Investment in Education and the Question of Return: A Socio-Statistical Analysis of Higher Education Financing in Algeria (2000–2025)

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Abstract:
This study examines the relationship between public investment in education and its socioeconomic returns within the Algerian higher education system from 2000 to 2025. Using a socio-statistical approach, the research analyzes longitudinal data on education expenditure, enrollment trends, graduate employability, and national economic indicators to assess the efficiency and equity of higher education financing. The findings reveal a persistent gap between the quantitative expansion of higher education—reflected in increased funding, infrastructure, and student enrollment—and the qualitative outcomes in terms of labor market absorption, innovation, and national productivity. Despite sustained state investment, the rate of return on educational spending remains limited due to structural inefficiencies, labor market mismatch, and the dominance of a rent-based economic model. The study highlights the need for a strategic reorientation of education financing policies towards performance-based funding, stronger university–industry linkages, and a comprehensive evaluation framework that integrates both social and economic returns. These insights aim to contribute to policy debates on optimizing educational investment to foster sustainable human capital development in Algeria.

Keywords: education investment, higher education, financing efficiency, socio-statistical analysis, Algeria, return on education, human capital

I. Introduction

Investment in higher education constitutes a fundamental pillar in the modern development strategies of various countries, as it serves as the main driver for forming human capital capable of leading transformations and advancing economic and social development within societies. It is viewed not only as a means for individual advancement but also as a collective investment in the capacities of humanity, directed at preserving its future and stability. However, amid the rapid transformations of knowledge and technology, several essential questions have emerged among researchers regarding the effectiveness of educational spending policies in achieving a balance between the growing demand for education and the requirements of sustainable development. This has made it the subject of numerous academic reviews across various strategies adopted by countries to measure the quality and efficiency of education policies, especially higher education, in serving their economic and social goals.

In the Algerian context, such investments have acquired a strategic and sovereign dimension since independence. The shift from an elite university system inherited from the colonial era to a widespread and practical academic system became the cornerstone of the Algerian nation-building project. This direction was defined through policies of democratizing education and expanding access, which led to an increase in government spending to develop university infrastructure and accommodate a growing number of students each year. Over recent decades, the state has allocated significant financial and human resources to universities and higher education institutions and has adopted various policies aimed at improving access, quality, and research support through planned financial management that ensures efficiency, scientific productivity, and cultural and educational activities.

Despite the massive quantitative investment reflected in increasing financial allocations and the expansion of the university network over the past two decades (2000–2023), the question of return on public spending in higher education imposes itself insistently at both academic and societal levels. Various reports and studies indicate a gap between the scale of spending on higher education and its actual outcomes. This gap appears in structural issues, such as the unclear distribution of returns between economic, social, and institutional dimensions, the inflation of academic degrees—especially postgraduate ones—and the difficulty of integrating graduates into the labor market, as well as the modest contribution of universities to knowledge and innovation (skills, scientific production). These issues raise critical questions about the efficiency, effectiveness, and justification of such massive public investment.

Accordingly, this study seeks to analyze this issue by observing and statistically analyzing data related to higher education financing in Algeria during the study period within an analytical framework that goes beyond descriptive statistics to a sociological approach linking funding policies to their social and economic outcomes. It examines the extent to which public policies can translate financial investment into tangible social and economic returns through the sound management of higher education allocations within the state budget. This approach helps determine whether the quantitative expansion in financing and infrastructure has necessarily led to a qualitative accumulation in human capital, or whether structural and political factors (such as university governance, resource allocation mechanisms, and the university's relationship with its economic environment) have hindered the expected returns from such a large investment.

To address this problem, the study adopts an academic approach combining statistical data (time series, funding indicators) with sociological analysis to highlight the social and institutional structures that shape and direct this financing and its potential returns—economic (growth, income, employment), social (inequality reduction, social integration), and institutional (universities' capacity for innovation and adaptability). This can be summarized in the main research question:

- How does the pattern of allocation and distribution of financial resources for higher education affect the development of the university system and its contribution to economic growth during the period 2000–2025?

From this main question, several sub-questions emerge:

- What are the key characteristics and dynamics of public spending on higher education in Algeria between 2000 and 2025?
- How can the social and economic return on this spending be assessed in light of indicators such as enrollment rates, faculty structure, and university infrastructure?
- What sociological factors may explain the potential gap between the size of financial investment and its realized returns in the Algerian higher education sector?

1. Significance of the Study

The epistemological significance of this research lies in its contribution to bridging the theoretical gap in understanding the sociological relationship between investment in higher education and its economic and social returns, particularly in developing countries. It seeks to provide an accurate diagnosis of the reality of Algerian higher education between 2000 and 2025, a period marked by unprecedented quantitative expansion in university infrastructure and sharp increases in financial allocations, accompanied by growing evidence of a gap between investment and actual outcomes.

This study offers a unique methodological contribution by integrating longitudinal statistical data (such as time series on government spending, enrollment and graduation indicators, and labor market data) with a deep sociological analysis of institutional and political structures that shape resource allocation and its outcomes. It goes beyond statistical description to explore the social and institutional mechanisms explaining the limited returns on investment—such as the nature of university governance, the mechanisms of resource distribution among universities, and the relationship between universities and the economic sector. Using models such as time-series analysis and structural equation modeling, it seeks to identify causal links between funding policies and tangible results, providing precise, applicable insights.

Practically, the study will provide policymakers in Algeria with data-driven evidence to improve the efficiency of educational resource management and enhance the resilience of the university system in responding to labor market demands. Its findings are expected to support the design of more effective funding policies, improve university governance mechanisms, and strengthen partnerships between universities and industry—thereby enhancing higher education's contribution to achieving sustainable development goals.

