

## The role of research laboratories in raising university performance

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### **Abstract:**

*In this context, Algeria has undertaken a number of radical reforms that have affected higher education. New Law No. 21/15 of 30 December 2015 was enacted to encourage and value scientific research and technological development. The new measures contained in this Act, which provides a basis for technological development, are designed to adopt scientific research measures that serve the national economy by facilitating the task of transforming the results of theoretical scientific research into the social and economic sector and in the industrial sphere.*

**Keywords:** *research laboratories; higher education; scientific research; technological development*

### **Introduction:**

There is no doubt that mankind evolved when it relied on the scientific approach to explore and understand phenomena where all ancient civilizations contributed to advancing science from Pharaonic civilization through Arab-Islamic civilization to modern Western civilization. Higher education means every formative pattern offered at the post-secondary

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level.<sup>1</sup> In Algeria, where the first university in the French colonial era, known as the University of Algiers, was founded in 1909. It went through prosperous periods but it did not last long and its performance declined terribly in the field of scientific research.

**Subject importance:**

Scientific research is an important factor of development on the one hand, and a pivotal function of university functions as well as teaching and community service on the other. This requires attention through the creation of institutions and structures dedicated to its promotion and improvement, including research laboratories, which are the base unit for scientific research at the university level.

while at the same time giving the possibility of completing doctoral theses in the professional environment, as well as the state's support for the public or private creative institution. The act also includes promoting and valuating scientific research and technological development in the social and economic sectors, knowing that the new law enshrines the concept of researchers and research in the industrial sphere.

**Objectives of the study:**

The subject of scientific research laboratories and national research programs is considered the gateway to entering the new law. they aim to develop Algeria's renewable energies and pursue sustainable development, in particular with a set of conditions adopted by national scientific research programs, such as the fact that the heads of proposed research projects have the rank of professorship, whether relating to the rank of Professor of Higher Education or Lecturer Professor A, or respect the actual number of research teams with a maximum of 3 to 6 members that cannot be exceeded. In this paper we will try to:

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<sup>1</sup> - Dr. Ali Azzouz, The Role of the Laboratory and the Scientific Council in the Dynamics of the Laboratory, National Forum on the Prospects of Graduate Studies and Scientific Research at the Algerian University, 23 to 26 April 2012, p. 227.

- Know the precise concept of scientific research laboratories.
- Indicate and clarify the administrative structure on which scientific research laboratories are based in accordance with the applicable legislation.
- Demonstrate various justifications and motives for embracing scientific research laboratories and the factors of the latter's success.
- Identify the difficulties and challenges that prevent scientific research laboratories from achieving the levels required.

**The proposed problem:**

How have scientific research laboratories contributed to the development and improvement of university performance and community service towards shaping the path of meaningful scientific research?

In this regard, we seek to answer a range of questions about the strategic scientific importance of scientific research laboratories. Are there difficulties in facilitating research work in front of these laboratories? Does it increase its capacity to provide budgets? Do these laboratories make effective contributions to the national economy in order to create an administrative atmosphere? Are the technical and scientific requirements for the establishment of research laboratories make them an active partner in the national economy?

**Approach:**

To answer the problem, we have adopted the descriptive approach to define the terms of scientific research laboratories, and the analytical approach to reach the extent to which research laboratories contribute to the development of university performance and upgrade the required scientific level.

We wanted this problem to be answered through the following axes:

- **First axis:** Definition of Scientific Research Laboratory.

- **Second axis:** justification for the establishment of the scientific research laboratory and the difficulties of its work.

**Third Axis:** Structuring the Scientific Research Laboratory.

### *I. Concept of Scientific Research Laboratory:*

Research laboratories in Algeria are one of the new formats developed by the Ministry of Higher Education and Scientific Research to raise the level of scientific research and thus create a wide field for researchers to practice their research and scientific work. Since the issuance of Directive 11/98 and subsequent executive decrees, the movement of establishing laboratories in university institutions has begun, as referred to as “an organizational structure that combines a group of research teams headed by a laboratory director who organizes research in axes by specialization in order to carry out the production of knowledge and objectives, as laboratories belong to the university”.<sup>1</sup> Despite the many and different fields in which scientific research laboratories are active and the reflection of this in the nature of their functions, they share the main functions of achieving the objectives of research and technological development in a specific scientific field, participating in the preparation of research programs related to its activities and participating in the acquisition, control, and development of new scientific and technological knowledge.<sup>2</sup>

Scientific research laboratories are one of the most important research structures developed to carry out the process of scientific research, and it is an official institution with a set of objectives to provide scientific and

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<sup>1</sup> Zaidi and Houidi, University Foundation, A Space for the Production of Scientific Knowledge, The Status of Scientific Research Laboratories and Research Competencies at the Algerian University, Journal of Humanities and Social Sciences, Vol. 02, Issue. 27, 2016, p. 480.

