Institutional Framework for the Valorization of Scientific Research Results in Algeria

الإطار المؤسساتي لتثمين نتائج البحث العلمي في الجزائر

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Abstract:

Since independence, Algeria paid attention to the scientific research and technological development system; as it is a key factor in economic development. However, the efforts made by the state from 1962 to 1998 did not help much to revive the scientific research process, in which the results of scientific research and studies remained far from the economic sector. In order to ensure the openness of the scientific research sector to the economic institutions' world, since 1992, Algeria has embarked on a series of reforms, the most important of which is the issuance of Law n° 98/11 containing orientation law and five-year projection program on scientific research and technological development (1998-2002), which established a national strategy aimed at promoting scientific research.

Law n° 15-21 embodied this strategy by establishing a homogeneous and stable regulatory and institutional framework that guarantees the transfer of scientific and technical expertise existing within research institutions to the industrial and economic sectors. This law also highlighted the state's will to enable Algerian researchers to communicate their research results to the economic sector by allowing universities and research centers to establish economic branches or take shares in institutions concerned with the valorization of scientific research.

Keywords: Scientific Research; Valorization of Scientific Research Results; Research Valorization Structures; Economic Sector; Establishment of Economic Branches.

ملخص:

اهتمت الجزائر غداة الاستقلال بمنظومة البحث العلمي والتطوير التكنولوجي، كونها عاملا أساسيا من عوامل التنمية الاقتصادية. إلا أن الجهود المبذولة من قبل الدولة من عام 1962 إلى عام 1998 لم تساعد كثيرا على بعث عملية البحث العلمي، فقد ظلت نتائج الأبحاث والدراسات العلمية بعيدة عن القطاع الاقتصادي. ولضمان انفتاح قطاع البحث العلمي على عالم المؤسسات الاقتصادية، شرعت الجزائر ابتدأ من عام 1992 في سلسلة من الإصلاحات لعل أهمها صدور القانون 11/98 المتضمن القانون التوجيهي والبرنامج الخماسي حول البحث العلمي والتطوير التكنولوجي 1998-2002، الذي أرسى إستراتيجية وطنية، هدفها الارتقاء بالبحث العلمي. وجسد القانون 21/15 هذه الإستراتيجية من خلال إرساء إطار تنظيمي ومؤسساتي متجانس ومستقر يضمن نقل الخبرة العلمية والتقنية الموجودة داخل مؤسسات البحث نحو القطاع الصناعي والاقتصادي. كما أبرز هذا القانون إرادة الدولة في تمكين الباحثين الجزائريين من إيصال نتائج أبحاثهم إلى القطاع الاقتصادي من خلال السماح للجامعات ومراكز البحث من إنشاء فروع اقتصادية أو أخذ حصص في مؤسسات تعنى بتثمين البحث العلمي.

الكلمات المفتاحية: البحث العلمي؛ تثمين نتائج البحث العلمي؛ هياكل تثمين البحث؛ القطاع الاقتصادي، إنشاء الفروع الاقتصادية؛

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Introduction:

The valorization of scientific research results is an essential stage for activating the scientific research process. It is a logical result of the research teams' efforts and evidence of their commitment to the real response to national priorities in the field of economic and social development.

Since independence, Algeria has paid attention, like other countries, to scientific research as a tool of development, and the state has undertaken this task within the framework of the university as a first stage, so the task of "scientific research" was close to the task of "higher education". Then, this task was entrusted alongside the university to the research centers, so the task of "technological development" has become linked to "scientific research".

However, scientific research did not know much success in Algeria from 1962 until 1998, which known the issuance of Law n° 98/11 on 22 August 1998 on orientation law and five-year projection program on scientific research and technological development (1998-2002), (1998-2002) [1]

That situation was due to multiple considerations, the most important of which is the absence of a national strategy for scientific research, and the period between 1962 and 1998 was characterized by multiple policies, whether concerning the legal texts regulating the scientific research sector or the institutions and structures charged with supervising the research process. This period also witnessed the marginalization of the economic sector and its exclusion from the scientific research sector.

Thus, the absence of links and bridges between economic institutions and scientific research institutions prevented the product of research and studies from reaching the actual application within the economic institution, which preferred to buy scientific products from abroad at exorbitant prices.

In the face of the shortcomings known by the scientific research sector, Algeria has embarked, since 1992, on a series of reforms to restore consideration to the research function, as it established new institutions concerned with scientific research and technological development, such as the National Council for Scientific and Technological Research[2] and the intersectoral committees, as well as, the state established in 1995 three national agencies to undertake the task of research and development.

The year 1995 witnessed the establishment of the National Agency for Development and Research in Health[3], the National Agency for the development of university research[4] , and the National Agency for Documentation in Health[5], in addition to a fourth national agency specialized in the valorization of scientific research results and technological development, established in 1998[6] . These reforms were followed by a series of legislative and regulatory texts, notably Law 99/05, on April 4, 1999, including the directive law for higher education [7].

Through these reforms, Algeria tried to ensure the openness of scientific research and technological development to the economic world and restore consideration to the research function in higher education and scientific research institutions by encouraging the valorization of research results.

However, the reality showed that despite the recovery known by the scientific research sector, the public sector researchers continued to face difficulties in communicating their research results to the economic sector. Therefore, the state decided to review the legislative framework through highlighting its national policy aiming at advancing scientific research and technological development, in order to ensure the continuity and activity of research within a stable and homogeneous institutional framework and drive it to open up to the social and economic sectors

This strategy was embodied by Law n°. 15-21 on December 30, 2015, containing the orientation law on scientific research and technological development [8]. This law highlighted the state's desire to develop a strategy for transferring scientific research technology to the implementation bodies, therefore, transferring scientific and technical expertise within institutions of higher education and training, and scientific research institutions, to serve the national economy, by supporting the financing of activities related to scientific research and technological development, motivating the process of valorizing research results through national programs for research, establishing centers, research units, and structures for the valorization of research results within institutions of higher education and scientific research, and establishing technological poles in fields of high added value.

Through Law n° 15-21, the state emphasized that scientific research and technological development has become a national priority [9], as it enjoys an excellent position compared to other sectors, which reveals the state's keenness to give a new dynamic to the process of scientific research and technological development, being a key factor to upgrade the knowledge economy.

