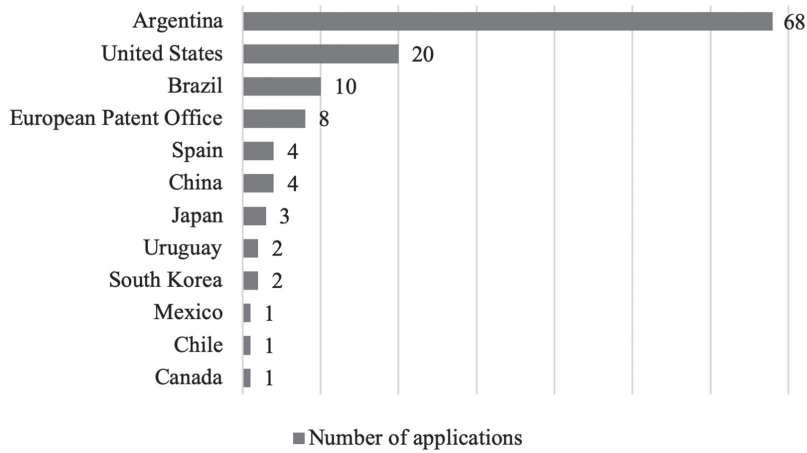
4.1 Patent Applications

All of the projects (100%) met the objective of filing patent applications: 124 applications were made in national offices (some projects resulted in more than one application), while 42 applications were made through the PCT system, at an average of 1.49 and 0.51 applications per project respectively. By contrast, among non-beneficiaries, only 30% of SMEs and legal persons and only 40% of science and technology public institutions applied for the patent for which they had applied to the ANR.

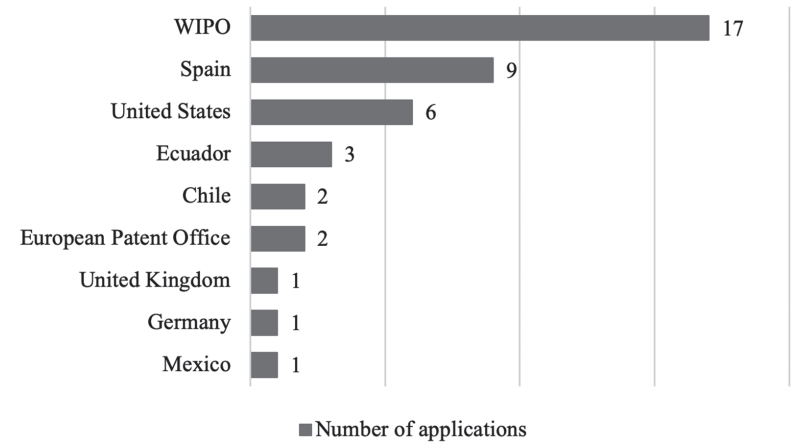
The next figure shows that among applications to national offices, those filed in Argentina predominate, followed by those filed in the United States. In the case of the PCT, the largest number of filings was made at the WIPO and the Spanish office. It should be noted that PCT applications cannot be filed at the Argentine office since the country has not signed the agreement.

FIGURE 3
NUMBER OF PCT AND NON-PCT PATENT APPLICATIONS BY OFFICE OF ENTRY

A. NON-PCT



B. PCT

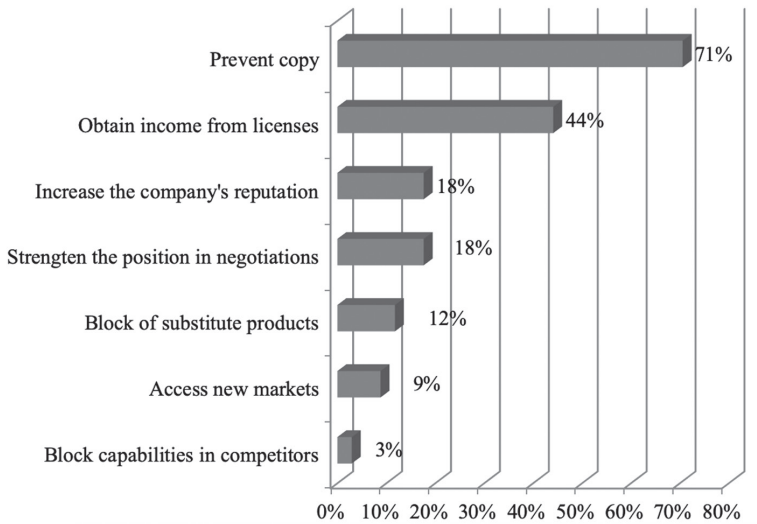


Source: Own elaboration based on information from PatentScope.