2. Objectives of the Study

The study aims to analyze the sociological relationship between the patterns of financial resource allocation in higher education and their social and economic outcomes within the Algerian context. It adopts an integrated methodology that combines advanced statistical analysis with a sociological theoretical framework. The specific objectives are as follows:

- To analyze and understand the historical dynamics of public spending on higher education by identifying and evaluating temporal transformations in the size and distribution of financial allocations (2000–2025).
- To evaluate the social and economic returns on spending from a structural perspective by measuring its impact on higher education performance indicators (enrollment rates, faculty structure, and infrastructure).
- To uncover the sociological mechanisms underlying the gap between investment and returns by exploring structural factors (such as lack of institutional autonomy, bureaucratic entanglement with economic policies, and the disconnection of universities from labor market needs).

Through these objectives, the study seeks to build a deep understanding of the complex relationship between financing and outcomes—moving beyond isolated interpretations—by linking social and political contexts with statistical data to offer applicable insights for improving the effectiveness of educational policies in Algeria and similar contexts.

3. Theoretical and Conceptual Framework

This component aims to highlight the conceptual and operational definitions of the study's key terms and to address the research topic within recognized sociological and epistemological frameworks by reviewing existing theoretical literature. The second part relates to previous studies that inform the identification of the research gap and provide a comparative lens for interpreting this study's findings in light of its hypotheses.

3.1. Conceptual and Operational Definitions

- **Higher Education:**

Higher education is the level of education provided by colleges, universities, and other academic institutions that award degrees such as bachelor's, master's, and doctoral degrees, as well as advanced diplomas (Mustafa Hassan Bahi et al., 2009, p. 15). It is considered a complex social institution that goes beyond being a mechanism for transmitting academic knowledge, as it interacts with the social, economic, and cultural structure at multiple levels—shaping national identity, developing human capital, and aligning curricula with local labor market needs while reinforcing cultural values. It also exhibits a global dimension through integration into international research networks and adherence to global academic mobility standards, thus facilitating knowledge exchange and multicultural intellectual identities.

- **Human Capital:**

According to Gary Becker (1975), human capital refers to the outcome of individual investments (such as education, training, and health) that enhance productivity and are often translated into higher earnings or income. It can be viewed as an investment stock similar to physical capital. This concept provides the theoretical basis linking investment in education to increased economic productivity, with social structures shaping access to education and health opportunities in countries like Algeria, making human capital not only an individual factor but also a potential source of collective economic gain.

- **Social Return on Spending:**

Measured through social cost-benefit analysis, this framework accounts for all costs and benefits (including non-market values) discounted to present value to estimate net benefits for society (World Bank). It emphasizes non-market social (health, equity, social cohesion) and economic (growth, employment) benefits of education spending and focuses on the distribution of returns among different social groups, translating them into a social net value that includes social capital and overall welfare.

- **Investment in Education:**

UNESCO defines investment in education as spending allocated to provide the inputs necessary for the educational process (human resources, facilities, materials, and technologies) to improve educational outcomes (skills, knowledge), which in turn enhance individuals' social and economic productivity. These investment patterns reflect political priorities concerning the future of social development in each nation, transforming education into a driver of individual productivity and comprehensive societal development.

- **Educational Spending and Financing:**

Some scholars define public spending as "a sum of money spent by a public entity for the purpose of achieving public benefit," or as "the monetary amounts the state expends to meet public needs" (Al-Aqoon et al., 2019, p. 79). Mohamed Ibrahim Nor (2025, p. 6) defines it as the government's ability to mobilize, allocate, and efficiently use financial resources. When directed toward education, financing refers to "any taxpayer-supported system providing education accessible to the public" (Baker, 2025), meaning government systems allocate public budget resources to operate educational institutions as part of broader policies to achieve educational goals effectively.

3.2 Previous Studies

Numerous studies have explored investment in education and its economic and social returns, each addressing specific aspects of this relationship through sociological or economic approaches highlighting the interaction between government funding and social development across various contexts.

Social and economic returns on investment in higher education in Arab countries are influenced by complex interactions among labor market dynamics, education quality, social and economic disparities, and public sector employment practices. These factors collectively shape individual incentives to pursue higher education and its broader impacts on economic development and social justice (Tzannatos et al., 2016; Salehi-Isfahani et al., 2009). Labor market dynamics in the Arab region are marked by high unemployment among university graduates, largely due to a mismatch between acquired skills and market needs. This mismatch reduces wage returns and discourages investment in higher education, particularly in contexts where employment depends heavily on the public sector or foreign opportunities (Tzannatos et al., 2016).

Education quality and the mismatch between graduate supply and labor demand critically affect social returns, with regional disparities in education quality leading to differing returns—as in Egypt, where a rigid labor market values academic credentials over practical skills (Rizk, 2019). The overemphasis on theoretical education versus vocational training exacerbates this imbalance, limiting the economic benefits of higher education (Salehi-Isfahani et al., 2009).

Inequality of access to higher education remains a pressing issue, as family socioeconomic status continues to determine educational attainment. Consequently, public spending on higher education disproportionately benefits wealthier groups, particularly in countries like Egypt and Tunisia, where higher education is tuition-free (Krafft et al., 2016). Additionally, the dominance of the public sector in Arab labor markets entrenches structural rigidity and affects social returns on higher education. Public employment practices favor academic degrees over practical skills, reinforcing credentialism and widening the gap between educational output and labor market needs (Ali, 2002; Salehi-Isfahani et al., 2009).

The economic returns on higher education spending in Arab countries are shaped by multiple factors—including labor markets, gender disparities, and education quality. Studies indicate that these returns are generally lower than global averages, with significant variation by gender and education level. The mismatch between graduates' skills and market demands, with surpluses in certain academic fields, reduces the financial returns on higher education (Rizk, 2016; Tzannatos et al., 2016). This highlights how labor market structures, whether public or private, largely determine the added value of higher education at both individual and societal levels.

Gender disparities in the economic returns to higher education exhibit a complex pattern that varies according to national context in many Arab countries. Women often achieve higher returns from education compared to men, especially in the public sector, where distinctive employment benefits for females strengthen the incentive to invest in education (Tzannatos et al., 2016; Psacharopoulos & Patrinos, 2018). However, notable regional differences exist; in Sudan and Tunisia, women show lower returns at the university level than men, reflecting the influence of local cultural and economic factors on the relationship between gender and education (Rizk, 2016). Regarding the quality of education and its alignment with labor market requirements, this remains a critical factor in determining economic returns. Studies reveal considerable disparities in educational quality across the region, where countries like Tunisia achieve higher returns due to better alignment between curricula and economic needs (Rizk, 2019). On the other hand, countries investing in improving educational quality and enhancing practical skills, such as Egypt and Morocco, demonstrate improvements in human capital stock, highlighting the importance of qualitative educational investment to enhance economic returns (Arbak, 2012).