Based on the aforementioned, we try through this research paper to shed light on the concept of the process of valorizing the scientific research results and its relationship to the development of the economic sector. This relationship is achieved through the bridges and ties that the state establishes by means of a homogeneous institutional framework that watches over the valorization of scientific research product, in order to ensure greater openness to the economic institutions as being the main lever for the knowledge-based economy.

The answer to this problem statement is through two main axes. The first one deals with the concept of valorization of scientific research results and the structures in charge of it in Algeria (1), and the second addresses the practical mechanisms for the valorization of scientific research results (2)

1 - The Concept of Valorization of Research Results and the Structures in Charge of it in Algeria:

Scientific research is one of the economic development tools on which most countries in the world rely. Perhaps the secret behind the progress that developed and developing countries know is due to the great interest they give to various fields of science and scientific research.

According to the United Nations Development Program report on the Arab countries for 2019, it has become generally accepted that knowledge is the main component in production and determning productivity, and countries that suffer from the lack of knowledge and the stagnation of its development are condemned to weak productive capacity and diminishing development opportunities.[10]

Nowadays, valorizing the scientific research results and linking the research sector with the industrial and economic sectors is considered a national priority, if we want to create a knowledge-based economy model and build a knowledge society based on scientific research in all its forms. And perhaps the efforts made by Algeria, both in terms of organizational and institutional, reflect its desire to make institutions of higher education and training, and research institutions, open to the industrial and economic sectors.

Through this axis, we will try to give a concept to the process of valorizing the scientific research results and its relationship to the industrial sector (1-1), then touch on the structures in charge of the valorization process in Algeria (1-2).

1 – 1 Definition of the Process of Valorizing Research Results and its Relationship to The Economic Sector:

Professor "Meyer" considers that the main goal of effective cooperation between public research and private research is to transform the acquired knowledge and technological foundations into products through participation with research teams.[11] Based on this definition, what is meant by the valorization of scientific research results is to transform the knowledge, innovations, and technologies acquired within the framework of research into marketable products.

As for Professor **Blaizot-Hazard**, she considers that the term valorization means the increase, that is to say, giving an added value to something in the research field. So, what is meant by it is "scientific valorization" and not just "transferring or transforming the scientific product to economic institutions that intend to exploit it."[12] Thus, the process of valorizing the research results means, in one part, intellectual property, authors' rights, and patents, but in another part, it means transferring the scientific product to economic institutions for its exploitation.

Referring to the general report annexed to Law n° 05/08 of February 23, 2008[13], we find a special paragraph was devoted to "the valorization of scientific research results", it includes: Valorization includes all the processes that should be implemented, in order for the research to have a real impact, economically and socially, and to reach, directly or indirectly, new or value-added products used by existing institutions or established for this purpose.[14]

The report added that the outcome of scientific research demonstrated the scientific capabilities existing within universities and research centers; however, the impact of research activities on social and economic development remains weak. Therefore, the issue of transferring knowledge and skills between research spaces and the production world constitutes a permanent concern and factor in directing and formulating any policy related to scientific research and technological development, considering that the most active societies in the economic, social, and cultural fields are those that benefit from the knowledge industry.[15]

Referring to Law n° 15-21 on December 30, 2015, containing the orientation Law for Scientific Research and Technological Development, we find that "valorization" is defined as every activity that allows the possibility of using or marketing the results and knowledge of research skills[16].

The valorization of research results is divided into two types, "scientific valorization" and "economic valorization". Professor Blaizot-Hazard referred to them when she defined the valorization process, as she distinguished between scientific valorization and the transfer of scientific research towards economic institutions.

Scientific valorization is spreading knowledge, skills, and innovations acquired through scientific research within the community, by which we mean patents, intellectual property, and copyright. As for "economic valorization" is exploiting research activities or scientific research products by economic institutions. The term "valorization of scientific research results" is often used to denote the economic valorization of scientific research activity.

In this regard, the report annexed to Law n° 05/08 indicated that the economic valorization of scientific research activity and technological development is the final stage of the process of transferring products and knowledge from research spaces to the economic sector.

Thus, Economic valorization is a window for valorizing the scientific research activity, and this valorization will only be achieved through the relationship between the research sector and the industrial and economic sectors.

Today, the relationship between scientific research and the economic sector is one of the foundations of knowledge-based economic development. The knowledge economy is the one that exploits products, innovations, and knowledge obtained within universities and research centers and puts them into immediate implementation.

In this context, the two professors: **Benninghoff and Lereseche** consider that the interaction of the scientific research sector with the economic world, which is predominantly competitive, requires reducing the time between the innovation or discovery process and the immediate implementation of the scientific product.

The rapid valorization of public and private investments in the field of technological development is achieved only by setting the results of scientific research subject to immediate implementation[17]. In order to embody this purpose, there must be a strong and continuous relationship between the university, the research centers, and the economic sector through establishing scientific and technological poles.

Professor **Meyer** considers that achieving the relationship between the research sector and the economic or industrial sector requires a set of conditions that can be limited to the following:[18]

Taking incentive procedures by Public authorities through developing bridges and ties between basic and industrial research. Encouraging cooperation between the research sector and the industrial sector resulting in obtaining immediate marketable products.

In this regard, Professor **Meyer** asserts that the future of research must pass through the development of partnership, which depends on the incentive procedures set by the state in order to develop the relationship between basic research and industrial research.[19]

In this context, the research sector in Algeria is working on the openness of the university and research centers to the industrial and economic sectors, by concluding partnership agreements with several sectors, especially with the mining, industry, trade, fishing, and postal sectors, which will have a positive impact on the renaissance of the national economy based on knowledge.

By 2021, the scientific research sector has also embarked on the implementation of national programs of research in the axes that were given priority in the government's action plan, especially those related to food security, energy security, and citizen health. These programs, which extend over five (05) years, include the completion of (750) research projects in cooperation with economic partners.[20]

- Providing well-equipped research structures: this means the availability of research facilities equipped with tools and devices that allow the researcher to carry out his research, as economic institutions are looking for and are attracted to innovative and competitive research structures.