In line with the international literature (Levin et al., 1987; Blind et al., 2006; Guiri et al., 2006; Blind et al., 2009; De Rassenfosse, 2012; Holgersson and Granstrand, 2017), the main motivation for patenting is to prevent copying

(70%). However, again in line with the literature, other motivations related to what is called strategic patenting also have significant percentages. Among them, obtaining licensing income (44%) and, to a lesser extent, improving reputation (18%) and strengthening a negotiating position (18%) stand out. Blocking substitutes or competitors, which for instance appear as important strategic motivations when analyzing the most recent Argentine innovation survey, ENDEI II (Petelski et al., 2020), are less important in this case[3], supporting the objectives of the instrument to increase patenting, and validating, in accordance with this, the type of agents targeted by the instrument.

FIGURE 4
MAIN MOTIVATIONS FOR FILING A PATENT APPLICATION
(% OF RESPONSES RECEIVED)



Notes: Respondents could answer more than one option.
Source: Own elaboration based on survey to beneficiaries of ANR Patentes.

Finally, regarding the technological field of the applications, Table 4 shows that although they are varied, since they are distributed among 7 of the 8 sections of the International Patent Classification (IPC), 83% are concentrated in

[3] The correlation index between the ranking of motivations of ANR beneficiaries and ENDEI II patenting companies is low (0.21), with a relative preeminence of the use of the patent (whether internal or by licensing) in the first case and of the blockage in the second case.

four sections (A, B, C and G). In terms of classes, the applications are distributed among 36 of the 130 IPC classes[4].

TABLE 4
DISTRIBUTION OF APPLICATIONS BY IPC SECTIONS AND CLASSES

Code	Description	Part.
A	**Human necessities**	**28%**
A61	Medical or veterinary sciences; hygiene	12%
A01	Agriculture; forestry; animal husbandry; hunting; trapping; fishing	7%
A47	Furniture; domestic articles or appliances; coffee mills; spice mills; suction cleaners in general	4%
A41	Wearing apparel	3%
A23	Foods or foodstuffs; treatment thereof, not covered by other classes	1%
A62	Life-saving; fire-fighting	1%
B	**Performing operations; transporting**	**21%**
B63	Ships or other waterborne vessels; related equipment	5%
B60	Vehicles in general	4%
B65	Conveying; packing; storing; handling thin or filamentary material	3%
B01	Physical or chemical processes or apparatus in general	2%
B23	Machine tools; metal-working not otherwise provided for	2%
B66	Hoisting; lifting; hauling	2%
B62	Land vehicles for travelling otherwise than on rails	1%

[4] The IPC is composed of sections, classes, subclasses, groups and subgroups that in the 2015 version reached 8, 130, 639, 7402, 64332 respectively (see https://www.inegi.org.mx/contenidos/app/scian/cip.pdf). The information on applications funded by ANR Patentes is registered at the subgroup level. However, for stylization purposes version reached 8, 130, 639, 7402, 64332 respectively (see https://www.inegi.org.mx/contenidos/app/scian/cip.pdf). The information on applications funded by ANR Patentes is registered at the subgroup level. However, for stylization purposes, we decided to group them by sections and classes, taking the first subgroup indicated in each application, which in many cases are multiple, reaching 16 in some of them. In this sense, this exercise is a very imprecise approximation since not in all offices the first code is the most important one. See in this regard OECD (2009). However, it should also be noted that almost all applications financed by the ANR Patentes that present more than one IPC code do so within the same section and in many cases also within the same class.