At the political level, the economic context directly affects the economic returns to higher education. Economic policies that promote labor market flexibility and private sector development can improve returns, while rentier practices reduce the demand for high skills in the private sector, leading to lower wages and decreased incentives for higher education (Tzannatos et al., 2016).

Accordingly, all these studies share a common assertion of the existence of a gap between financial investment in higher education and its economic and social outcomes. This relationship is not merely economic but rather a complex system influenced by social, political, and institutional structures. There is near consensus that the

mismatch between skills and labor market demands, the dominance of the public sector, and gender disparities together constitute shared factors affecting returns and determining the effectiveness of investment in higher education.

A clear research gap also emerges in the collective body of these studies, particularly the absence of in-depth research in specific national contexts such as Algeria. This opens the way for socio-analytical studies that take into account institutional specificities in Southern countries, such as understanding how financial policies interact with internal university governance. Previous studies have generally been limited to regional analyses without conducting detailed statistical analyses that clarify resource distribution mechanisms within Algerian universities and how these are transformed into tangible outcomes. They have rarely addressed the interactions between the local socio-economic environment (such as crises resulting from falling oil prices and regional disparities between the north and south) and higher education policies in each country — that is, how these external factors shape funding priorities and desired outcomes. This presents an opportunity for the current study, which relies on a methodology combining longitudinal statistical analysis of government spending and socio-economic returns (2000–2025) with qualitative field study of university governance mechanisms, contributing to the construction of socio-political models capable of explaining the complex relationship between financial investment and socio-economic returns in the context of higher education in Algeria and the Global South.

II - Method and Tools:

The methodological determinism in constructing any scientific article requires the researcher to highlight the methodological procedures adopted to obtain results that are analyzable, inferable, and discussable. Accordingly, the procedures of this research are embodied in the following:

1. **Spatial and Temporal Boundaries of the Study:**

The study is limited to the geographical framework of Algeria as a whole, focusing on the outputs of the Ministry of Higher Education and Scientific Research. Nevertheless, regional disparities in resource distribution and higher education outcomes are considered when processing statistical data, while maintaining national-level analysis as the main framework for observing general trends in policy implementation and their interaction with socio-economic dynamics.

The study covers the period from 2000 to 2025, relying on actual data from official sources (Ministry of Higher Education and Scientific Research, National Statistics Office, UNESCO, and the World Bank). Econometric models such as ARIMA were used to generate forecasts for the 2018–2023 period due to the unavailability of standardized statistical data for those years.

2. **Method and Sample of the Study:**

The study adopts a mixed-method approach that integrates quantitative analysis of longitudinal data with qualitative study of institutional and social contexts. The quantitative aspect includes analysis of secondary data derived from official databases (Official Gazette of Algeria, Ministry of Higher Education, National Statistics Office, UNESCO, and the World Bank) and includes indicators such as government spending on higher education, enrollment and graduation rates, faculty structure, research productivity, and labor market indicators (such as graduate employment rates).

3. **Tools and Statistical Applications Used in the Study:**

The quantitative analysis uses advanced statistical models suited to longitudinal and multidimensional data. Time-series models are applied to study the evolution of government spending and its relationship to socio-economic variables over time, while panel regression is used to examine variations between time periods and the impact of study variables on economic and social returns — such as financial resource allocation, educational quality indicators (e.g., student–teacher ratios, research productivity), and labor market returns (graduate employment).

Qualitative data are subjected to thematic analysis using sociological interpretation, allowing the linkage of statistical results with the complex social and political contexts that shape the investment–return gap in the Algerian education system.

III - Results and Discussion:

Through the presentation and discussion of the study's results in the following tables, we attempt to provide sociological interpretations consistent with analytical logic within the discipline of sociology, considering the scientific significance of these results, which are summarized as follows:

1. **Analysis of Public Spending Indicators in Algeria (2000–2025):**

Algeria has paid considerable attention to the higher education sector as a key policy to improve the quality of higher education outputs. It has allocated substantial annual budgets to various departments, accompanied by increased use of technological and scientific development in academic research. This can be observed through various statistical rates and percentages during the 2000–2025 period.

1.1 **Analysis of the Growth in Higher Education and General Budgets:**

The higher education sector in Algeria has witnessed numerous educational policies, programs, and pedagogical plans, with corresponding financial allocations aimed at improving the quality of educational outputs capable of entering the labor market and advancing various economic and social sectors. The following table shows the magnitude of this growth in the higher education budget and the general budget for the period 2000–2025:

Table (01): Development of the Higher Education Budget and the General Budget in Algeria (2000–2025).

Table (01): Development of the Higher Education Budget and the General Budget in Algeria (2000–2025)

Year	Higher Education Budget (DZD)	State Budget (DZD)	Share of Higher Education Budget in the General Budget (%)
2000	38,580,667,000	965,328,164,000	3.99
2001	43,591,873,000	836,294,176,000	5.21
2002	58,743,195,000	1,050,166,167,000	5.59
2003	63,494,661,000	1,097,385,900,000	5.78
2004	66,497,092,000	1,200,000,000,000	5.54
2005	78,381,380,000	1,200,000,000,000	6.53
2006	85,319,925,000	1,283,446,977,000	6.64
2007	95,689,309,000	1,574,943,361,000	6.07
2008	118,306,406,000	2,017,969,196,000	5.86
2009	154,632,798,000	2,593,741,485,000	5.96
2010	173,483,802,000	2,837,999,823,000	6.11
2011	212,083,056,500	3,434,306,634,000	6.19
2012	277,173,918,000	4,608,250,475,000	6.01
2013	264,582,513,000	4,335,614,484,000	6.10
2014	270,742,002,000	4,714,452,366,000	5.74
2015	300,333,642,000	4,972,278,494,000	6.04
2016	312,145,998,000	4,807,332,000,000	6.49
2017	310,791,629,000	4,591,841,961,000	6.76
2018	313,336,878,000	4,584,462,233,000	6.83
2019	317,336,868,000	4,954,476,536,000	6.40
2020	364,283,132,000	4,893,439,095,000	7.44
2021	370,596,356,000	5,314,506,529,000	6.97
2022	400,051,187,000	6,311,532,532,437	6.33
2023	892,597,158,446	5,986,666,510,000	6.71
2024	910,530,474,252	6,470,287,800,000	7.11
2025	852,306,367,311	7,760,326,900,000	9.11

Source: Prepared by researchers based on the official gazettes of the Algerian state (2000–2025).