Since the issuance of Law n° 98/11, including the orientation Law for Scientific Research and Technological Development, Algeria has worked to embody the national policy in the field of scientific research through the establishment of bodies supervising the process of scientific research and technological development, including centers, units, and research laboratories, and providing funding through the National Fund for Financing Scientific Research.[21]

Following the issuance of Law n° 08/05 on February 23, 2008, including the five-year law 2008-2012, the scientific research strategy witnessed a remarkable development; the activation of the role of the National Council for Scientific and Technical Research, renewal of its formation, and the establishment of National Council for Scientific Research Evaluation. This period also marked the

establishment of the General Directorate of Scientific Research and Technological Development in 2008, whose priorities were to structure the scientific research sector, provide an integrated national research system, and raise the level of Scientific equipment and facilities by financing them through the National Fund for Scientific Research.

Until mid-2021, the scientific research network in Algeria included (06) research agencies, (46) research centers, including (18) research centers affiliated with the scientific research sector, and (28) research centers outside the university, distributed throughout the national territory and active in the field of applied research in industrial, agricultural, mining, atomic energy, and other specialties.

The number of research units reached (26) units, (12) of which are affiliated with universities and higher schools, and (14) research units affiliated with public institutions of a scientific and technological nature.

As for research laboratories, their number moved from (600) laboratories in 2008 to (1672) laboratories in 2021, and the number of integrated research teams within the laboratories affiliated with universities reached (6931) teams[22]. Today, all Algerian universities include laboratories in multiple specialties, equipped with research tools and equipment of High specification.

The number of university institutions reached (109) institutions, including (53) universities, (09) university centers, (11) higher schools for teachers training, (35) higher national schools, (01) university for continuous training, and (55) university institutions affiliated with sectors other than higher education, and (14) private institutions.[23]

- Establishing a legal framework for industrial property: the effective relationship between research and industry is based on the ability of public institutions to provide harmonized valorization policies, especially in the field of industrial property.[24]

In this regard, Algeria worked on establishing an integrated legal system for the regulation and protection of industrial and intellectual property, such as Ordinance n° 03-05 on copyright and related rights, Ordinance n° 03-06 on trademarks, Ordinance n° 03-07 on patents, and Ordinance n° 03- 08 related to the protection of layout-designs of integrated circuits, and all these texts were issued on July 19, 2003. [25]

Referring to the statistics of patent applications and other forms of intellectual property, such as trademarks, software, databases, tags, and industrial models, submitted by Algerian researchers for the years 2019 and 2020, we find that higher education and scientific research institutions recorded the highest percentage. Where the universities recorded (158) patent applications in 2020 compared to (139) in 2019. Followed by the research centers affiliated with the Ministry of Higher Education and Scientific Research, with (135) patent applications in 2020 compared to (117) in 2019. Then research centers not affiliated with the scientific research sector, with (31) patents compared to (29) in 2019.

Finally, the research agencies affiliated with the higher education and scientific research sector recorded the same number of patents in 2019 and 2020, estimated at (07) patents[26]. Accordingly, the total number of patent applications for Algerian researchers reached (331) in 2020, compared to (292) in 2019.

The University of Blida 1 holds the lead with (20) patents, followed by the University of Science and Technology Houari Boumediene with (15) patents, the University of Setif 1 with (14) patents, the University of Boumerdes with (11) patents, followed by the University of Biskra with (10) Patents.[27]

In 2020, the total number of intellectual property forms filed by Algerian researchers reached; (54) for literary and artistic works, (09) for software and databases, and (01) for plant possession certificate submitted by the National Higher School of Agriculture [28].All of the aforementioned forms of intellectual property (other than patents) were submitted by universities and research centers affiliated with the higher education and scientific research sector[29].

Finally, by referring to the statistics of the World Intellectual Property Organization (WIPO) about Algeria for the year 2019, we find that (638) patent applications has been submitted to the National Institute of Industrial Property (L'INAPI), including (113) for resident researchers and (525) for non-resident researchers. In 2019, Algeria issued (140) patents, including (109) for non-residents and (31) for residents, bringing the total number of patents in force to (4496).

1 - 2 Structures in Charge of the Valorization of Scientific Research Results:

The issue of valorizing the scientific research results is the responsibility of all sectors. The general report annexed to Law n° 08/05, including the five-year program (2008-2012), stated that "All successful experiences abroad show that the apparent, continuous and, unambiguous support provided by the public authorities is a necessary condition for achieving the harmonious development of the activities related to the valorization of scientific research results. [30]" Law n° 15/21, including the directive law for scientific research and technological development, defines the role that each of the following agencies undertakes in the process of valorizing the scientific research results:

1 – 2 - 1The Role of Central, Scientific, and Technical Bodies in the Process of Valorizing the Research Results:

The state is primarily responsible for the process of valorizing the scientific research results. Article 19 of Law n° 15-21 stipulates: "The state, represented by the Ministry in charge of scientific research and qualified bodies, shall take appropriate arrangements in order to valorize the scientific research results and technological development, particularly for the purpose of:

- Valorizing the value-added technologies and capabilities in engineering and available technological equipment.
- Raising the capabilities of adapting technologies.
- Promoting standardization.
- Facilitating the transfer of scientific research results and technological development to the social and economic sectors.
- Valorizing knowledge.
- Providing public authorities with the necessary experience in decision-making.

In accordance with the aforementioned article, the Ministry of Scientific Research is the first body entrusted with powers in the field of valorizing scientific research results. Thes powers are among the basic powers of the Minister of Higher Education and Scientific Research.

Article 07 of Executive Decree n° 13-77, on January 30, 2013, specifying the powers of the minister, states: "The Minister of Higher Education and Scientific Research in the field of valorizing research results, is charged with organizing and coordinating programs and projects related to the technological, industrial, and economic exploitation of research results. In this context, he is charged, in particular, with the following :

- Encouraging the establishment of economic branches in public institutions of higher education and scientific research.

- Suggesting incentive measures to encourage and activate the exploitation of research results as well as works of invention and creativity".

From the above, it is clear that the major sectors whose research results should be valorised are in the technological field, the industrial and economic sector.