B29	Working of plastics; working of substances in a plastic state in general	1%
B32	Layered products	1%
C	**Chemistry; metallurgy**	**21%**
C12	Biochemistry; beer; spirits; wine; vinegar; microbiology; enzymology; mutation or genetic engineering	8%
C07	Organic chemistry	5%
C02	Treatment of water, waste water, sewage, or sludge	4%
C01	Inorganic chemistry	2%
C04	Cements; concrete; artificial stone; ceramics; refractories	1%
C11	Animal or vegetable oils, fats, fatty substances or waxes; fatty acids therefrom; detergents; candles	1%
G	**Physics**	**13%**
G06	Computing; calculating or counting	5%
G01	Measuring; testing	3%
G02	Optics	2%
G07	Checking-devices	1%
G21	Nuclear physics; nuclear engineering	1%
G09	Educating; cryptography; display; advertising; seals	1%
E	**Fixed constructions**	**7%**
E04	Building	4%
E21	Earth or rock drilling; mining	2%
E01	Construction of roads, railways, or bridges	1%
F	**Mechanical engineering; lighting; heating; weapons; blasting**	**7%**
F16	Engineering elements or units; general measures for producing and maintaining effective functioning of machines or installations; thermal insulation in general	4%
F24	Heating; ranges; ventilating	1%
F28	Heat exchange in general	1%
F03	Machines or engines for liquids; wind, spring, or weight motors; producing mechanical power or a reactive propulsive thrust, not otherwise provided for	1%
F04	Positive-displacement machines for liquids; pumps for liquids or elastic fluids	1%
H	**Electricity**	**4%**
H04	Electric communication technique	2%
H01	Basic electric elements	1%

Source: Own elaboration based on information from PatentScope and OECD (2009).

4.2 Patents Granted

In terms of patents granted, 76% of the projects (63 out of 83) were granted at least one of the patents applied for, indicating that the selection of projects has adequately foreseen the potential for patentability in most cases. This conclusion is reinforced if we analyze the reasons in the six surveyed cases of non-granting. Within these cases, there are two that are still in the process of analysis (filed in 2016 and 2017) and could end up being granted. Of the remaining four, in three projects, the inventors desisted from continuing with the process, and in one case, the patent was formally denied by the European Patent Office for lack of an inventive step[5].

The 63 projects that were granted patents generated a total of 166 applications and 83 patents granted, 62 by direct entry to national offices (50% of applications) and 21 by entry through the PCT system (50% of applications). Of this total, 66 are still in force (46 and 20, respectively). Table 5 summarizes this information.

TABLE 5

PATENTS APPLICATIONS, GRANTS AND IN FORCE

Project results	Number	Average per project
National Offices		
Applications		1.49
Grants		0.75
Grants/Applications (in %)	50.0	
In force		0.55
In force/Grants (in %)	74.2	
PCT		
Applications	42	0.51
Grants		0.25
Grants/Applications (in %)	50.0	
In force		0.24
In force/Grants (in %)	95.2	

Source: Own elaboration based on information from the ANR PATENTES Database, PatentScope, Espacenet and Google Patents.

[5] In this case, however, the holder registered the invention as a utility model in Spain.

Some characteristics of applicants and applications affect the probability of obtaining the patent. Table 6 shows how the applications are distributed (taking the total of 166 applications) between granted and not granted according, on the one hand, to the type of applicant and their previous experience in patent applications and, on the other, to the application office and the technological class (at the section level). As can be seen, those beneficiaries with prior experience and who are SMEs or science and technology institutions show a higher proportion of patents granted than those who are legal persons and have no experience, respectively. For their part, the application offices with the highest proportion of patents granted are the USPTO and those in Asian countries, while those with the lowest proportion of grants are those filed in neighboring countries. Finally, the technological classes with the highest proportion of concessions are B (mainly related to machines, devices and transportation equipment for various activities) and E (mainly related to transportation, water and mining infrastructure).

