DOI: https://doi.org/10.36719/2706-6185/52/111-124

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Programming Research and Development Activities in Algeria Between Description and Implementation

Abstract

This study investigates the programming of scientific research and technological development activities in Algeria, with a particular focus on the relationship between conceptual frameworks and practical implementation. The analysis draws on the provisions of the *Guiding Law on Scientific Research and Technological Development* No. 98-11 of 22 August 1998, amended and supplemented by Law No. 08-05 of 23 February 2008, as well as *Guiding Law* No. 15-21 of 30 December 2015. In addition, it considers the implementation of the five-year national research programs (1998–2002 and 2008–2012) and the adoption of *Executive Decree* No. 21-89 of 1 March 2021, which introduced a multi-year development plan to guide priority national research programs.

The findings reveal a persistent gap between the conceptualization of programming, as defined in legislative and policy frameworks, and its practical execution in the preparation and implementation of research projects. While the legal texts emphasize strategic objectives such as alignment with socio-economic needs, inter-sectoral cooperation, and valorization of results, the actual implementation faced significant challenges. These included weak coordination, limited involvement of socio-economic actors, administrative delays, and underutilization of allocated budgets.

The study concludes that bridging the gap between concept and practice requires adopting flexible, top-down programming approaches, enhancing coordination with user sectors, and reinforcing the role of multidisciplinary research teams to ensure that research outputs contribute effectively to national development.

Keywords: *programming, research activities, scientific research, development, technology*

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Əlcəzairdə elmi-tədqiqat və inkişaf fəaliyyətlərinin proqramlaşdırılması: Təsvir ilə icra arasında

Xülasə

Bu tədqiqat Əlcəzairdə elmi-tədqiqat və texnoloji inkişaf fəaliyyətlərinin proqramlaşdırılmasını araşdırır, xüsusilə konseptual çərçivələrlə praktiki icra arasındakı münasibətə diqqət yetirir. Təhlil 22 avqust 1998-ci il tarixli, 98-11 saylı *Elmi-Tədqiqat və Texnoloji İnkişaf üzrə İstiqamətləndirici Qanun*un (23 fevral 2008-ci il tarixli, 08-05 saylı Qanunla dəyişdirilmiş və tamamlanmış) və 30 dekabr 2015-ci il tarixli, 15-21 saylı *İstiqamətləndirici Qanun*un müddəalarına əsaslanır. Bundan əlavə, beşillik milli tədqiqat proqramlarının (1998–2002 və 2008–2012) həyata keçirilməsini və 1 mart 2021-ci il tarixli, 21-89 saylı *İcra Qərarı* ilə qəbul edilmiş çoxillik inkişaf planını da nəzərə alır. Bu plan prioritet milli tədqiqat proqramlarının istiqamətləndirilməsini təmin etmək məqsədi daşıyır.

Nəticələr göstərir ki, qanunvericilik və siyasət çərçivələrində müəyyənləşdirilən proqramlaşdırmanın konseptualizasiyası ilə tədqiqat layihələrinin hazırlanması və həyata keçirilməsindəki praktiki icra arasında davamlı bir uçurum mövcuddur. Hüquqi mətnlər sosial-iqtisadi ehtiyaclarla uyğunluq, sektorlararası əməkdaşlıq və nəticələrin dəyərləndirilməsi kimi strateji məqsədləri vurğulasa da, faktiki icra əhəmiyyətli çətinliklərlə üzləşmişdir. Bu çətinliklərə zəif koordinasiya, sosial-iqtisadi aktorların məhdud iştirakı, inzibati gecikmələr və ayrılmış büdcələrin səmərəsiz istifadəsi daxildir.

Tədqiqat belə nəticəyə gəlir ki, konseptlə praktika arasındakı boşluğun aradan qaldırılması üçün çevik, yuxarıdan-aşağıya proqramlaşdırma yanaşmalarının qəbul edilməsi, istifadəçi sektorlarla koordinasiyanın gücləndirilməsi və çoxtərəfli tədqiqat qruplarının rolunun möhkəmləndirilməsi zəruridir. Bu, tədqiqat nəticələrinin milli inkişaf prosesinə effektiv şəkildə töhfə verməsini təmin edəcəkdir.