1 – 2 – 2 General Directorate of Scientific Research and Technological Development:

This directorate is one of the main structures of the Ministry of Higher Education and Scientific Research concerned with the process of valorizing research results. It is also concerned with embodying all the provisions of the directive law for scientific research and technological development, especially the provisions related to the valorization of scientific research results. For this purpose, Executive Decree n°13-81 on January 30, 2013, defining the tasks of the General Directorate of Scientific Research and Technological Development, stipulates in Article(16), the powers assigned to the Sub-Directorate for the valorization of scientific research results, they are as follows:

- Suggesting draft texts related to incentive procedures for scientific and technological production.
- Designing, coordinating and embodying chains of valorizing scientific and technological production, especially the preparation and development of mechanisms that allow the conversion of research results into products that can be valorized.
- Defining and carrying out activities that promote research results and scientific and technological generalization.
- Ensuring the activation of valorization interests at the level of higher education institutions and research structures.

The role played by the General Directorate of Research in the field of valorizing scientific research results through the institutional organization (establishing valorization mechanisms), ensuring the follow-up of the activities of valorization structures and institutions, and generalizing the publication of research results, would contribute to creating bridges of cooperation between research teams and economic partners.

1 – 2 – 3 The Role Of Guiding, Coordination and Evaluation Bodies in the Process of Valorizing Research Results:

- The National Council for Scientific Research and Technologies:[31]

This council is the highest body in the country in the field of defining the major directions of the national policy for scientific research and technological development. The council exercises the powers of promoting national research in the field of technological and scientific innovation, as well as the task of evaluating the effectiveness of specialized agencies in valorizing research results for the benefit of the national economy within the framework of sustainable development. [32]

In addition to the tasks entrusted to the council under the constitution, Law 20-01,on March 30, 2020 defined the tasks of the council, particularly the task of promoting scientific and technical creativity in the university community and integrating it into social and economic development, and preserving, valorizing and strengthening national scientific and technical capabilities.[33]

The Council also gives its opinion on every issue related to defining, implementing, and evaluating the national policy for scientific research and technological development, as well as

valorizing the scientific research results and technological development activities submitted to it by the President of the Republic, the government, and public bodies.[34]

There is no doubt that the powers entrusted to the National Council for Scientific Research and Technologies will contribute to activating the relations between the university, research centers, and the economic and social environment, and the creation of a national economy based on knowledge.

- Permanent Sectoral Committees:

These committees exist at the level of each ministerial department and are charged with promoting it, coordinating and evaluating scientific research and technological development activities in the sector. Executive Decree n° 99-243, on October 31, 1999, defined the organization of these committees and entrusted them with the tasks of implementing and following up national programs for research and evaluating their results and proposing sectoral programs for scientific research that deserve funding from the National Fund for Financing Scientific Research and Technological Development.

- Intersectoral committees for the promotion of scientific research:

In accordance with Article 03 of Decree n°. 238-08 on July 27, 2008[35], these committees are responsible for programming, promoting, coordinating, and evaluating the research works and technological development or the national programs entrusted to it, and in this capacity, they are charged with proposing every work that would valorize the research projects results.[36]

- Thematic agencies for research:

Article 06 para 05 of Law n° 15-21, on December 30, 2015, defines the thematic agency as "a leading institution located between the central administration and the entities carrying out research activities. It is charged with coordinating, and implementing research programs within its field of competence and valorizing them."

Based on this definition, the thematic agency undertakes the follow-up of the scientific research and technological development activities carried out by the research entities, including laboratories and research teams, according to their scientific specialization. The thematic agency for research, in coordination with other structures concerned with research, especially with intersectoral committees, works on evaluating scientific research activities and valorizing their results, through evaluating the outcome of scientific research activities, selecting results that can be valorized, and participating in the exploitation of research results by developing systems and approaches for their valorization.[37]

The number of thematic agencies for research has reached five (05) agencies, in addition to a national agency for research, which will be the subject of study in the next axis.

- The Thematic Agency for Research in Science and Technology (ATRST)[38], based in El Harrach, Algeria. This agency replaced the National Agency for University Research Development (ANDRU)

- The Thematic Agency for Research in Health Sciences (ATRSS), based in Oran, replaced the National Agency for the Development of Research in Health (ANDRS)[39]. The Thematic Agency for Research in Health Sciences was reorganized in 2021 and renamed the Thematic Agency for Research in Health and Life Sciences (ATRSSV)

- The Thematic Agency for Research in the Social and Human Sciences (ATRSSH) based in Blida. It was created by Executive Decree n° 12-96, on March 2012, and dissolved by Executive Decree n° 21-207, on May 20, 2021.

- The Thematic Agency for Research in Nature and Life Sciences **ATRSNV**, based in Bejaia. It was established by Executive Decree n° 12-97, on January 01, 2012, and dissolved by Executive Decree 209-21, on May 20, 2021, and all its assets were transferred to the Center for Research in Nutrition and Agriculture Technologies.

- Thematic Agency for Research in Biotechnology, Agriculture and Nutrition Sciences, based in Constantine. It was established by Executive Decree n° 12-95, on March 01, 2012, and reorganized and renamed "the Thematic Agency for Research in the Social and Human Sciences" by Executive Decree n° 21-208 on May 20, 2021.

2- Practical Mechanisms for the Valorization of Scientific Research Results:

The issue of transferring knowledge and skills between the research spaces and the production world remains a concern and a factor in directing the policy related to scientific research and technological development. In the face of the absence of partnership between the scientific research sector and the economic and industrial sector in Algeria, which was mainly caused by the lack of bridges and legal ties that allow public sector researchers to transfer the results of their research and studies to the production world, since1998, the state has taken a set of legal procedures included in the directive law for scientific research and technological development, which stipulated the establishment of an integrated institutional system that does not only ensure the development of appropriate arrangements in order to direct, coordinate and evaluate the process of valorizing scientific research, but also works to create practical mechanisms that allow the economic valorization of scientific research activity by transferring the scientific product to the world of industry and economy.