TABLE 6

GRANTED APPLICATIONS ACCORDING TO CHARACTERISTICS OF APPLICANTS AND APPLICATIONS

Characteristics	Results of Patent Applications					
	Number			Percentage		
	Not granted	Granted	Total	Not granted	Granted	Total
Type of beneficiary						
Legal person	40	31	71	56%	44%	100%
SME	26	31	57	46%	54%	100%
S&T public institution	17	21	38	45%	55%	100%
Total	83	83	166	50%	50%	100%
Previous experience applying to patents						
No	48	39	87	55%	45%	100%
Yes	35	44	79	44%	56%	100%
Total	83	83	166	50%	50%	100%
Office of application						
AR	33	35	68	49%	51%	100%
PCT	21	21	42	50%	50%	100%
USPTO	8	12	20	40%	60%	100%
Other South American countries (Brazil/Chile/Uruguay)	16	0	16	100%	0%	100%
Asian countries (China/S. Korea/Japan)	2	11	13	15%	85%	100%
Other Countries/Offices	3	4	7	43%	57%	100%
Total	83	83	166	50%	50%	100%
International Patent Class (Sections)						
A (Human necessities)	25	22	47	53%	47%	100%
B (Performing operations, Transporting)	12	22	34	35%	65%	100%
C (Chemistry; Metallurgy)	20	13	33	61%	39%	100%
D (Textiles; Paper)	0	0	0	-	-	-
E (Fixed constructions)	4	8	12	33%	67%	100%
F (Mechanical engineering)	7	5	12	58%	42%	100%
G (Physics)	10	12	22	45%	55%	100%
H (Electricity)	5	1	6	83%	17%	100%
Total	83	83	166	50%	50%	100%

Source: Own elaboration based on information from the ANR PATENTES Database, PatentScope, Espacenet and Google Patents.

Some of these effects remain and others disappear when a probit model of the probability of obtaining the patent is estimated. In this case, each of the characteristics in Table 7 are included as dummies and an indicator of the number of years since the request is added to control for biases associated with the non-granting of the most recent applications. However, the average elapsed time is around 10 years, for both granted and not granted applications.

TABLE 7

DETERMINANTS OF THE PROBABILITY OF OBTAINING THE PATENT

Explanatory variables	**F=Pr(Grant=1)**
SME	0.421*
S&T public institution	0.433
Experience	0.170
AR	0.393
PCT	0.437
USPTO	0.811
Other South American	-0.790
Asia	1.482*
IPC_A	4.062
IPC_B	4.788
IPC_C	3.876
IPC_E	4.671
IPC_F	4.555
IPC_G	4.318
IPC_H	3.147
Time	0.144***
Constant	-6.431
Observations	166
Pseudo R2	0.2031

*** p<0.01, ** p<0.05, * p<0.1

In the multivariate framework, the probability of obtaining increases when the beneficiary is an SME, when the application is made in Asian offices and also increases as more time passes from the moment of the application (Table 7).

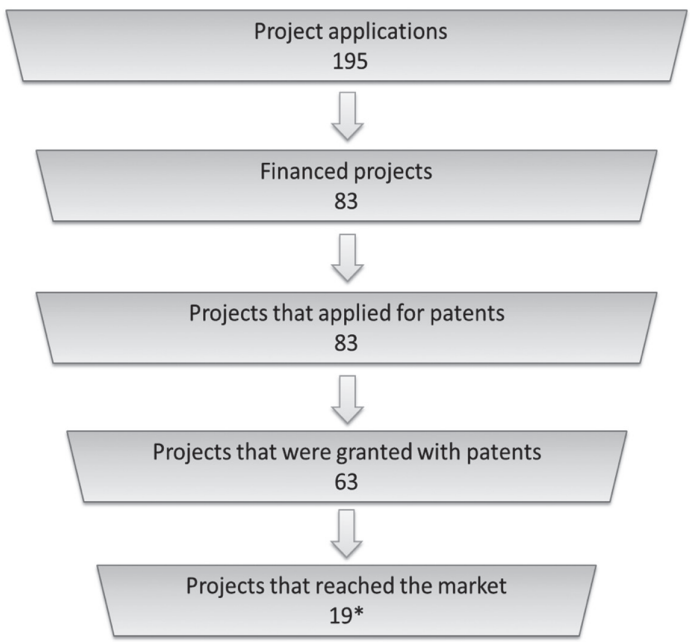
4.3 Commercial Exploitation

Finally, with regard to commercial exploitation, which is the most difficult information to reconstruct from secondary sources, the results of the fieldwork show that almost one third of the projects (10) reached this phase, 70% of them directly and 30% through licensing. If these proportions are extrapolated directly to the total number of projects that obtained patents, it would mean that 19 of the 63 would be exploiting the patent, 14 of them directly and the remaining 5 through licensing.