Açar sözlər: *proqramlaşdırma, tədqiqat fəaliyyətləri, elmi-tədqiqat, inkişaf, texnologiya*

Introduction

The rapid scientific and technological progress driven by the momentum of research and development systems in certain countries has converged with the global transformations that characterized the end of the twentieth century. This convergence has reshaped patterns of competitiveness within societies, particularly in the context of the knowledge explosion, which has generated cultural, economic, and technological challenges. As a result, it has become imperative for Algeria's research system to align with the strategies adopted by leading nations in the field of scientific research in order to narrow the scientific gap between developed and developing countries.

In line with the path of pioneering countries in research and development, Algeria, at the end of the twentieth century, adopted an approach based on programming research activities in accordance with societal transformations, government priorities, and the aspirations of its people. This approach stemmed from a firm belief that global challenges can only be met through the development of a national system for scientific research and innovation.

Research

To achieve this objective, Algeria's scientific research sector introduced a set of measures aimed at strengthening the national research system through the careful execution of research projects within national research programs whose outcomes could generate added value. In this regard, Law No. 98-11 of 29 Rabiʻ al-Thani 1419 (August 22, 1998), as amended and supplemented by Law No. 08-05 of 16 Safar 1429 (February 23, 2008), regulated the programming of research activities within the framework of the five-year programs 1998–2002 and 2008–2012 for scientific research and technological development. Furthermore, Law No. 15-21 of December 30, 2015, concerning the orientation of scientific research, marked a turning point by separating the orientation law from the five-year plan and entrusting programming to national research programs implemented through development plans issued by executive decrees.

Despite the amendments affecting the procedures governing the national research system, the fundamental objectives of implementing national research programs and addressing government priorities have remained unchanged.

This raises the following central question:

To what extent does the description of programming scientific research and technological development activities in Algeria align with the actual results of their implementation?

To address this issue, we will examine two main axes, each of which includes several sub-axes:

1. The concept of programming

Programming scientific research and technological development activities falls within the implementation of the national strategy for comprehensive development as defined in the orientation law on scientific research and technological development. This, in turn, reflects the broader challenge of addressing Algeria's economic, social, and cultural development (Mouzali, 2021, p. 333).

1. To better understand the programming of research activities, we will examine three sub-axes:

1.1. Linguistic Meaning

From a linguistic perspective, programming refers to the set of procedures established to implement specific activities according to a defined policy within predetermined timeframes. In Arabic, the term "research" conveys the notions of seeking, searching, investigating, and exploring.

According to the *Oxford English Dictionary* (2024), "programming" is defined as "the action or process of planning or writing a program; the scheduling or arranging of activities or events in advance." The *Cambridge English Dictionary* (2023) adds that programming refers either to the activity of planning or writing a program, a set of instructions that control a computer, or the planning of activities and outputs. In general usage, programming thus signifies "*the process of setting a sequence of operations or tasks in a predetermined manner*," whether in scientific, organizational, or technological contexts. Applied to research activities, the term underscores the systematic organization of investigative efforts in accordance with strategic priorities and available resources.

1.2. Legal and Regulatory Meaning

To fully grasp the concept of programming in Algeria, it is necessary to refer briefly to the relevant legal and regulatory frameworks.

Law No. 98-11 of August 22, 1998, concerning the orientation of scientific research and technological development within the five-year program (1998–2002), stated in Article 9 that programming entails the organization of research and development activities into national research programs designed to achieve defined objectives. These programs may be sectoral, inter-sectoral, and/or specific in scope. Article 8 of the same law specified that research and development programs for 1998–2002 were to be defined and executed through annual plans, which served as regulatory and evaluative instruments ensuring coherence in the selection of objectives.

The amended Law No. 98-11 (Official Gazette of the People's Democratic Republic of Algeria, No. 10, February 27, 2008, pp. 16–17) reaffirmed the centrality of programming in the national research system. It characterized programming as the process of identifying and defining research domains that encompass broad themes and clarify the scientific and technological goals to be achieved. This legal framework also guided research teams in formulating projects aligned with national objectives, thereby institutionalizing a "Top-Down" approach to programming in which research themes reflect socio-economic issues in an integrated, cross-sectoral, and multidisciplinary manner.

By contrast, prior to Law No. 98-11, the programming of research activities largely followed a "bottom-up" model, where individual researchers proposed projects based on personal interests rather than national socio-economic priorities.

Further reform was introduced by Law No. 15-21 of December 30, 2015, concerning the orientation of scientific research and technological development. Article 6 defined programming as the process of identifying and determining research axes composed of general themes that explicitly justify the established scientific and technological objectives. It also defined the development plan as a mechanism for setting national research programs, outlining their scientific, social, and economic goals, and specifying the means required for their implementation over several years.