A reading of the table above shows a tremendous and steady growth in the absolute figures allocated to the higher education sector. The higher education budget jumped dramatically from **38.5 billion Algerian dinars in 2000** to an **estimated 852.3 billion dinars in 2025**. This increase, which exceeds twenty-twofold, is conclusive evidence of Algeria's commitment to the policy of educational democratization and the expansion of access adopted since independence. This financial inflation can also be justified by the quantitative need to accommodate the ever-growing number of students each year.

From a **sociological perspective**, a deeper analysis of the **share of the higher education budget within the general budget** reveals the changing strategic importance of the sector within government spending priorities, which can be divided into three distinct phases:

- **1. The Foundation and Rapid Growth Phase (2000–2006):**

During this period, there was a significant increase in the sector's share, rising from **3.99% to 6.64%**. This qualitative leap reflects a clear political decision to make higher education a fundamental pillar of the state-building project following the crisis of the 1990s, representing a practical shift from an inherited elitist system to a mass academic system.

- **2. The Relative Financial Stability Phase (2007–2019):**

During this period, the budget share stabilized between **5.7% and 6.8%**, indicating that higher education had been consolidated as a strategic sector with a fixed priority in the national budget. Its expenditure grew in parallel with the overall state budget, which was then supported by high hydrocarbon revenues. This stability reflects the state's effort to institutionalize expenditure, shifting focus from expansion to the management and maintenance of a vast university system. However, despite these apparent improvements, higher education had to compete with other sectors (such as social subsidies, security, and infrastructure), limiting its ability to achieve qualitative progress during this period.

- **3. The Expansion Phase (2020–2025):**

This phase recorded qualitative leaps, with the budget share reaching **7.44% in 2020** and an estimated **9.11% in 2025**. Although this increase may be justified by the expansion of the Ministry of Higher Education's administrative responsibilities, it raises questions about whether this shift reflects growing awareness of the gap between expenditure and actual outcomes (as noted in prior reports and studies), or whether it represents an attempt to address new challenges — such as rising graduate unemployment and the university's weak contribution to its socio-economic environment — by injecting more financial resources. This issue lies at the heart of the current study's concern with **the efficiency and effectiveness of investment**.

> The pattern observed suggests that **education funding in Algeria is driven more by rent-based state revenues than by long-term strategic planning grounded in developmental needs.**

This behavior is consistent with prior analyses such as **Salehi-Isfahani et al. (2009)**, which indicate that **rentier states** prefer to allocate resources to short-term social contracts ensuring political stability at the expense of long-term structural reform. Thus, Algeria — as a rentier economy — demonstrates resilience in protecting education budgets from oil price fluctuations, but this resilience remains largely symbolic unless accompanied by genuine improvements in educational outcomes. Despite the relative increase in funding, indicators such as the **graduate unemployment rate (43% among science graduates, Rizk, 2016)** and **low research productivity (less than 0.5% of GDP)** reveal a large gap between financial investment and social returns, a finding confirmed by **Tzannatos et al. (2016)**. Their research shows that rentier economies tend to transform education into a **political safety valve** rather than a **driver of development**, thereby weakening its role in economic transformation.

Referring again to **Table (01)**, one notes a sharp increase in student enrollment between 2000 and 2025. However, the higher education budget share never exceeded **9.11%** of total state expenditure, which is far below the **UNESCO global recommendation (15–20%)**. This gap is reflected in structural problems such as the **student-to-teacher ratio**, which has deteriorated in favor of students — for example, the budget share dropped to **5.74% in 2014** despite growing student numbers, deepening the mismatch between educational outcomes and economic needs.

According to **Rizk (2016)**, this is partly due to Arab labor markets' preference for theoretical academic qualifications over practical skills, reducing the incentive to increase investment in program and curriculum development or teaching tools, and consequently increasing graduate unemployment due to lack of practical competencies. Statistical data also reveal that **investment in scientific research remained below 0.5% of GDP** (see Table 05), confirming **Ali's (2002)** argument about the dominance of the public sector in education, which favors quantitative expansion over quality, often wasting resources on infrastructure rather than improving content.

What can be inferred is that the presented data do not directly answer the question of **return on investment**, but they do show a **large and sustained financial commitment**. However, this quantitative expansion remains incomplete without a clear link between funding policies and social or economic outcomes — particularly in Algeria's rentier economic context, heavily dependent on oil revenues. Based on the provided statistics, several observations emerge:

- Resource allocation mechanisms within the Algerian university system are **highly centralized and bureaucratic**, limiting institutional autonomy and adaptability to socio-economic needs, while directing most expenditure to **operational costs and salaries** at the expense of research and innovation.
- The rentier economy reduces **demand for high skills and innovation** in the private sector, weakening the link between educational outputs and labor market needs, and creating a structural gap between supply (graduates) and demand (employers).
- **Wealthier social groups benefit disproportionately** from free higher education; while quantitative expansion has increased access across social classes, educational quality and post-graduation opportunities remain tied to students' social and cultural capital, reproducing inequality under a façade of equality.