All of the above shows that for various reasons, there are some projects that fall along the way from project presentation to market arrival. This can be seen graphically in the following diagram.

DIAGRAM 2

PROJECT PATHWAY BETWEEN APPLICATION AND ARRIVAL TO MARKET



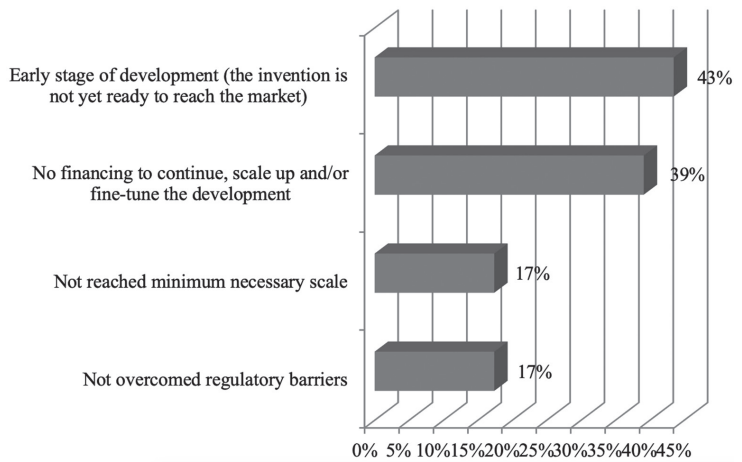
*Estimated based on Survey to beneficiaries of ANR Patentes.

Source: Own elaboration based on information provided by FONTAR, ANR Patentes Database and survey of beneficiaries of ANR Patentes.

Regarding the projects that have not reached commercial exploitation, the reasons are varied. In 43% of the cases, the projects are still at an early stage of development to convert the invention into an innovation. If all of them were to reach commercial exploitation after completing the development phase, the percentage of patents that complete the cycle from application to market would double (43% of the 44 that have not reached the market). In the other cases, the constraints seem to be more definitive in that they refer to systemic conditions such as lack of financing (39%) and regulatory barriers (17%) or conditions intrinsic to the beneficiaries or the project itself that are very difficult to remove, such as lack of scale (17%).

FIGURE 5

MAIN REASONS FOR NOT BEING ABLE TO COMMERCIALLY EXPLOIT THE INNOVATIVE DEVELOPMENT (% OF PROJECTS THAT ARE NOT BEING EXPLOITED).



Note: Respondents could answer more than one option.

Source: Own elaboration based on survey to beneficiaries of ANR Patentes.

In this regard, the beneficiaries were asked about those aspects in which the public sector could have assisted the project to make it possible or to facilitate its arrival on the market. Of the 25 responses obtained, one main issue stands out: the fact that the invention still has some way to go before it can be exploited. There is a high proportion of projects that are still in the development phase, for example in the biotechnology area, and this is indicated as the main reason for non- exploitation, however, in these cases the question of the financing necessary for the projects to advance to a higher stage of development is implicit. This aspect is partially linked to another, which also emerged

from the open-ended questions answered by the beneficiaries: the relationship with potential licensees. On the one hand, some beneficiaries mentioned that the potential licensee demanded the project show a higher degree of progress in order for them to get involved and invest, confirming the lack of maturity of the project to be an obstacle for its commercial exploitation. On the other hand, some potential licensees consulted found the cost/benefit ratio insufficient to undertake production or lacked the necessary production capacity to do so, which may indicate the need for greater activity in the promotion and dissemination of inventions so that supply and demand can meet. Among the other issues mentioned, the lack of articulation with other public institutions (the National Atomic Energy Commission – CNEA, the National Institute of Industrial Technology – INTI) that could have supported the projects from the technical point of view and the lack of regulatory support policies for the invention (the Argentine position towards the International Maritime Organization, the policy of the Secretariat of Energy on biodiesel, delays on the part of the National Administration of Drugs, Food and Medical Technology – ANMAT, among others) also stand out.

An additional element to consider regarding the general relevance of the instrument and its results is related to its role within the industrial property management trajectories of the beneficiary entities.