Unlike earlier laws, Law No. 15-21 separated the orientation law from the five-year plans, thereby freeing programming from rigid cycles. Its aim was to stimulate research, enhance performance, and ensure stronger alignment between scientific, economic, and social objectives in line with sustainable development requirements.

In summary, while the legal framework governing programming has undergone structural changes—particularly with the adoption of Law No. 15-21—the essence of programming has not fundamentally changed. The description of programming activities continues to emphasize the systematic organization of research efforts to achieve clearly defined national objectives.

1.3. Conceptual and Epistemological Meaning

In the context of linking scientific research to industrial and economic development, programming follows the rules imposed by modernization: abundance requires organization, programming, and planning. Once considered an elite intellectual pursuit, research has become a profession integrated into the production system (*Salomon*, 1970).

As Harvey Brooks observed, "Scientific planning often involves dealing with uncertainty, since research outcomes cannot always be anticipated. Programming therefore requires flexibility to adapt to new knowledge and unexpected discoveries." (*Brooks*, 1978, p. 253). Science may be planned implicitly, through external decision-making processes, or explicitly and intentionally. Programming thus entails determining research projects, distributing tasks, and guiding researchers' efforts to strike a balance between the autonomous pursuit of knowledge and society's need to benefit from research outcomes.

The inherent unpredictability of scientific inquiry reinforces this point. As noted in *American Scientist* (2002), *"Scientists are highly aware that the process of conducting research is full of uncertainty. A new study can lead to unexpected data that can completely revise existing theories."* Similarly, Loeb emphasizes that, *"The history of science reveals that major discoveries are not predictable... open research without a programmatic agenda establishes a fertile ground for unexpected breakthroughs."* (Loeb, 2012, p. 2).

Debates on research programming oscillate between planning and regulation, on the one hand, and the classical view of research as a pathway of curiosity, imagination, and unforeseen discoveries, on the other. Yet modernity has imposed planning as synonymous with programming. Unlike industrial or agricultural production, where outputs are largely predictable, scientific research is characterized by uncertainty. Each discovery or innovation introduces unforeseen variables, which explains why many projects, particularly in fields such as health and biotechnology, often fail to meet deadlines.

Experts thus stress that clarity of objectives and timelines is less crucial than the selection of competent researchers, institutions, and research entities—those capable of competitiveness, innovation, and adaptability. Programming must therefore account not only for material and human resources but also for the intangible dimension of research: fostering intellectual cohesion within teams and aligning their shared vision with project goals and design capacities.

As Erik Jantsch argued in *Technological Forecasting*, optimism in achieving expectations increases when administrative managers systematically implement state-level decisions, thereby reducing reliance on chance in research outcomes. He explained: *"Technological forecasting is not a prediction of the future, but a systematic attempt to look into the longer-term future of science, technology, the economy, and society with the aim of identifying areas of strategic research and the emerging fields of innovation."* (Jantsch, 1967, p. 15).

Programming, however, also requires imagination and foresight, moving from the whole to its parts. Donald Schön (1971) noted that *"forecasting innovation is itself an innovation"* (p. 38). In his view, *"the act of prediction creates new frames of reference and new expectations, and in doing so it helps to bring about the very innovations it attempts to anticipate"* (Schön, 1971, p. 38). A theory that anticipates innovation thus becomes itself a generator of innovation.

Ultimately, programming defines a coherent set of objectives to be achieved according to specific priorities, within a given timeframe, by judiciously selecting resources, means, and procedures to transform objectives into reality (Masoud, 1984). Programming research activities therefore requires the design and formulation of national research and development programs in a clear and structured manner, taking into account available resources, anticipated conditions, and modalities of implementation. Research and development activities thus involve both the generation of technology and the application of knowledge. Each national research program is structured around economic, social, and scientific objectives, articulated through thematic axes and topics, and translated into targeted projects with defined implementation methods and streamlined execution plans.

One of the key mechanisms of sound planning in the implementation of a research project is the existence of a unified and shared vision among all members of the research team. This requires strengthening coordination, monitoring progress in accordance with the research plan, identifying strengths and weaknesses in order to address them, and assessing program performance by the supervising authority.

The success of any program further depends on ensuring effective coordination between the economic sector that utilizes research outcomes and the research teams producing them. It also requires rapid decision-making, sound implementation, effective project leadership, and adherence to the principle of collective research work across all levels of the research structure—while placing strong emphasis on building the trust of producers.