<sup>2</sup> Sabri Mokemeh, Iman Ramdan, The Role of Research Laboratories in Achieving Sustainable Development through Social Innovation, Case Study of Economic Sciences Laboratories in Algeria, Journal of Innovation and Marketing, Volume 09, Issue 01, 2022, pp. 18 (13-28).

knowledge services to the community, supervised by researchers. The research laboratory consists of three components:<sup>1</sup>

- **Human source:** Consisting of the director of the laboratory according to the research constituted.
- **Financial source:** All material spaces, namely offices, workshops, equipment, etc.
- **Moral source:** The legal formula that applies to this gathering through its organic, financial, and legal independence from the university administration because it is an institution with a public moral personality independent of the university's administration.

Thus, the number of laboratories established at the university has evolved through stages, where in 2000, 301 laboratories were accredited, increasing in 2003 to 542 laboratories and reaching 680 in 2009. Furthermore, Algeria has issued a series of legislative texts to revitalize research areas, including Law No. 11/98 of 22 August 1998 on the Directive Act and the Projection Policy Program of five years 1998/2000, related to the establishment of a National Plan for Scientific Research (PNR) and the establishment of a National Fund for Scientific Research and Technological Development (FNR) responsible for financing research. In order to implement Act No. 11/98 and Executive Decree No. 99/244 of 31/10/1999 on the creation, regulation, and work laws within the research laboratory, each research professor or assistant researcher can propose a file for the establishment of a research laboratory. The research laboratory carries out one or several topics of scientific research and technological development related to national research programs. Article 10 Law No. 98/11 states that the laboratory must

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<sup>1</sup> Qassi Mohammed Al-Hadi, Scientific Research Laboratories: Their Fields, Spaces, and Their Cognitive and Applied Roles in the Development of Scientific Research, Al-Hikma Journal of Philosophical Studies, 2018, p. 12.

be subject to the Scientific Council of the institution of which it is affiliated.<sup>1</sup>

The Research laboratory aims to accomplish research and development objectives, carry out studies and research work, participate in the acquisition of knowledge, improve knowledge and composition for research and the dissemination of scientific information and results obtained. It is supervised by an elected director and it must consist of four research units; each unit run by a qualified researcher and consisting in turn of at least three researchers. The Research laboratory includes a special Board of the laboratory charged with the preparation of the programs and the assessment of the anticipatory cases of the collections and expenses provided by the Director of the laboratory. Moreover, we find that the laboratory has the autonomy of financially controlled management where this is indicative. It is financed by financial subsidies provided by FNRSDT. The research laboratory can find its own sources of funding, while respecting the laws relating to its research activities through establishing service lending contracts with a third person.

## ***II. Justification for the establishment of the scientific research laboratory and the difficulties of its work***

Research laboratories are a specialized scientific body belonging to an educational and research institution that contributes to researchers' activity. It is one of the research structures developed to carry out scientific research, and it is an official institution with a set of objectives based primarily on the provision of scientific services to society, supervised by a group of researchers.<sup>2</sup>

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<sup>1</sup> Article published on the website: / <https://www.univ-tlemcen.dz>, Hour of access 21:27, Date of access 2022/09/06.

<sup>2</sup> Karima Falah, Research and Development Laboratories and Scientific Research in Algerian Universities, Journal of Thought for Legal and Political Studies, Issue 01, March 2018, pp. 100 (95-106).