- **Transformative effectiveness** of funding depends on internal allocation mechanisms — a high budget does not guarantee high-quality expenditure if funds remain focused on infrastructure or operating expenses rather than faculty training, applied research, university–industry collaboration, or performance evaluation.
- Periods of sharp increases in funding often coincide with **oil revenue surges or emergency national programs** (such as salary adjustments or student grants). Thus, reliance on volatile revenue sources makes **sustainable educational financing** vulnerable to political and economic fluctuations, undermining long-term strategic planning for universities.

2.1. Development of Higher Education Expenditures by Departments

Table (02): Distribution of Higher Education Expenditures across Central Departments in Algeria during the period 2002–2017

Unit: (million DZD)

Years	Equipment and Department Management	Operating Grants	Educational and Cultural Activities
2002	43.015	52,047.133	23.800
2003	46.303	56,603.090	26.800
2004	63.937	65,159.600	26.800
2005	72.536	76,948.800	28.800
2006	83.824	83,904.000	29.000
2008	106.309	112,817.416	502.500
2009	116.565	148,536.030	501.500
2010	120.265	167,090.456	501.600
2011	123.415	208,186.175	411.600
2012	138.915	270,449.800	411.600
2013	119.328	257,837.014	412.600
2014	156.865	263,648.775	412.600
2015	171.546	292,898.000	412.600
2016	130.687	305,017.388	312.600
2017	107.607	305,169.000	228.500
2018	*245.000	573,000.000	110.368
2019	*249.000	580,000.000	103.368
2020	*270.000	620,000.000	129.083
2021	*292.000	675,000.000	129.797
2022	*312.000	750,000.000	130.511
2023	460.227	842,416.900	220.237
2024	491.043	855,786.900	220.447
2025	*505.000	900,000.000	376.674

Source: Prepared by researchers based on the official gazettes of the Algerian state during the period 2000–2025. (*Note: The asterisk symbol in some years indicates estimated values calculated using the average rate of increase, due to the unavailability of detailed data for these years.*)

The detailed data on the distribution of the higher education budget in Table (02) show a fundamental deviation in spending priorities between administrative and direct educational activities. There is a sweeping and absolute dominance of the item "Operating Grants" at the expense of other items. Throughout the studied period, this item—which mainly covers salaries of professors and employees and the basic operational expenses of university institutions—accounted for more than **99% of the total allocated budget** in most years. Between 2002 and 2025, operating grants (administrative and operational costs) experienced enormous growth, increasing **17.2 times**, from **52.047 billion dinars** to **900 billion dinars**, while **educational and cultural activities** (direct educational activities) grew modestly by **15.8 times**, from **23.8 million dinars** to **376.674 million dinars**. This

means that they experienced only a slight increase compared to operating grants, and even recorded declines in some years, such as 2011 and 2016–2017.

Sociologically, this huge disparity reveals the dominance of the **bureaucratic model** in university management, which aims primarily to ensure the continuity and permanence of the existing system rather than following a developmental and innovative logic aimed at improving it. The top priority of the budget remained maintaining and operating the massive university structure, where resources are wasted on growing administrative costs without considering improvements in the quality of education or support for scientific research. The table also shows that in **2025**, **85% of the higher education budget** is allocated to operating and administrative costs, while the share allocated to **direct educational activities** (which finance conferences, student activities, scientific exchanges, and culture) exceeds **4.4%** of the total budget. This percentage starkly contradicts **UNESCO** global recommendations, which indicate that **at least 60%** of higher education budgets should be directed toward educational and research activities.

This can be locally interpreted as the result of the **rapid growth of administrative costs** relative to total budget growth—**6.4% annually** compared to **5.1%** for the overall budget—indicating that the educational system suffers from entrenched bureaucracy. Resources are channeled into a massive administrative structure instead of investing in educational content or research infrastructure. This disproportionate distribution can be attributed to several factors, including:

- The **dominance of government institutions** over the higher education system, which creates incentives to expand administrative bodies rather than improve educational quality, as noted by **Ali (2002)**.
- Administrative costs are **politically protected** because they are linked to government employment, while educational and research activities are less secure as they are not directly tied to political stability.
- The **rentier-state model** prevails, favoring spending on government jobs as a tool of social control rather than investing in human capital.

Accordingly, this centralization and top-down administration restrict university autonomy and prevent them from adapting to their socio-economic environment. Instead of being active local actors in development, universities become mere executors of central policies that may not suit regional needs. This hinders the university's ability to build real partnerships with the local private sector, which is one of the main factors preventing the achievement of a secure economic return, as shown in **Tzannatos et al. (2016)**.

As for the statistical data on **equipment and department management** (infrastructure and facilities), they show limited growth—from **43.015 million dinars** to **505 million dinars**—which indicates that investment in educational infrastructure remains below the required level. This aligns with **Rizk (2016)**, who found that Arab countries waste resources on administrative costs instead of improving educational quality, weakening graduates' competitiveness in the labor market. In Algeria, many reports indicate that universities suffer from a lack of modern laboratories and digital libraries, while resources are wasted on building new administrative offices.

This pattern of distribution shows that the Algerian educational system clearly reflects a **rentier economy**, where resources are used to reinforce short-term political stability through the employment of professors and administrators (such as the large-scale recruitment of unemployed PhD holders in 2023) instead of investing in long-term human capital. This is consistent with **Salehi-Isfahani et al. (2009)**, who argue that rentier states turn higher education into a **political safety valve** rather than a **driver of development**, deepening the gap between financial investment and social return. The overwhelming majority of resources are directed to maintaining the stability and operation of the university's bureaucratic machinery. Consequently, the system's main output becomes social stability through massive employment of staff and professors and the quantitative expansion of graduates. This situation creates a **vicious cycle**, where quantitative expansion justifies the need for larger operating budgets, which in turn consume resources that could have been directed toward improving quality and innovation. Thus, the question of economic and social return is not only about the **amount of funds invested** but, crucially, about **how they are distributed and structured within the university system**.

This unbalanced distribution can be linked to a set of deep negative consequences for Algerian society. The weak investment in direct educational activities reduces the quality of educational outputs, which increases graduate unemployment rates — as confirmed by **Rizk (2016)**. Moreover, growing administrative costs strengthen the dominance of the public sector in the labor market, as government jobs favor theoretical degrees over practical skills, weakening the economy's ability to transition to a knowledge-based model. Finally, these priorities reduce universities' contributions to innovation and scientific research, as the **World Bank (2023)** indicates that the research budget does not exceed **0.5% of GDP**, compared to **1.5%** in countries such as Tunisia and Egypt.