Every five-year plan for scientific research, or any other multi-year plan, is the result of a specific strategy. Its implementation reflects the visions, recommendations, and directives issued by the country's highest authorities, as well as government action plans and the outcomes of various national conferences on economic and social development. These strategic guidelines are then compiled and translated into national research programs of an inter-sectoral nature, sectoral programs, or specific programs.

2- The Reality and Content of Programming National Research Programs

1.2 - The Content of Programming

2.2 The Content of Programming

The national research programs included in the five-year plan (1998–2002) comprised thirty (30) programs, which collectively reflected the country's developmental challenges through a coherent set of objectives and research and development activities. These programs addressed all aspects of sustainable development, ranging from agriculture and irrigation to population and society.

It is noteworthy that thirteen (13) of these programs had already been prepared in 1995, prior to the enactment of Law 98-11. The programs were grouped under the following domains:

- Agriculture and food
- Water resources
- Exploration, exploitation, and valorization of raw materials
- Industry
- Basic sciences
- Construction, civil engineering, and urban planning
- Health
- Transport
- Energy
- Nuclear technologies
- Renewable energies
- Information and communication technologies
- Biotechnologies
- Space technologies
- Culture and communication
- Economics
- History and archaeology
- Law
- Population and society

Altogether, these national research programs were expected to implement **6,026 research projects** during the five-year period (1998–2002), distributed annually through national calls for research project proposals.

The average estimated cost of a research project of a technological nature was set at **3 million Algerian dinars**, while the average cost of a project in the social and human sciences was **1.5 million dinars**. The total operating budget allocated for the implementation of all scheduled projects amounted to **11.883 billion dinars**.

However, statistical reviews of the implementation of this five-year plan show that the total number of national research programs actually covered by various calls for proposals was **27 out of the 30 originally planned**. Among these, **1,150 research projects** were selected through national calls, but only **794 projects** were actually implemented.

In addition, statistics also indicate the number of research projects supervised by the **National Agency for the Development of University Research (ANDRU)**, which were distributed as follows:

Table 1: Annual Program (Selected Years)

Program / Year	1997	1998	1999	2002
Agriculture	37	28	28	
Water resources	20	12	10	
Environment & biodiversity	41	14	16	
Raw materials exploitation	22	10	10	
Raw materials valorization	24	21	18	
Advanced technologies	31	15		
Basic sciences			111	111
Renewable energies			14	14
Biotechnology			03	3
Space technology			03	3
Communications			01	1
Urban planning			08	8
Education & training			16	16
National language			12	12
Economics			11	11
History			03	3
Population & society			11	11
Construction & housing				126
Urban planning & drylands				78
Youth & sports				32
Translation				6
Road transport				21
Islamic sciences				15
Law				23
Total	**175**	**100**	**275**	**301**

As for the remaining projects selected during the first five-year period (1998–2002), they were managed by the **National Agency for Health Research**. With regard to the second five-year program, which accompanied the amended Orientation Law on Research No. 98-11 and covered the period **2008–2012**, it was designed specifically to address the shortcomings of the first plan. This program included **34 national research programs**, each reflecting the developmental challenges of Algeria during that period, while also anticipating societal transformations of the future.

The programs were grouped into the following thematic areas:

- Water resources
- Agriculture
- Fisheries
- Environment

- Prevention of natural disasters and major risks
- Exploration and valorization of raw materials and industries
- Basic sciences
- Energy and nuclear technologies
- Hydrocarbons
- Information and communication technologies
- Industrial technologies
- Biotechnology
- Space technologies
- Housing and urban development
- Public works
- Health
- Transport
- Education
- Youth and sports
- Arabic language
- Amazigh (Berber) language
- Translation
- Culture and communication
- Economics, history, and prehistory
- Law
- Population, society, and the human sciences

Regional planning, development of arid regions, and the fight against desertification

Altogether, the program planned for the implementation of **3,752 research projects**, with an average estimated cost of **1.5 million Algerian dinars per project**, for a **total budget of 5.8 billion dinars**. The contents of these national research programs were prepared by program committees composed of researchers and representatives of ministerial departments. The projects were announced collectively in **2010**, and **2,842 research projects** were ultimately selected. Approximately **18,539 researchers** participated in their implementation, distributed across **85 hosting institutions**. Management and oversight of these projects were entrusted to **13 supervising bodies**, which were responsible for conducting expertise, evaluation, and monitoring.