***A- Justification for the establishment of scientific research laboratories:***

The multiplicity of sources of knowledge and beyond knowledge, the emergence of a wave of globalization and its consequences such as intellectual property rights, the intrusion of technology, and the invasion of the web, satellites, telecommunications, and others reflected their effects on universities. Hence, Algerian universities had to create the appropriate ground to keep pace with these developments, especially since universities no longer merely provide students with information and knowledge, but become community research educational beacons.<sup>1</sup>

**In this context, what are the reasons that pushed the Algerian legislation to create scientific research laboratories?**

- 1. Searching for the development of university education performance:** due to the deteriorating quality level of university education. The university, like any other institution, has had a slew of modern challenges thrust upon it. Hence, to abandon old concepts and move towards improving the quality of performance and keeping pace with the needs of the new world, it was necessary to develop new ways of making a qualitative shift in the University's performance.
- 2. Because of the technological scientific revolution:** the university as a system open to major international prospects was affected by the phenomenon. With this scientific and technological development, the scope of scientific activities has expanded, and new terms based on the information world have begun to be operationalized<sup>2</sup>,

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<sup>1</sup> Mohamed Ali Nasr, "Developing Teacher Preparation and Training Programs in the Light of the Concept of Performance" Scientific Conference 14, Education Approaches in the Light of Performance Concept, Egyptian Association for approaches and Teaching Methods, Ain Shams University, Guest House, Cairo 2002, p. 51.

<sup>2</sup> Like the term arbitrage, the term cyber contract and others... , see Hussein Kamal Bahaa El-Din, Patriotism in a World Without Identity, Challenges of Globalization", Dar al-Ma'arif, Cairo, 2000, pp. 36-42.

selecting the best ones, employing them, building a database, and identifying innovations to consider introducing qualitative changes in scientific systems and focusing on scientific research.<sup>1</sup>

3. **Searching for competitiveness, especially under the financial position of economic enterprises.** Quantitative and qualitative weaknesses of economic enterprises manufacturing means of production have led to the search for the value of the advantage and the imposition of employment. Competitiveness has become measured in any country by the percentage of knowledge accumulation through the collection of expertise.
4. **Building human capital and capabilities:** This can only be done through the production, renewal, and employment of knowledge. Education in the XXI century requires that excellence and equality remain a priority in every educational policy through the introduction of new curricula, the introduction of computing processes and informatics to activate research, and the introduction of academic curricula along with professional curricula to prepare a student for the labor market directly.

***B- Difficulties of operating scientific research laboratories:***

Although the number of scientific research laboratories in Algeria has increased at an accelerated pace following the establishment of the General Directorate for Scientific Research and Technological Development, interest in scientific research laboratories has increased by encouraging and bringing these structures closer to research professors. It has seen variation from one specialization to another, with a great emphasis on areas of priority concerning national development, especially in the areas of technology, health, and life sciences.

Despite all the state's supplies and assistance to upgrade the operational research laboratories, it continues to suffer from serious obstacles and difficulties in performing its work and fulfilling its role, including:<sup>1</sup>

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<sup>1</sup> Amer Kandilji Imam Al-Samarrai, Quantitative and Qualitative Scientific Research,



- The increase in the number of scientific research laboratories is not associated with an increase in qualitative and outstanding performance.
- The absence of a strategy that identifies the community's domestic needs and underpins research projects.
- Lack of effective participation of all parties, members, and the actions of research laboratories to improve and upgrade scientific research.

### ***III. Structure of the Scientific Research Laboratory:***

Executive Decree No. 99/244 set out the rules for the establishment of a laboratory by establishing it as part of the completion of the university's Institution research program. The Research laboratory is mandated to carry out research on one or more topics related to development and technological development. Regional committees are appointed to study laboratories formation files for legal approval. The accreditation of research laboratories is carried out under a decision of the Guardian Authority. Concerning the tasks of the Scientific Research Laboratory, article IV of Executive Decree No. 99/244<sup>2</sup> specifies the tasks of the laboratory as follows:

- Achieving development goals in a particular scientific area.
- Carry out research work related to the subject matter.
- Participation in the acquisition of new scientific and technological knowledge to control and develop them.
- Participation in the improvement and development of levels, production techniques, and services.
- Upgrade and publish the research results.
- Contribute to the establishment of appropriate research networks to serve integrated development in all disciplines.

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Al-Bazouri Scientific House for Publishing and Distribution, Amman, Jordan, 2008, pp. 49-50.

<sup>1</sup> Karima Falah, op. cit., p. 103.