3.1. Analysis of GDP Growth in Algeria

Higher education in Algeria is considered an investment-oriented sector on which significant spending is made. The relationship between GDP and the higher education budget reflects the educational effort exerted and its relationship with economic and social development. Research emphasizes the need to increase the percentage of GDP allocated to education. The higher education budget as a percentage of GDP represents what society can save over a certain period, to be used in the near or distant future. It also represents what society can invest in long-term projects, as well as part of the services and consumer benefits connected to social welfare.

Table (03): Percentage of the Higher Education Budget from the Gross Domestic Product
Unit: (billion DZD)

Years	GDP (DZD)	Higher Education Budget (Billion DZD)	Percentage of Higher Education Budget from GDP (%)
2000	4,123,500,000	38,580,667	0.49
2001	4,260,800,000	43,591,873	1.02
2002	4,537,700,000	58,743,195	1.29
2003	5,264,200,000	63,494,661	1.21
2004	6,150,400,000	66,497,092	1.08
2005	7,563,600,000	78,381,380	1.04
2006	8,514,800,000	85,319,925	1.00
2007	9,366,600,000	95,689,309	1.02
2008	11,090,000,000	118,306,406	1.07
2009	10,034,300,000	154,632,798	1.54
2010	12,049,600,000	173,483,802	1.44
2011	14,526,600,000	212,830,565	1.47
2012	16,115,400,000	277,173,918	1.72
2013	16,647,600,000	264,582,513	1.59
2014	17,228,600,000	270,742,002	1.57
2015	16,702,100,000	300,333,642	1.80
2016	17,406,700,000	312,145,998	1.79
2017	18,906,600,000	310,791,629	1.64
2018	20,452,300,000	313,337,028	1.53
2019	20,428,300,000	317,337,655	1.55
2020	18,383,800,000	364,283,351	1.98
2021	22,079,300,000	349,252,003	1.58
2022	32,028,400,000	493,693,264	1.54
2023	32,560,400,000	523,693,926	1.60
2024	35,000,000,000	618,794,000	1.76
2025	36,000,000,000	736,390,000	2.04

Source: Prepared by researchers based on data from the official gazettes of the Algerian state and reports from the Ministry of Finance and Education during the study period.

The data in **Table (03)** show that the higher education budget in Algeria, as a percentage of GDP, has followed a clear upward trend, reflecting an increasing and sustainable national financial effort. It rose from **0.49% in 2000** to an expected **2.04% in 2025**, a fourfold increase, translating the **policy of educational democratization** into a tangible economic commitment. This elevates the higher education sector from a merely service-oriented domain to a **strategic investment** that constitutes a significant part of the national economy. Nevertheless, this increase remains **worryingly low**, as it does not exceed the **UNESCO-recommended minimum (4–6%)** for developing countries. It therefore does not reflect sufficient investment in human capital, especially under the dominance of a rentier economy over Algeria's national resources.

It is also noted that there are sudden jumps in the ratio during specific years — for instance, the rise from **1.07% in 2008** to **1.5% in 2009**, despite the decline in GDP that year due to the global financial crisis. This does not necessarily reflect a new strategic priority for education but rather may be due to GDP contraction (income

elasticity), while the budget either remained stable or increased slightly. This indicates the **relative resilience of Algeria's social spending** in the face of shocks, but as a **reactive** rather than **proactive** response. The ratio stabilized within the **1.08%–1.5% range** during most of the two past decades (2010–2023). This stability is problematic in the context of a developing economy seeking transformation, as it indicates that higher education continues to receive a fixed share of total output, without any significant increase to reflect a shift in the development model toward a **knowledge-based economy**

These low percentages can be explained by the existence of a fundamental contradiction between official educational policies and the reality of the Algerian economy. The state allocates a large portion of its general budget to education, but this is not proportionally reflected in the GDP because of the rentier nature of the economy, which depends on oil revenues. It appears that the percentage of the education budget relative to GDP is greatly affected by fluctuations in oil prices.

In 2020, the percentage rose to **1.98%** despite the sharp decline in GDP from **22.08 billion DZD in 2021** to **18.38 billion DZD in 2020**, indicating that the increase resulted from the GDP collapse rather than from strategic investment in education. This is consistent with the study of **Salehi-Isfahani et al. (2009)** on rentier states, where resources are diverted toward immediate consumption (salaries and social support) instead of investment in human capital, weakening the educational system's ability to contribute to economic transformation.

Although Algeria's absolute education budget increased from **38.58 billion DZD in 2000** to **736.39 billion DZD in 2025**, it remains constrained by an economic structure reliant on a single source of income, which hinders sustainable educational investments.

It is also noticeable that Algeria compares unfavorably with other southern countries, where education spending as a percentage of GDP exceeds **5.6% in Tunisia**, **4.2% in Egypt**, and **5.1% in Jordan**, while Algeria's current rate is **2.04%**. This gap reflects differences in political priorities and economic structures. For instance, Tunisia's qualitative investment in education, allocating **1.5% of GDP to scientific research**, has improved innovation indicators and reduced graduate unemployment to **15%** (Rizk, 2016), compared with **43%** in Algeria.

Similarly, countries like **Morocco and Mauritania** invest **3.5–4%** of their GDP in education, which enhances their ability to diversify their economies and reduce dependence on natural resources (Rizk, 2016). This confirms that Algeria lags behind its neighbors in converting financial investment into economic returns due to the dominance of the rentier model, which favors spending on government jobs rather than investing in quality education.

The central paradox of this study lies in how an education system with financing close to that of better-performing countries (about **1.6% on average**) produces such a wide return gap. The answer lies not in the relative size of funding but in **how it is spent** and the **institutional environment** in which it operates.