These mechanisms were embodied in the National Agency for the Valorization of Scientific Research Results and Technological Development (2.1) and the establishment of economic branches and taking shares in companies concerned with the valorization of scientific research results (2.2)

2 – 1 The major role of the National Agency for the Valorization of Scientific Research Results and Technological Development ANVREDET:

The National Agency for the Valorization of Scientific Research Results and Technological Development was established by Executive Decree n° 98-137, on May 03, 1998[40]. The agency is a public corporation of an industrial and commercial nature (EPIC). The agency enjoys financial independence and is a trader in its relations with others. The agency is based in Algiers and undertakes the task of supporting and accompanying innovative research and developing ways of partnership between the scientific research sector and industrial and economic sectors. Since its establishment, the agency was under the supervision of the Ministry of Higher Education and Scientific Research, until 2008, the agency has become under the supervision of the General Directorate of Scientific Research and Technological Development. In particular, the agency is responsible for:

- Identifying and selecting research results that can be valorized.
- Encouraging and supporting technological innovation and invention.
- Upgrading valorization methods and approaches.
- Organizing technological vigilance by establishing observatories and technology dissemination networks.

- Developing and promoting means of cooperation and partnership between the scientific research sector and the economic sector.
- Assisting innovative project holders and inventors and accompanying them through providing services to achieve original models, studying the market, searching for partners, and preserving patents and intellectual property. According to Article 17/3 of Executive Decree n° 137-98, the Agency installed its regional delegations at the national level and chose the University of Constantine 1 for the East delegation, the University of Boumerdes for the middle delegation, Al-Sanieh University of Oran for the West delegation, and Kasdi Merbah University for the South delegation.

These delegations form an integral part of the agency's organizational structure. They allow the embodiment of its goals and tasks in the best way, as they are located near the movement of innovation and innovative project holders, as well as the adaptation of the way the agency works with regional specificity.

As for the areas of intervention of the Agency and its delegations, they are diverse, including the field of agriculture and food, environment, water resources, industry, energy, mining, architecture, health, information and communication technology, economy, law, and other fields.

Given that the National Agency for the Valorization of Research Results was a link between the research world and the economic institutions' world, it worked to lay the ground for valorization by organizing valorization workshops and training courses throughout the year within educational and scientific research institutions, therefore, it is obliged to control technology to accompany innovative projects and suggest means of financing them.

In order to carry out its tasks to the fullest, the Agency developed a work program that enables searching for innovative and creative capabilities existing within universities, higher schools, and research centers, which can be valorized and put at the service of social and economic sectors.

In the embodiment of this program, the agency identifies innovative ideas and evaluates them technologically by experts in various fields, particularly financial, legal, mining, communication, marketing, and project management.

The National Agency for the Valorization of Research Results is the agency that accompanies the innovator from the birth of the idea until the transfer of the scientific product to the economic enterprise or assists the innovator in setting up a start-up. This assistance goes through the following stages:

- Defining the project (innovative idea).
- Providing technical expertise.

Evaluating the Project.

- Protecting creativity (patent or intellectual property).
- Assisting in developing prototypes.
- Market study.
- Establishing a partnership between the investor and the innovator or accompanying the latter in setting up his start-up.

This program, run by the National Agency, contributed to protecting the ideas and innovations of researchers and inventors and transferring them safely to the economic sector. The agency was able to double the number of start-up incubators at the national level and organize a group of scientific

events with specific topics, such as the Waste Transformation Technology Forum, the National Salon for Innovation, the National Salon for the valorization of National Research Projects, and the National Competition for the Best Innovation Project.

In 2021, the agency registered (47) innovation projects, and the specialized committee of the agency selected (17) competitive projects, and (5) projects of them won. The National Agency for the Valorization of Research Results, together with the Technology Incubator of the university of El Oued, organized a ceremony to crown the winners. As well as the university of El Oued and the agency, through the incubator, accompanied the winners in setting up their start-ups in order to embody their ideas in reality. Perhaps the issuance of Executive Decree n° 21-254, on September 15, 2020, including the establishment of a national committee to grant the label "start-up" and "business incubator" [41] amended and supplemented by Executive Decree n° 21-422 on November 4, 2021[42], will help innovators transfer their research and studies through setting up their start-ups, as being reliable actors to support economic development.

2 – 2 Establishing Economic Branches and Taking Shares:

Since 1998, the higher education and scientific research sector has known the birth of public institutions entrusted with the mission of higher education, scientific research, and technological development.

Law n° 11/98[43] and Law n° 21/15, on December 30, 2015, including the Directive Law for Scientific Research and Technological Development, stipulated that "a public institution of a scientific and technological nature (EPST) is established to undertake the implementation of scientific research and technological development programs[44], and this institution shall take the form of a research center.

Likewise, Law n° 05/99 on April 04, 1999, including the directive law for higher education, stipulated "a public institution of a scientific, cultural and professional nature (EPSCP)[45] is established to undertake the tasks of higher education, scientific and technological research and the valorization of its results."[46] This institution takes the form of a university, university center, or school.

As public institutions, they are funded mainly from the state budget in the form of appropriations for management and equipment. They also acquire other public resources in the form of donations, bequests, and subsidies. In order to enrich and diversify the incomes of these public institutions, the law provided them with the authority to carry out activities and services in the form of studies, research, pedagogical assistance, organizing training courses, and concluding research and expertise contracts[47]. And since these public institutions, such as universities, higher schools, and research centers, are the place that abounds in scientific research, innovations, and creations, Law n° 05/99 and Law n° 21/15 gave these public institutions the possibility of using part of the resources resulting from the performance of services and expertise, and those resulting from the exploitation of patents, invention, licensing, and trading the products of various activities, to establish an economic branch or taking shares in institutions or companies, in order to valorize of their scientific research results. [48]

Accordingly, since 1998, the Algerian legislator has opened, for the first time, the door for public sector researchers to communicate their scientific research results to the industrial and economic sectors through a legal mechanism that facilitates the process of transferring knowledge, skills, and innovations to the production world.

However, the Algerian legislator did not specify, through the aforementioned laws, the legal form of the economic subsidiary institution, which referred to the general rules contained in the Algerian commercial law in the part devoted to companies. Nevertheless, the regulatory texts of the Higher Education Directive Law and the Scientific Research and Technological Development Directive Law have rectified this lapse. Executive Decree n° 11/396, on November 24, 2011, specifying the model organic law of a public institution of a scientific and technological nature, and Executive Decree n° 11/397 of the same date, specifying the rules for the management of a public institution of a scientific, cultural and professional nature, stipulated the legal form of the economic subsidiary institution and the conditions for its establishment. Article 56 of Executive Decree n° 11/396, as well as Article 13 of Executive Decree n° 11/397, stipulated that a public institution may use part of the institution's resources resulting from the activities it provides in terms of expertise or exploitation of patents and other revenues, in order to establish an economic subsidiary institution to valorize the scientific research results.