The accepted research projects were distributed across the major fields as follows:

Table 2: Research Projects and Stakeholders

Research fields (by joint sectoral committees)	Accepted projects	Permanent researchers	Economic & social partners	Professors abroad	University faculty	Other participants	Total participants	Valorisable research projects
Agriculture, water resources & fisheries	344	219	327	10	1116	429	2096	26
Land-use planning, environment & major risks	160	96	148	27	606	241	1118	24
Law, economics & society	236	87	312	13	1033	281	1696	50
Education, culture & communication	204	17	163	13	962	209	1364	41
Housing, urban planning & public works	110	33	121	12	417	157	740	16
Raw materials & energy	203	163	154	22	688	243	1270	20
Health & life sciences	264	27	176	13	1279	299	1794	19

Basic sciences	712	155	46	52	3579	474	4306	35
Humanities & history	331	112	256	7	1482	306	2163	37
Technology & industry	278	100	257	25	1180	430	1992	44
Total	2842	979	1960	194	12342	3064	18539	312

Final Evaluation of the 2008–2012 Program

The evaluation of research projects under the second five-year plan (2008–2012) produced the following results:

- **1,100 projects** in the field of basic sciences.
- **1,100 projects** identified as "vaporizable."
- **312 projects** selected by a National Committee of Experts for their added economic and social value.
- Approximately **400 projects** were either not approved by experts or abandoned by research teams.

Programming under Law No. 15-21 (2015)

The adoption of **Law No. 15-21 of December 30, 2015** on the orientation of scientific research and technological development marked a decisive shift in Algeria's research programming framework. This law abolished the five-year plans that characterized Laws No. 98-11 and its amendment, introducing a new model based on **guidance, monitoring, and flexibility**.

Key features of this new approach included:

- Greater adaptability to economic and social needs.
- Execution of projects through multi-year **development plans**, rather than rigid five-year cycles.
- Stronger coordination between scientific objectives and developmental goals in the context of globalization and rapid technological change.

According to **Article 13**, national R&D programs—prepared by specialized bodies and structures—are implemented through development plans that specify human, material, and financial resources by regulatory measures. This provision allowed scientific authorities to design plans based on needs and priorities, formalized by **executive decrees** rather than new orientation laws.

The First Development Plan (2021)

The first development plan was enacted by **Executive Decree No. 21-89 of March 1, 2021**, covering multi-year development in three priority areas, as defined in the Government Action Plan (May 2017):

1. **Food security**
2. **Citizen health**
3. **Energy security**

Each program was defined in terms of its **social, economic, and scientific objectives**, supported by institutional measures, human resources, infrastructure, and project funding.

Preparation of the Program Content

Between **March 2015 and April 2016**, ten **intersectoral committees** on scientific research and technological development prepared the content of the national programs. Programming followed a **top-down approach** and involved:

- Developing shared frameworks for methodologies and criteria.
- Aligning research themes with government action plans and development strategies.
- Organizing **thematic workshops** with 1,259 participants, including ministerial representatives, research institutions, private-sector actors, and civil society.

Nine of these workshops addressed the **three priority programs** (food security, citizen health, energy security). Their outputs included:

- Identification of cross-sectoral and multidisciplinary themes reflecting Algeria's socio-economic and cultural challenges.
- Mechanisms for setting priorities and assessing feasibility (especially regarding human

resources).

- Proposals for monitoring and evaluation mechanisms with user-sector participation.

Emphasis was placed on selecting projects with **practical applicability**, potential for **technology transfer**, and usefulness for **policy-making and problem-solving**.

The Three Priority Programs (2017–)

1. Food Security

- Strengthening sustainable agricultural policies and ensuring national food independence.
- Reducing the trade deficit in agricultural products.
- Diversifying the national economy.
- Increasing production of plant, animal, and aquatic proteins.
- Addressing ecological concerns (forest degradation, soil conservation, desertification, water management).

2. Citizen Health

- Reducing morbidity and mortality from the epidemiological transition.
- Combating communicable diseases, maternal and perinatal health challenges.
- Promoting multi-sectoral approaches to healthcare.
- Ensuring equitable, affordable, and high-quality care.
- Addressing demographic transition (aging population).
- Responding to epidemics and re-emerging diseases.
- Adapting to **WHO international health regulations (2016)**.

3. Energy Security

- Expanding renewable energies to reach **27% of electricity production by 2030**.
- Mobilizing national capacities through legislation, regulation, and economic initiatives.
- Implementing the **Renewable Energy Development Program (March 2020)** with a target of **16,000 MW by 2035** (15,000 MW grid-connected, 1,000 MW off-grid).