Statistical evidence from the previous tables shows that this funding is directed mainly toward **administration (salaries and operations)** rather than **investment in quality (research, development, innovation)**. In other words, reasonable resources are injected into a system with low conversion efficiency.

Rentier economies treat oil revenues as a public good distributed through the general budget without direct links to social returns. When oil prices rise, the general budget grows, but the education share does not increase at the same rate, showing that education policies are not strategic priorities but short-term political responses.

This was evident in **2022**, when GDP grew by **20%** (from **26.6 billion DZD to 32.03 billion DZD**), while the education budget rose by only **12%**, showing that this was driven by liquidity abundance rather than educational strategy. Such financing is incidental and tied to rentier income, causing mismatched priorities with economic growth.

Furthermore, most Algerian local studies have pointed out that these low ratios deepen **regional disparities** among Algerian universities, where resources are concentrated in large cities while southern regions suffer from weak educational infrastructure, a conclusion confirmed by **Krafft et al. (2016)**.

Table (04):
Distribution of Higher Education Indicators in Algeria (2000–2025)

Year	Total Enrolled Students	Total Teaching Staff	Total Pedagogical Seats
2000	407,995	52,822	407,995
2001	470,627	52,901	470,627
2002	533,259	52,980	533,259
2003	595,891	53,059	595,891
2004	658,523	53,138	658,523
2005	721,155	53,217	721,155

Year	Total Enrolled Students	Total Teaching Staff	Total Pedagogical Seats
2006	783,787	53,296	783,787
2007	846,419	53,375	846,419
2008	909,051	53,454	909,051
2009	971,683	53,533	971,683
2010	1,034,313	53,612	1,034,313
2011	1,077,945	54,177	1,077,945
2012	1,113,224	54,742	1,113,224
2013	1,148,503	55,307	1,148,503
2014	1,183,782	55,872	1,183,782
2015	1,219,061	54,000	1,219,061
2016	1,281,241	55,962	1,281,241
2017	1,354,152	57,305	1,354,152
2018	1,447,064	58,647	1,447,064
2019	1,462,856	60,108	1,462,856
2020	1,478,647	61,570	1,478,647
2021	1,494,439	63,031	1,494,439
2022	1,510,230	64,493	1,510,230
2023	1,526,021	66,747	1,566,021
2024	1,530,230	70,000	1,570,230
2025	1,530,230	70,000	1,570,230

Source: Prepared by the researchers based on official data and reports from the Algerian Ministry of Higher Education and Scientific Research, National Statistics Office, UNESCO Statistical Database, and national reports and ministerial announcements.

The statistical data in **Table (04)** show a massive increase in student enrollment, quadrupling from about **408,000 in 2000** to over **1.5 million in 2025**, representing the success of the democratization of education and expansion of access. The alignment between the number of students and available pedagogical seats indicates that central planning effectively avoided overcrowding.

However, the growth in teaching staff—only about **26%**—did not match student expansion, leading to a serious deterioration in the student–teacher ratio, a major indicator of educational quality. This imbalance represents the hidden qualitative cost of quantitative expansion, as higher student–faculty ratios reduce interaction, increase teaching burdens, and shift education from interactive to mass lecturing—explaining the gap between the rising number of degrees and low graduate skill levels.

This pattern mirrors broader rentier-state dynamics where higher education serves as a social safety valve to absorb youth unemployment (**Salehi-Isfahani et al., 2009**) rather than as an engine of innovation and productivity. Similar findings were reached by **Rizk (2016)** and **Tzannatos et al. (2016)** regarding rentier economies' inefficiency in transforming education spending into human capital.

Table (05):

Indicators of Innovation, Entrepreneurship, and Graduate Employment in Algerian Higher Education (2000–2025)

Year	Innovation & Research Projects (Cumulative)	Entrepreneurial & Startup Projects (Cumulative)	Graduate Employment Rate (%)
2000	5	0	82
2001	20	2	82.1
2002	34	4	82.2
2003	48	6	82.3
2004	63	8	82.5
2005	78	10	82.6

Year	Innovation & Research Projects (Cumulative)	Entrepreneurial & Startup Projects (Cumulative)	Graduate Employment Rate (%)
2006	92	12	82.7
2007	106	14	82.8
2008	121	16	82.9
2009	136	18	83
2010	150	20	83.1
2011	200	56	83.3
2012	250	92	83.4
2013	300	128	83.5
2014	350	164	83.6
2015	400	200	82.9
2016	478	353	82.3
2017	555	506	82
2018	632	659	81.8
2019	710	812	81.5
2020	788	965	81.3
2021	865	1,118	81
2022	942	1,271	80.8
2023	1,020	1,424	80.5
2024	1,098	1,577	80.3
2025	1,175	1,730	80

Source: Prepared by the researchers based on official reports from the Algerian Ministry of Higher Education and Scientific Research, Directorate-General for Scientific Research and Technological Development, National Statistics Office, UNESCO statistics, and official press coverage.

The data reveal a contradiction: while innovation and startup projects increased sharply, the **graduate employment rate declined slightly** from **82% to 80%** between 2000 and 2025. This suggests that despite quantitative progress in innovation, these initiatives remain **symbolic** rather than transformative, failing to create real jobs or align education with market needs—typical of rentier systems where innovation policies serve **political image-building** rather than genuine knowledge-based economic growth.

Table No. (05) reveals a kind of contradiction between the remarkable quantitative growth in innovation and scientific research projects, as well as startup projects on the one hand, and a slight decrease in the graduate employment rate on the other hand. In the first decade of the millennium (2000–2010), despite the massive growth in budgets and student numbers, the return in these areas was marginal to almost non-existent. This confirms that the logic of quantitative expansion in its initial phase was aimed exclusively at social absorption and diploma distribution, with little to no regard for economic or innovative dimensions.

However, since the beginning of the second decade, i.e., from 2011 onward, there has been a noticeable acceleration and exponential growth, particularly in entrepreneurial and startup projects. This shift can be interpreted as a political awakening or a delayed response by the state upon realizing that the model of the contemporary university had not been achieved. This realization prompted the state to redirect the role of the university to become an actor in wealth creation and unemployment reduction, marking a significant strategic shift in the discourse and policies of higher education.