The subsidiary institution may take the form of a limited liability company or a joint-stock company[49] after the deliberation by the board of directors of the public institution and the express approval of the Minister in charge of higher education for public institutions of a scientific, professional and cultural nature, and the relevant Minister for institutions of a scientific and technological nature.

As for the capital of the economic subsidiary institution, it must be subscribed from the private resources of the public institution resulting from its activities and classified under the heading "Off-Budget operations". The board of directors of the public institution monitors the cash share allocated for the establishment of the subsidiary institution before approving the annual budget of the public institution.

The public institution may also provide an in-kind share in the form of patents or a work submission[50]. The scheme for the establishment of the economic subsidiary institution shall be presented to the board of directors of the public institution. This scheme shall include a presentation of the project, framing, and an analysis of the market, products and services provided, and the marketing and commercial strategy followed, as well as clarifying the ways and means of financing it.[51]

The Algerian legislator gave the public institution, in its two forms, of a scientific and technological nature EPST or a scientific, cultural and professional nature EPSCP, the possibility of obtaining shares in other economic institutions or companies concerned with the valorization of scientific research results, provided that the offer of these shareholding institutions is in line with the public institution field of activity. Taking shares in other companies is also subject to the same conditions, as it must be the result of the private resources resulting from the various activities of the institution, and it must be subject to the deliberation by the Board of Directors and the approval of the relevant authority[52] in the form of a decision issued by the relevant Minister.

Regardless of the legal mechanism that the public institution chooses to valorize and study its research results, whether by establishing a subsidiary institution or taking shares in companies active in the field of valorizing the scientific research results, the objective of this mechanism must be in line with the activity of the public institution within the framework of public service for higher education, scientific research, and technological development.[53]

However, the regulatory texts of public institutions of higher education, scientific research, and technological development, defining the legal form of the economic subsidiary institution charged with the process of valorizing the scientific research results, did not contribute much to embodying the process in reality, as the establishment of the economic subsidiary institution is neither

limited to defining its legal form nor to obtaining the approval of the commission or the relevant authority, but lies in the method of financing this economic subsidiary institution.

The public institutions concerned with higher education, scientific research, and technological development are institutions funded mainly by the state budget, as mentioned above, where the appropriations necessary to perform their tasks are registered in each fiscal year, with allocating a small part of this budget to scientific research, and this is on the one hand. On the other hand, the law prevents these public institutions from using public money to establish economic branches, therefore, they are obliged to search for this funding in their revenues resulting from their activities, including the performance of services and expertise, the exploitation of patents, or the provision of studies and research.

Given that the returns of these activities remain at this stage insufficient to form capital that allows the establishment of an economic subsidiary institution, especially since the legally stipulated forms require considerable capital in accordance with requirements for the establishment of commercial companies stipulated in the commercial law, this legal mechanism has not been used much to advance the process of valorizing the scientific research results.

The commercial company, whether in the form of a limited liability company or a joint-stock company, needs partners or shareholders and also needs sums of money to establish it, with the necessity of matching the purpose of its establishment with the purpose of the partner or shareholder in the case of the economic branches established to valorize the research results, as stipulated in the law, which is difficult to achieve it in reality.

In addition to that, when establishing the economic branch, the public institution does not aim, at least in the first stage of its establishment, to achieve commercial profits as much as it aims to distribute the results of its research and studies. Therefore, the process of valorizing the scientific research results in Algeria, through the establishment of economic branches or taking shares, did not witness the same jump as the activity of scientific research and technological development..

Although they are still in an embryonic stage, scientific research centers have been pioneers in the field of establishing economic subsidiaries since 2002, and higher education and scientific research institutions have only accompanied them since 2018.

The Algerian institution for Information and Communication Technologies (SATICOM) is the first leading institution in Algeria in the field of valorizing the scientific research results.

The **SATICOM** institution was established by the National Center for the Development of Advanced Technologies **CDTA** in 2002, in the form of a limited liability company with one person **EURL**, that is , before the issuance of the regulatory texts for public institutions in 2011 and the determination of the legal form of economic branches in 2015. And in the implementation of Executive Decree 11/396, the research center changed the legal form of the SATICOM subsidiary institution from a one person company to a joint- stock company, where Algeria Telecom owns 67% of the shares compared to 33% for the National Center for the Development of Advanced Technologies.

In 2018, Algeria Telecom raised the company's capital to 44,916,000 DZD and acquired 95% of the shares compared to 05% for the research center, which made Algeria Telecom become the first leading economic institution in the field of valorizing the research results.

The main objective of establishing SATICOM was to valorize the developmental scientific research results and to market the technological products resulting from the research. The institution

was able to conclude several contracts and agreements, especially in the field of technical assistance, consultancy and expertise in the field of developmental research.

The Research Center in Industrial Technologies (CRTI) followed the same path. It established its economic branch in the form of a joint-stock company with 100% capital belonging to the center, under the name of Welding, Monitoring and Industrial Expertise Company, and it is active in the theoretical and applied professional training field.

Similarly, the Scientific and Technical Research Center in Physical and Chemical Analyzes established its economic branch in 2013, in the form of a stock- company under the name SPA-CRAPC Expertise. Its major role is to develop the results of research and studies in the field of physical and chemical analyzes and provide expertise and technical assistance.

At the level of Algerian universities, and according to Executive Decree n° 11-397 on November 24, 2011, in early 2020, two institutions of higher education established a subsidiary institution to valorize their scientific research results. in 2018, Houari Boumediene University of Science and Technology, Bab Ezzouar, established a joint-stock company under the name Bab Ezzouar science and Engineering, BSE Spa.[54]

Likewise, in 2019, the National Polytechnic School of Oran established a subsidiary institution in the form of a limited liability company under the name Sarl ENP VALOR[55]after the approval of the school's board of directors and the approval of the technical committee charged with studying applications for the establishment of subsidiary institutions at the Ministry of Higher Education. The institution is active in the field of manufacturing materials and equipment related to solar and electrical energy and those resulting from other energy sources.