Estimation of Research Projects

- Total projects planned: 750 over five years.
- Annual average: 150 projects per year.
- Duration of each project: 3 years.

Table 3: Forecast of Projects to be Implemented (2021–2027)

Year	2021	2022	2023	2024	2025	2026	2027	Total
Expected research projects	150	300	450	450	450	300	150	750

3.2 Estimation of the Average Unit Cost of a Research Project

The research projects arising from the **national research and technological development programs** are carried out within the research entities responsible for implementing activities as defined in Law No. 15-21.

The **average unit cost** of a research project is estimated at **5 million Algerian dinars**, in addition to expenses related to compensating the researchers participating in the implementation of these projects. On average, the execution of a single research project requires the involvement of **six (06) researchers**.

Table 4: Estimated Costs of National Research Programs (in million DZD)

Year	2021	2022	2023	2024	2025	2026	2027	Total
Research project costs	375.0	562.5	750.0	750.0	750.0	375.0	187.5	3,750.0
Researchers' compensation	5496.5	993.0	1,489.5	1,489.5	1,489.5	993.0	496.5	57,447.5
Total expenses of	5871.5	1,555.5	2,239.5	2,239.5	2,239.5	1,368.0	684.0	511197.5

national research programs								

-Difference in Classification of Research Programs

A clear difference emerges between the classification of national research programs under Amended Law No. 98-11 and Amended Law No. 15-21.

- Under **Law No. 98-11**, classification followed a hierarchical structure based on concerns and needs, comprising three categories:
  1. National inter-sectoral research programs.
  2. Sectoral programs, prepared by permanent sectoral committees.
  3. Institution-specific projects announced within universities or research institutions.
- Under **Law No. 15-21**, however, all national research programs were grouped into a single category of inter-sectoral programs, thereby giving them a purely developmental orientation.

- Research Projects Outcomes (2022–2024)

- **Food security**: 133 projects (out of 150 planned).
- **Citizen health**: 101 projects (out of 150 planned).
- **Energy security**: 101 projects (out of 150 planned).
- **Total**: 335 projects implemented (out of 450 planned).

By call for proposals:

- 123 projects selected in the first call.
- 79 projects in the second call.
- 133 projects in the third call.

Evaluations of the first two calls highlighted a **lack of coherence** between outputs expected by economic institutions and those proposed by research teams. This led to a corrective measure: allowing user institutions to define objectives and outputs directly, ensuring alignment between real needs and research activities. Thus, research programming became more integrated within a **top-down approach**.

Although final judgment requires comprehensive evaluation, interim expert reports indicate **optimism**, with a satisfaction rate of about **95%**.

3.3 -Execution of Research Programming in Practice (Critical Study)

Implementation in research presumes that conceptual models can be applied to socio-economic reality. Yet this assumption often fails, as **a gap persists between conceptualization and realization**—between what is planned and what is achieved. Concepts and programs only become transformative when innovatively formulated to fit the socio-cultural and institutional environment.

In Algeria, programming under the five-year plans was marked by **diffusion**. Success relied more on mobilizing **human competencies** than on material or infrastructural resources (Official Gazette, 2008, p. 16). This aligns with the **second five-year plan (2008–2012)**, which sought to integrate more university professors into research teams and redirect them toward socio-economically relevant topics. It was, however, unrealistic to expect researchers to deliver fully mature technological products, especially under the early stages of Law 98-11.

The amended Law 98-11 recommended **strategic management**, focusing research creativity on topics with direct economic relevance, strengthening competencies, and encouraging partnerships.

Effectiveness of National Research Programs

- Laws No. 98-11 and its amendment primarily generated **sectoral programs** tied to ministerial agendas (housing, agriculture, fisheries, energy, culture, communication, justice, etc.).
- Interviews revealed that the **proliferation of programs** reflected ministerial and parliamentary demands rather than integrated planning.
- **Law No. 15-21** corrected this by separating orientation provisions from development plans, consolidating programming on an inter-sectoral basis, and promoting **multidisciplinary teams** aligned with socio-economic needs.

Causes of Imbalances in Implementation

First two five-year plans (1998–2002; 2008–2012):

- National Council for Scientific Research never convened to prioritize programs.
- Calls for proposals were poorly coordinated and overly general.
- Only **27 of 30 programs** executed (1998–2002).
- Only **794 of 6,026 projects** implemented (≈15% of budget used).
- Constraints: weak human resources, bureaucracy, lack of incentives, limited engagement with economic actors.