TABLE 8

PATENTING BEFORE AND AFTER ANR PATENTES

Beneficiary Entities	No previous or subsequent applications	Subsequent applications only	Previous applications only	Pre- and post-applications
SMEs	50%	8%	29%	13%
Legal persons	70%	4%	26%	0%
Institutions	20%	0%	0%	80%
Totals	56%			13%

Source: Own elaboration based on information from the ANR Patentes Database.

Of the total number of beneficiary entities, slightly more than half (56%) do not register patent applications before or after the ANR (Table 8). For these entities, it could be considered that, up until now, the ANR is an isolated milestone in their IP management. The highest proportion of beneficiaries in this condition corresponds to legal persons, where it reaches 70%, followed by SMEs (50%) and public institutions (20%). In this regard, when evaluating

the instrument in the framework of the survey, several beneficiaries stated that without the instrument's support they would not have considered patenting their invention.[6] It remains to be seen whether, over time, some of these cases may also show that the ANR has been a learning milestone that mobilized their systematic IP management. For the moment, the evidence in this regard is scarce since only 6% of the beneficiaries, all of them SMEs and legal persons, reapplied for a patent after their first experience financed by ANR.

For another 25% of the beneficiaries – again made up exclusively of SMEs and legal persons – who already had prior application experience, the ANR has helped to finance their most recent application. Finally, for the remaining 13% with previous and subsequent patent application experience, the ANR appears to have been a funding opportunity for one-off applications in the framework of more established IP management. In this group, public institutions stand out in relative terms.

5. Conclusions and Recommendations

The evidence generated and analyzed in this study allows us to draw a set of reflections and conclusions about the policy instrument.

ANR Patentes has proven to be effective in its objective of supporting individuals, institutions and companies to protect intellectual property generated in the country. The evidence shows that three quarters of the projects financed have obtained at least one patent. In turn, considering averages, two patents were applied for per project and one was obtained. The survey reveals a generalized opinion among the beneficiaries that, without the instrument, it would have been difficult for them to patent, i.e., the subsidy was the condition for the possibility of patenting (project additionality) (Georghiou, 2002; Verre et al, 2020, Buisseret et al, 1995). To this is added an 'additionality of scale and scope' insofar as the subsidy has made it possible to expand the target countries in which to patent the invention (which would have been much smaller without public aid).

If we consider the different stages of the projects' life cycles (from the time they apply to FONTAR to obtain financing to commercial exploitation), a process of disengagement is observed. In the case of the most original evidence provided by this study, which corresponds to the step from obtaining the patent to reaching the market, a success rate of around 30% is observed – although

[6] This statement seems to be confirmed by the results commented above. Only 40% of non-beneficiary public science and technology institutions applied for a patent, a percentage that drops to 30% in the case of SMEs and legal persons.

this may increase when the projects that are still at an early stage of their development reach commercial exploitation. In this step, there is a need to think of strategies to extend the support for projects in order to improve their chances of making an effective contribution to society through the commercial exploitation of patented inventions. Currently, this phase is not contemplated in ANR Patentes, but it is an instance whose concretion is crucial to give real meaning to the effort involved in supporting the patenting of inventions.

This entails the consideration of patenting as part of the innovation process, avoiding the patent becoming an end in itself, and pursuing the goal of reaching the market. To this end, it is suggested that two fundamental issues be addressed. Firstly, the evaluation of support mechanisms and/or actions to continue with the maturation process of the patented invention (development, prototyping, manufacturing, regulatory approval, etc.). Secondly, facilitation of the encounter between supply and demand for inventions. The former entails a need to articulate ANR Patentes with: i) instruments for other phases of the innovation process, ii) programs aimed at entrepreneurship, iii) sources of financing for productive development and iv) support for regulatory aspects (a need detected in several of the projects). A niche instrument, with a demanding ex-ante evaluation, would increae its impact as long as subsequent support to reach the market is also provided. The latter involves generating spaces and instances to guarantee the proper dissemination of inventions and potential licensees. A small-scale instrument, where 60% of beneficiaries are legal persons or public institutions, would benefit from the identification of a bank of potential licensees, which could strengthen the selection phase and facilitate the market exploitation. In this regard, it should be noted that the vast majority of the beneficiaries have not had access to other public support instruments, so there is an important space for articulating this instrument with others, based on a path that leads from the project idea to its application.

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