<sup>2</sup> Executive Decree No. 99/244/of October 31, 1999, as amended and supplemented in 2008, Official Gazette Issue. 77.

These objectives will make the scientific institution the closest to the service of research and the development of technologies to serve the achievement of the goals of society and its development.<sup>1</sup> Research laboratories also play a pivotal role in the development of the academic scientific publishing movement in Algerian universities through its various scientific activities in the study days, scientific seminars, and scientific forums.<sup>2</sup>

### **1. Composition of the Scientific Research Laboratory:**

The Scientific Research Laboratory consists of at least four research teams consisting of at least three researchers and is managed by a qualified researcher. The task of the research team is to carry out one or several research projects within the framework of the laboratory's program. Each project is supervised by a responsible researcher, and the head of the team can be the head of the research project. The Research Laboratory is managed by a laboratory director appointed by the Guardian Authority, who is responsible for the scientific management and financial management of the laboratory, as well as the proper functioning of the research laboratory. The Director of the research laboratory shall submit his program and the outcome of his activities to the evaluation bodies of the "University" for study, and shall prepare the estimated tables of income and expenditure. The director of the laboratory can also initiate, with the authorization of the rector, to conclude contracts and agreements to carry out research and studies. He also exercises peaceful authority over all users of the research at

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<sup>1</sup> Moulay M'hamed, Ziram Bahia, Ismail Nowara, The contribution of research laboratories to the scientific publishing movement in Algeria, Laboratories of the University of Ahmed Bougara Boumerdes as a model, Journal of the Researcher for Mathematical and Social Sciences, pp. 449 (447-456).

<sup>2</sup> Moulay M'hamed, Ziram Bahia, Ismail Nowara, Ibid., p. 448.

the laboratory and is responsible for the proper functioning of the research laboratory.<sup>1</sup>

## **2. Sources of the Scientific Research Laboratory:**

Funding research activities is an important requirement for promoting and revitalizing research. Due to the critical importance of controlling resources to ensure the liquidity and good functioning of scientific research laboratories and the provision of research requirements, Decree 99/244 specified the laboratory's resources, namely the contributions of the National Fund for Scientific Research and Technological Development, the management funds delegated by the rector, the returns of service activities, contracts, patents, and publications, contributions of national or international institutions, and donations and wills.

## **3. Advantages of scientific research laboratories:**

- Provide important spaces for research, mainly offices and workshops for research laboratories and such scientific equipment and means necessary to establish and conduct field and scientific research.
- A special budget for the laboratory which allows it to cover the budget for equipment and management according to annual estimates.
- Freedom of researchers and research teams to conduct research away from administrative obstacles.
- Ensure coordination between researchers and exchange experiences during teamwork through international and national forums and study days organized by the laboratory.
- Linking scientific research to the social, economic, and professional sectors.
- The possibility of issuing specialized and periodic journals and printing the results of research reached.<sup>1</sup>

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<sup>1</sup> Mashhouq Ibtissam, The relationship between the establishment of scientific research laboratories and the development of scientific production in Algeria, Master's thesis University of Mentouri, Constantine, 2012, p. 140.

**4. Reasons for the success of the Scientific Research Laboratory:**

- Provide a special budget for scientific research independent of the University.
- Allocate scientific space to each laboratory and the necessary devices to carry out scientific research operations, link scientific research to the economic, social, professional, and services sectors, as well as separation between the university administration and the administration of scientific research laboratories.

It is critical to emphasize that scientific research is not conducted in a vacuum and that scientific research institutions must be independent in both the management of research projects and the management of their budgets. Despite the accreditation of more than 500 research laboratories framed by about 1200 researchers and the allocation of significant funds, and although this process is worth valuing, the researchers are shocked by the regulations of Executive Decree 99/224 of 31/10/1999, which sets out the rules for the establishment, organization, and functioning of the research laboratory, according to which the main director of the laboratory is the president of the university and not the director of the laboratory. It also devotes bureaucracy to the management and mistrust of the guardian in the laboratory's board and its director, while trusting the professor when entrusting him with teaching, pedagogical process, and the formation of students.