Second plan (2008–2012):

- Calls delayed until 2010, compressing all projects into a single round.
- Only **2,841 of 3,752 projects** implemented.
- Lack of qualified researchers in many applied fields.
- Collaboration with socio-economic actors often **symbolic**.
- Only **312 projects** valorized economically/socially; most failed to reach maturity.

***- New Approach and Outlook**

Executive Decree No. 21-89 (March 1, 2021) introduced a decisive shift:

- Research teams for priority programs (food security, citizen health, energy security) must include **both researchers and socio-economic institutions**.
- This top-down, outcome-driven model emphasizes real alignment between needs and research outputs.
- Interim evaluations are encouraging, but long-term success requires:
  - Continuous coordination,
  - Timely problem-solving,
  - Reduction of administrative delays,
  - Strengthened managerial skills among research leaders.

Summary of Findings

The comparative analysis of Algeria's national research programming across three phases—Law No. 98-11 (1998–2002), its 2008 amendment (2008–2012), and Law No. 15-21 with Executive Decree No. 21-89 (2021–)—reveals significant evolution in both design and implementation.

- The first plan (1998–2002) was highly ambitious, with over 6,000 planned projects, but only about 13% were implemented, mainly due to weak governance, poor coordination, and limited engagement with socio-economic actors.

- The second plan (2008–2012) showed better performance, with 76% of planned projects executed. However, the focus remained largely sectoral, ministerial pressures expanded the number of programs, and only a small fraction (312 projects) achieved economic or social valorization.

- The current model under Law 15-21 (2021–) represents a major shift toward purely inter-sectoral, developmental, and top-down programming. Although only 45% of planned projects (2022–2024) have been implemented so far, interim evaluations show a 95% satisfaction rate, reflecting improved alignment with national priorities such as food security, citizen health, and energy security.

The evidence highlights a persistent gap between conceptual programming and practical execution.

Success depends less on the number of projects and budgets, and more on:

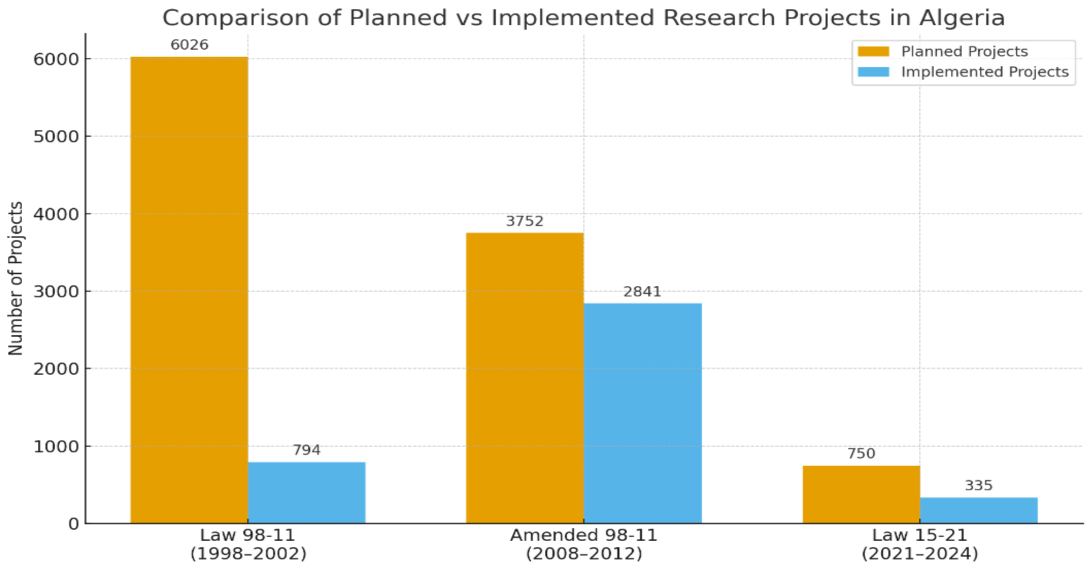
• The quality and cohesion of research teams.
• Effective coordination with socio-economic institutions.
• Timely decision-making and problem-solving.
• Stronger managerial skills in research governance.

Ultimately, the transition from hierarchical and sectoral programming (Law 98-11) to a unified inter-sectoral model (Law 15-21) reflects Algeria's recognition that research must be both strategic and applied, directly serving developmental goals in the era of globalization and rapid technological change.