The simple comparison between the number of public institutions of a scientific, professional and cultural nature (national and private universities and higher schools), which reached (109) institutions until 2021, and the number of public institutions of a scientific and technological nature (research centers), which reached (46) centers, whether belonging to the higher education and scientific research sector or outside the sector, and between the number of economic branches (filiales)established for the valorization of scientific research results, the vast difference appears between the aspirations of the state in the field of valorizing scientific research and the embodiment of the valorization process in reality, as the recorded results do not reflect the amount of attention given to this process by the state, in which the number of the valorized projects remains insufficient compared to the needs of the national economy.

Conclusion:

Law n° 98/11 on August 22, 1998, constituted the cornerstone of setting a national strategy for scientific research and technological development, as this law embodied the state's desire to transfer research technology to the implementation bodies through the valorization of scientific research and studies existing within universities and research centers, in order to serve the national economy.

Law n° 98/11 was followed by a series of legislative and regulatory texts, particularly Law n° 99/05 on April 4, 1999, including the directive law for higher education - introduced many reforms to the higher education system - which allowed highlighting the role of the university in the research field, as well as Law n° 15-21 on December 30, 2015, which reviewed the orientation law and the five-year program for scientific research and technological development (1998-2002). Through this legal system, the state established a homogeneous and stable legislative and institutional framework that works to give a new dynamism to the research process and drive it to be open to the social and

economic sectors. This legal system also reflected Algeria's efforts to include scientific research activity in the process of building a state based on a knowledge economy.

Despite the support provided by the state to the scientific research sector to make it open to the production science, such as: installing valorization support structures whose mission was to facilitate the process of cooperation between research teams and external partners; installing the valorization structures for research products to provide prototypes and samples; financing research activities; and encouraging the relationship between Economic institutions and innovators through partnership, research and university studies remain far from the economic world.

The various reports submitted to the National Council for Scientific Research and Technological Development confirmed that despite the efforts made through the accomplished research programs and projects, and the high number of registered patents, their impact on the development of the economic and social sectors remains small and do not live up to the aspirations of the state and the challenges facing the economic sector, whether due to the lack of projects and the non-valorization of research results or the non-exploitation of the legal bridges provided by the directive law for scientific research and technological development.

With the exception of the National Agency for the Valorization of Research Results and Technological Development, which in recent years has developed a program to valorize the scientific research results, through holding awareness sessions within national universities and schools to detect innovative ideas and innovators and accompany them in the process of valorizing research, creating competitions for the best innovation project, and establishing partnerships with incubators existing within universities, and other steps taken by the Agency. However, the process of valorizing the scientific research results by establishing economic branches or taking shares in companies concerned with valorizing the scientific research results remains in its embryonic stage and needs greater motivation by public authorities.

Perhaps reviewing the regulations related to the distribution of revenues resulting from the activities of public institutions of a scientific, cultural, and professional nature (universities and higher schools) and public institutions of a scientific and technological nature (research centers), resulting from the services and expertise they perform, and making them more appropriate, will allow the latter to exploit those resources to establish an economic branch. Noting that the revenues collected by the public institution are not exploited individually, but rather are distributed in the form of contributions to the National Fund for Scientific Research, and the form of incentive bonuses to employees participating in the relevant activities, and part of them is granted within the framework of social services. Thus, the weakness of the capital collected by the public institution is the main reason that prevented it from exploiting the legal bridges provided by the Directive Law for Scientific Research and Technological Development to valorize the research results.

And Since the budget allocated for scientific research in Algeria is not sufficient so far, it seems necessary to review the strategy of funding scientific research and involving financial companies, especially after the closure of the National Fund for Scientific Research and Technological Development.

Citation:

[1]Law n° 98/11 was amended and supplemented by Law 08 -05on February 23, 2008, and subsequently repealed by Law 15/ 21on December 30, 2015, including the Directive Law for Scientific Research and Technological Development.

[2]About the National Council for Scientific and Technical Research (see later)

[3]The National Agency for the Development of Research in Health (ANDRS) was established by Executive Decree n°. 95- 40 on January 28, 1995.

[4]The National Agency for the Development of University Research (ANDRU) was established by Executive Decree No. 95-183 on July 02, 1995.

[5]The National Agency for Documentation in Health (ANDS) was established by Executive Decree n° 95-319 on October 14, 1995.

[6]The National Agency for Valorization of Research results and Technological Development (ANVREDET) was established by Executive Decree n° 98-137 on May 03, 1998.

[7]Amended by Law 2000-04 on December 06, 2000 (Official Gazette No. 75, on December 10, 2000, p. 04) and amended and supplemented by Law n° 08-06 on February 23, 2008 (Official Gazette n° 10, on February 27, 2008, p.: 38)

[8]See: Article 02 of Law No. 15-21 on December 30, 2015 (Official Gazette No. 71, on December 30, 2015, p. 06)

[9]Law n° 15-21 on December 30, 2015 amended by Law No. 20-02 on March 30, 2020 (Official Gazette, n°. 20, pp. 07-08)

[10]Report " The Future Of Knowledge: A Foresight Report 2019" United Nations Development Program in the Arab Countries, December 2019. To view the report, see the link:
knowledge 4 all. com/ar/130/Pages/2019إستشراف- مستقبل- المعرفة.

[11]Meyer (M),Pour une Recherche sans Frontières, In Revue Politique et Parlementaire, Volume 101, N : 998, Janvier- Février 1999, P : 119 a 121.

[12]Blaizot- Hazard (C), Le Droit de la recherche scientifique, Presse Universitaire de France, Paris, 2003, P : 115.

[13]Law n° 08-05 on February 23, 2008, amending and supplementing Law n° 98-11 on August 22, 1998 , containing the directive law and the five-year program for scientific research and technological development 1998-2002.

[14]The general report annexed to Law n° 08-05 , on February 23, 2008 (Official Gazette No. 10 of February 27, 2008, p. 29).

[15]The general report annexed to Law n° 08-05, op cit, p 30.

[16]See: Article 06, paragraph 10, of Law No. 15-21, on December 30, 2015.