It is controversial that even in Western countries, the university administration and the laboratory administration are managed separately, but our reality in Algeria has known as the mix between the two administrations. Thus, the university administration should not interfere with the management of the laboratory, but only give facilities, flexibility, and freedom to researchers to move between research institutions. Laws must also be adapted to the specificity of scientific research to allow the

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<sup>1</sup> Mashhouq Ibtissam, *Ibid.*, p. 149.

professor to establish research branches without forcing him to abandon his pedagogical functions.<sup>1</sup>

### **Conclusion:**

Scientific research in Algeria has already moved ambitiously to play the pivotal role expected of it in society's development project and to drive the dynamic of scientific, technical, and socio-economic development. This is part of a strategy that takes into account several variables, including:<sup>2</sup>

- Select and identify priority subjects in the development project at the national level.
- Develop more precise and rigorous scientific and methodological criteria for the acceptance and follow-up of research projects.
- More openness to economic institutions and searching for other sources other than those provided by the state to finance the research.
- More attention to the study of regional and international variables and their implications for the societal situation (economic and social...) in Algeria; in this context, we mention the phenomenon of globalization, privatization, the communications revolution, and scientific and technological progress...<sup>3</sup>
- Guiding research activity, in particular scientific laboratory activity, in line with development requirements in different and multiple fields.
- Serving the community by encouraging faculty members and university researchers to create and innovate in their research.

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<sup>1</sup> Habib Allah bin Mohammed Rahim Al-Turkistani, "Strategy for Marketing the Results of Scientific Research with Reference to the Experience of King Abdulaziz University", Proceedings of the Research Planning and Management Seminar, Riyadh, 1998, pp. 28-29.

<sup>2</sup> Lahrash Moussa, Notes on University Scientific Research in Algeria, University of Badji Mokhtar Annaba, unpublished article.

<sup>3</sup> Saleh Filali, General Note on the Politics of the Democratic Education, Scientific Research, Journal of the Social Researcher, No. 05 / University of Constantine, January, 2004, p. 81.

In this context, it must be said that, despite efforts to improve and develop the conditions for university scientific research in Algeria, the latter continues to suffer from a clear failure to meet local and national needs, in addition to the decisive achievements in this field.

### **Impediments to university scientific research in Algeria:**

There are undoubtedly obstacles to the revitalization of Algeria's university scientific research movement in many ways that can be summarized as follows:

- Prevent the overall cultural, social, and economic structure from producing scientific knowledge, which in Algeria's mind has often been associated (scientific knowledge) with a crucial role of foreign expertise.
- The absence of a clearly defined strategy for the course of scientific research to be adhered to administratively and scientifically.
- Poor expenditure on scientific research as well as the migration of scholars to developed countries; a problem that researchers have called "human brain bleeding" or "brain drain".
- The weak relationship between the University and other development sectors (industry and agriculture) <sup>1</sup>. This is demonstrated by the impression at the University that industrial and other enterprises do not have much confidence in university research, but are not even convinced of its usefulness, while officials and entrepreneurs in the industrial and other sectors feel that universities are not interested in conducting applied research that addresses production or solves practical problems.
- The weak information base in research centers and scientific laboratories compared to those in countries that are experiencing scientific progress.
- The general and special atmosphere of researchers that restricts all necessary research, knowledge, and thinking requirements, mainly

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<sup>1</sup> Saleh Filali, *op. cit.*, p. 80.

academic freedom and scientific responsibility anticipated by the university towards its surroundings.

- Failure to take care practically and fully of outstanding scientific research in various fields within the framework of specialized publishing and printing vessels.

**As for the proposed recommendations:**

- The need for research laboratories to be committed to the continuous improvement and development of their research outputs.
- Work to provide basic requirements for the work process of scientific research laboratories.
- Supporting a healthy research environment and developing national prizes for the best research and the best performing laboratories.

The development of higher education in Algerian society continues to be particularly important. It involves the desire to lay the foundations for development and modernization and provide the foundations for creativity and innovation in a world where the products of the human mind are accelerating in terms of knowledge and technology in various spheres of life. Scientific research, as one of the most important functions of universities, also remains the hope of generating a paradigm shift in the societal setting. In this context and the light of this ambition, Algeria has undertaken several actions relating to the legal and institutional aspects to activate scientific research. It should be said, however, that the gap between example and reality, between theoretical and actual existence, between universities with constraints, burdens, and pressures on the one hand and high aspirations and noble goals on the other.