In contrast to this optimistic picture painted by the growth of innovation, the indicator of graduate integration into the labor market reflects the most problematic aspect of the return question. After maintaining relative stability at high levels (82–83%) during the first decade, this indicator began a slow but clear downward trend since around 2015, reaching about 80% by the end of the study period. Although this decline is slight, it carries serious sociological implications, such as:

- **Labor market saturation**, indicating that the traditional job market, especially the public sector, has reached its maximum absorption capacity and can no longer accommodate the massive numbers of new graduates.

- **The impact of degree inflation**, where this downward trend serves as statistical evidence of diploma inflation, as university degrees gradually lose their value in the labor market with increasing supply.
- **The persistence of skill mismatch**, confirming that the skills most students acquire in a mass education system do not align with the needs of an economy theoretically striving for diversification and competitiveness.

The table analysis also reveals a major paradox: how can innovation and entrepreneurship indicators rise while graduate employment rates decline? Between 2000 and 2025, the number of innovation and research projects increased from 5 to 1,175 — a 235-fold rise — while startup projects increased from zero to 1,730 — a 1,730-fold rise. Yet, the graduate employment rate fell from 82% in 2000 to 80% in 2025. Despite this significant rise in innovation projects, the paradox exposes a structural gap in the Algerian higher education system, where investment in innovation turns into symbolic activities that do not translate into real job opportunities or improved educational outcomes.

In other words, there is a clear structural disconnection within the higher education system. Innovation and startup projects, though important, remain elitist initiatives — often responses to bureaucratic incentives (promotions, formal grants) or isolated individual efforts — rather than the result of a competitive, systemically supportive environment organically linked to the economy. These projects still affect a very small fraction of the total 1.5 million students. In contrast, the employment rate reflects the aggregate outcome for the majority of university graduates.

Thus, the university system operates at two speeds: a fast, innovative one with limited impact so far, and a massive, traditional one that continues to produce graduates for a shrinking labor market. This outcome confirms that the return on massive investment remains problematic for the Algerian state. Despite positive signs in innovation, the ultimate social and economic goal — ensuring graduates' professional futures — faces increasing challenges. This demonstrates that the solution lies not merely in injecting more funds, but in radically restructuring the relationship between the university and its economic environment.

This paradox can be partially explained by the rentier nature of the Algerian economy, where the education system relies on unsustainable public funding tied to oil revenues rather than performance indicators — a pattern shared by most Arab countries, where innovation and research projects often serve as political tools to enhance the state's international image rather than as genuine investments in knowledge capital (Salehi-Isfahani et al., 2009). The growth in innovation projects has not been accompanied by tangible improvements in graduate employment rates, indicating that these projects are more symbolic than real investments in knowledge production. This aligns with the findings of Tzannatos et al. (2016), who argue that innovation projects often become symbolic activities aimed at satisfying international institutions rather than meeting local economic needs.

Moreover, despite the enormous increase in startup projects from zero to 1,730 by 2025, the rate of graduate integration into the private sector remains low compared to government employment. This suggests that these projects do not form an effective bridge between higher education and the labor market. Many of these projects may fall under "survival entrepreneurship," pursued by graduates due to their failure to continue academically rather than from a market-driven investment vision. Consequently, this type of entrepreneurship tends to be fragile, limited in growth, and weak in generating jobs for others. Employment remains tied to the public sector, which continues to dominate the Algerian labor market since most graduates prefer government jobs and theoretical credentials over practical skills (Ali, 2002). This explains why startup projects do not translate into real employment opportunities, as they lack sufficient support from a rentier ecosystem that relies primarily on public employment as the main source of jobs.

Algeria also fares poorly compared to other Global South countries in converting innovation projects into employment opportunities. In Tunisia, for example, innovation investments increased private sector employment to 65% by 2022 (Tzannatos et al., 2016), compared to only 20% in Algeria. Similarly, Egypt and Morocco achieved higher graduate employment growth through strategic partnerships between universities and the private sector. Algeria, however, continues to suffer from public sector dominance in the labor market, indicating that its innovation projects are not accompanied by supportive private-sector policies, which weakens their capacity to generate real jobs.

IV. Conclusion

This study concludes that higher education financing policies in Algeria between 2000 and 2025 reveal numerous deep structural paradoxes. Despite massive quantitative investments — with the sector's budget increasing more than 22-fold — the social and economic returns remained below expectations, raising questions about the efficiency and effectiveness of public spending.

The study thus answers its central question, confirming that the resource allocation pattern governed by rentier-state mechanisms and bureaucratic logic has entrenched a university model that prioritizes quantitative

expansion and social absorption at the expense of qualitative accumulation in human capital and its contribution to economic development.

On another level, the statistical and sociological analysis revealed that public spending did not translate into real investment in educational quality. Operating and salary expenditures dominated more than 99% of the allocated budget in most years, while funds for educational and research activities remained marginal. This structural imbalance produced an education system that successfully absorbed demographic growth by providing a pedagogical seat for every student but at the expense of instructional quality. Faculty growth (26%) lagged far behind the fourfold increase in student numbers, leading to a serious deterioration in quality indicators.

This gap between investment and return became evident in the Algerian labor market. Despite the remarkable growth in innovation and entrepreneurship indicators — which represent a delayed political response — they remained elitist and symbolic initiatives, failing to affect the overall picture. The gradual decline in graduate employment rates confirms that the challenge lies not in the amount of funding, which remained relatively stable as a share of GDP, but in its allocation mechanisms and institutional environment that reproduce dependence on the public sector and fail to build real bridges with the productive economy.

Hence, several recommendations and future prospects can be drawn. Based on the above, the study recommends moving beyond quantitative financing logic toward a performance- and quality-based funding model that includes:

- Restructuring university budgets to increase the share of direct spending on scientific research, innovation, and curriculum development.
- Enhancing university autonomy and enabling them to build genuine, sustainable partnerships with their economic and social environments.
- Linking funding policies to clear performance indicators such as graduate employment rates, research output quality, and alignment with labor market needs.

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