[17]*Benninghoff (M) et Leresche (J.P),La Recherche Affaire d'état, enjeux et Luttes d'une politique fédérale des sciences ,Collections Le Savoir, Suisse, Presses Universitaires Romandes, Lausanne,2003,P: 15.*

[18]Meyer (F),Pour Une recherche sans frontières, Op.cit, P : 201

[19]idem, P.201

[20]See: Report on the outcome of the achievements of the higher education and scientific research sector for 2020-2021 on the website: mesrs.dz.

[21]Review: the joint ministerial resolution, on July 22, 2012, specifying the methods of monitoring and evaluating the special allocation account No. 082-302, entitled "The National Fund for Scientific Research and Technological Development."

[22]L'Annuaire électronique des laboratoires de recherche, Disponible sur le site dalilab.D.G.R.S.D.T.dz

[23]Report on the outcome of the achievements of the higher education and scientific research sector, op cit.

[24]Meyer (M), Op.cit, P: 201.

[25]To review the aforementioned legal texts, see: The Official Gazette, n° 44, on July 23, 2003.

[26]Statistics of applications for invention and other forms of intellectual property for Algerian researchers. The document of the General Directorate of Scientific Research and Technological Development for the year 2019 is available at: DGRSDT.dz.

[27]According to Articles 25 and 26 of Presidential Decree n° 05-275 of August 02, 2005, specifying the procedures for filing and issuing patents, the Algerian researcher (inventor) informs the employing institution of each invention he has reached through a written document containing the technical characteristics of the invention. The inventor and the institution are obligated to keep the

invention confidential until the patent application is filed, and the inventor may file the patent application in his name if the institution expressly abandons the patent claim.

[28]The Higher National School of Agriculture submitted an application for the approval of the Plant Possession Certificate in 2019 at the National Center for Seed and Seedling Control, but it has not yet entered into force.

[29]Statistiques sur les titres de propriété intellectuelle des chercheures algériens. Document Etabli par la direction général de la recherche scientifiques et du développement technologie, Année 2020, Disponible sur le site D.G.R.S.D.T. dz

[30]General Report for the year 2008, Official Gazette, No. 10, on February 27, 2008, p.: 09.

[31]The National Council for Scientific and Technical Research was established by Executive Decree n°. 92-23, on January,13, 1992, as an advisory body in charge of setting major directions for the national policy of scientific research and technological development. This decree was repealed by Executive Decree n° 08-237 , on July, 27, 2008, specifying the composition of the National Council for Scientific and technical research and its work. In accordance with Law n°. 15-21, on December 30, 2015, containing the Directive Law for Scientific Research and Technological Development, the Council took the name "The National Council for Scientific Research and Technological Development.The recent constitutional amendment of 2016, according to Article 206, created "A National Council for Scientific Research and Technologies," which was confirmed by the constitutional amendment of 2020 in Article 216.

[32]Review: Article 217 of Presidential Decree n°. 20-442, on December 30, 2020, containing the constitutional amendment of 2020 (Official Gazette, Issue 82, on December 30, 2020).

[33]Review: Article 003 of Law n° 20-01 , on March 30, 2020, defining the tasks , formation and organization of the National Council for Scientific Research and Technologies (Official Gazette, No. 20, on: April 05, 2020).

[34]Review: Article 04 of Law 20-01

[35]Decree n° 08- 238, on July 27, 2008, amending and supplementing Executive Decree No. 92- 22 on January 13, 1992, including the establishment of intersectoral committees to promote scientific and technical research. (The Official Gazette, No. 43, on July 30, 2008)

[36]review: Article 03 of Executive Decree n° 08-238, on July 27, 2008.

[37]Review: Articles 3, 4, and 5 of Executive Decree n° 19-232 on 13 August 2019, defining the tasks, organization, and functioning of the thematic agencies for research, supplemented by Executive Decree n° 21-205 on 20 May 2021.

[38]Established by Decree n° 19-12, on January 09, 2012, including the transformation of the National Agency for the Development of University Research into a thematic agency for research in science and technology. This decree was repealed by Executive Decree n° 21-206, on May 20, 2021, reorganizing the Thematic Agency for Research in Science and Technology.

[39]established by Decree n° 12-20, on January 09, 2012, including the transformation of the National Agency for the Development of Research in Health into a thematic agency for research in health sciences. This decree was repealed by Executive Decree 21-210, on20 May 2021, reorganizing the Thematic Agency for Research in Health Sciences and changing its name.

[40]Review: The Official Gazette, No. 28, on May 3, 1998.

[41]Review: the Official Gazette No. 55 of September 21, 2020.

[42]Review: the Official Gazette No. 84 of November 4, 2021.

[43]Review: Article 1/17 of Law 98/ 11on August 22, 1998, including the directive law and the five-year program for scientific research and technological development (1998-2002).

[44]Review: Article 34 of Law n° 15/21, including the directive law for scientific research and technological development

[45]Article 31 of Law n° 99/05, on 04 April 1999, including the directive law in higher education. (The Official Gazette, No. 24,on 07 April 1999)

[46]Article 38 of Law 99/05.

[47]Review: Article 48 of Executive Decree n° 11/396, on November 24, 2011, specifies the model organic law for a public institution of a scientific and technological nature. And Article 06 of Executive Decree n° 11/397, on November 24, 2011, defines the rules for the management of public institutions of a scientific, cultural and professional nature (Official Gazette, Issue 66,on December 04, 2011)

[48]Review: Article 37/2 of Law 99/05, and Article 34/3 of Law 15/21.

[49]Review: Article 59 of Executive Decree n° 11/396 and Article 14 of Executive Decree n° 11/397.

[50]Review: Article 60 of Executive Decree n° 11/396.

[51] Review: Article 63 of Executive Decree n° 11/396 and Article 18 of Executive Decree 11/397

[52]Review: Article 60 of Executive Decree n° 11/396 and Article 16 of Executive Decree n° 11/397.

[53]Review: Article 62 of Executive Decree n° 11/396 and Article 17 of Executive Decree n° 11/397.

[54]See Resolution n°. 342 on April 15, 2019, including the approval of the deliberation of the Board of Directors of Houari Boumediene University on December 26, 2018, in the official bulletin of the Ministry of Higher Education and Scientific Research.

[55]See Resolution 869 on June 12, 2019, including the approval of the deliberation of the Board of Directors of the National Polytechnic School of Oran on December 13, 2018, in the official bulletin of the Ministry of Higher Education and Scientific Research.