Comparative Table of National Research Programming in Algeria

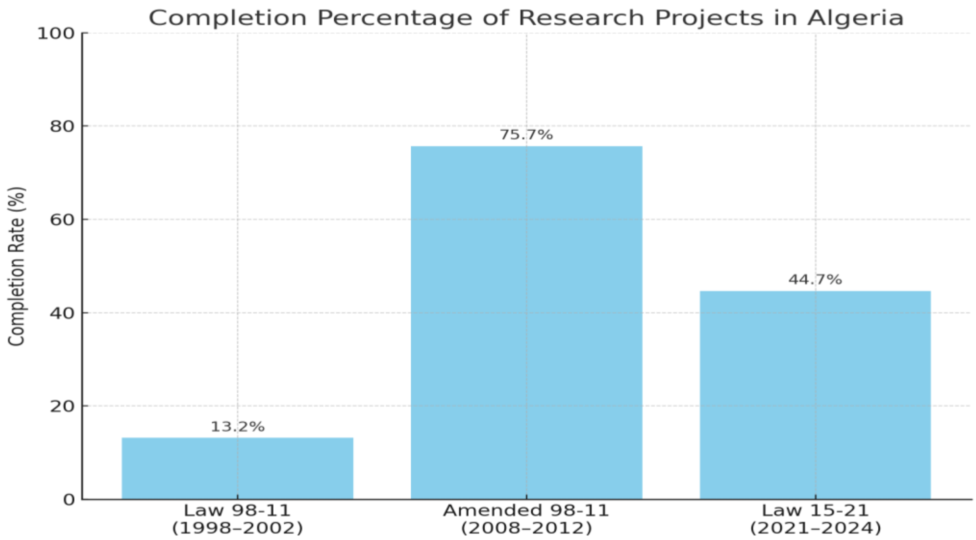
Phase / Legal Framework	Programming Model	Number of Programs	Planned Projects	Implemented Projects	Budget	Main Issues / Observations
Law No. 98-11 (1998–2002)	Hierarchical: inter-sectoral, sectoral, and institution-specific programs	30 (13 prepared in 1995)	6,026	794 (~13%)	11.883 billion DZD	- National Council for Scientific Research inactive - Poor coordination of calls - Only 27/30 programs executed - Weak incentives and HR shortages - Minimal collaboration with socio-economic actors
Amended Law 98-11 (2008–2012)	Sectoral/inter-sectoral mix; strong ministerial influence	34	3,752	2,841 (~76%)	5.8 billion DZD	- Calls delayed until 2010 (single batch) - Lack of qualified researchers in applied fields - Collaboration often symbolic - Only 312 projects valorisable; few reached maturity due to weak links with user sectors
Law No. 15-21 / Decree 21-89 (2021–)	Purely inter-sectoral, top-down developmental orientation	3 Priority Programs: • Food security • Citizen health • Energy security	750 (2021–2025)	335 (2022–2024) ≈45%	Not specified	- Stronger alignment with 2017 Government Action Plan - Teams include researchers + socio-economic institutions - Interim satisfaction ~95% - Challenges: admin delays, coordination, managerial skill gaps

A graph illustrating the comparison between planned and completed projects during the three phases of research programming in Algeria (Law 98-11, the 2008–2012 amendment, and Law 15-21/20.



This chart shows the project completion rate (%) for each of the three phases:

First Plan (1998–2002): Low completion rate (~13%). Second Plan (2008–2012): Significant improvement (~76%). Current Plan (2021–2024): Moderate completion rate so far (~45%) with positive preliminary results.



Conclusion

Developmental research programming demonstrates that **research is never "basic" in isolation**—its orientation depends on institutional support. Research directed toward products inevitably acquires an **applied dimension**. Programming is thus synonymous with planning, but in research it must account for **unpredictability**. Success depends less on rigid objectives or timelines than on the **quality, cohesion, competitiveness, and scientific spirit** of teams.

Recommendations:

- Establish expert teams to monitor research conditions and challenges.
- Create specialized committees to revise and update legislation.
- Form inter-sectoral expert committees to set priorities and design developmental projects.
- Foster an **organizational culture of excellence** within research institutions.
- Strengthen legal oversight and align evaluations with international standards.
- Require institutions to produce clear **roadmaps and programs**.

- Reform research centers to adapt to competitive dynamics and avoid wasted potential.
- Train qualified managers in research governance and project leadership.
- Develop a **comprehensive national strategy** for research and innovation, aligned with Algeria's developmental vision.

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Received: 01.05.2025
Accepted: 04.09.2025