

Future transformations in higher education policy: 2035 scenarios

• TAHCHI MERIEM tahchimeriem7@gmail.com

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Abstract:

This study aims to analyze the reality of higher education policy in Algeria in light of rapid global transformations, highlighting the structural and organizational challenges facing the university system. It also examines the internal and external factors influencing policy formulation through a comparative analysis based on international standards. The study provides an objective assessment of governance, the quality of education, and the role of digitalization in improving institutional performance. Using an analytical and forward-looking methodology, three possible scenarios for the future of higher education up to 2035 are developed, depicting varying paths ranging from gradual reform to rapid growth and cautious stagnation. The study concludes that comprehensive strategic reforms based on innovation and flexibility are necessary to ensure the competitiveness of Algerian universities.

Keywords : Higher education; educational policy; university governance; university reform; digitalization; foresight; scenarios; Algeria.

الملخص :

تهدف هذه الدراسة إلى تحليل واقع سياسة التعليم العالي في الجزائر في ضوء التحولات العالمية المتسارعة، مع إبراز التحديات البنيوية والتنظيمية التي تواجه المنظومة الجامعية. كما تستعرض العوامل الداخلية والخارجية المؤثرة على صياغة السياسات، من خلال قراءة مقارنة تستند إلى المعايير الدولية. وتقدم الدراسة تقييماً موضوعياً لوضع الحوكمة، جودة التكوين، ودور الرقمنة في تحسين الأداء المؤسسي. واعتماداً على منهجية تحليلية واستشرافية، تم بناء ثلاثة سيناريوهات محتملة لمستقبل التعليم العالي حتى عام 2035، تُظهر مسارات متفاوتة بين الإصلاح التدريجي، الطفرة السريعة، والجمود التحذيري. وتخلص الدراسة إلى ضرورة تبني إصلاحات استراتيجية شاملة قائمة على الابتكار والمرونة لضمان تنافسية الجامعات الجزائرية.

الكلمات المفتاحية : التعليم العالي؛ السياسة التعليمية؛ الحوكمة الجامعية؛ الإصلاح الجامعي؛ الرقمنة؛ الاستشراف؛ سيناريوهات؛ الجزائر.

* المؤلف المرسل : مريم طحشي

i. Introduction :

In recent decades, the world has been experiencing profound and rapid transformations across scientific, technological, economic, and social spheres—changes that have directly impacted higher education systems. Universities today are no longer just institutions for educating students; they have become hubs for scientific research, innovation, and engines of economic and social development. With the widespread adoption of digital technologies and shifts in global labor markets, higher education now faces new challenges that demand dynamic and flexible policies capable of adapting to an increasingly uncertain and constantly changing future.

In Algeria, as in many developing countries, there is growing pressure to reform higher education to meet the demands of the knowledge economy and to strengthen the competitiveness of universities both locally and internationally. This requires developing advanced academic programs, enhancing scientific research, improving the quality of training, and ensuring that graduates are effectively integrated into the labor market. However, this process is hindered by the complex interplay of political, economic, technological, and social factors—making traditional strategic planning alone insufficient.

Within this context, scientific foresight emerges as a key tool that helps decision-makers understand future challenges and anticipate possible scenarios, enabling the development of more effective educational policies that better align with upcoming changes. This approach relies on analyzing influential factors, studying the relationships among them, and building multiple scenarios that allow for envisioning how higher education in Algeria might evolve by the year 2035.

Based on the above, we pose the following problem:

How can national higher education policies in Algeria adapt to future transformations and ensure quality education and an effective response to labor market demands by 2035?

Sub-questions:

- What are the internal and external factors shaping the future of higher education in Algeria?
- How can these factors be classified according to their importance and their impact on educational policies?

- What are the possible future scenarios for higher education policy through the year 2035?
- What measures and policies are needed to ensure the achievement of the most favorable future scenario?

Proposed hypotheses:

- Improving the management of educational resources and developing academic programs will enhance higher education's ability to meet labor market demands by 2035.
- The strong interrelationship between economic, technological, and educational policy factors will significantly influence the formulation of future policies.
- Using forecasting tools such as MICMAC and morphological analysis will enable the development of accurate and realistic scenarios that will help policymakers adopt effective policies.

ii. The importance of higher education in the world and in Algeria:

Higher education is one of the fundamental pillars of comprehensive development in any country, as it contributes directly to building human capital, promoting innovation, and driving economic and social growth (Olugbenga S. Adedeji and Omolara A. Campbell, 2013). At the global level, universities have become centers for knowledge production and scientific research, and vital institutions for creating a qualified workforce capable of facing the challenges of the digital age and the knowledge economy. From this standpoint, higher education policies play a crucial role in guiding the work of academic institutions towards achieving the Sustainable Development Goals, and ensuring that educational outputs are aligned with the requirements of the labor market and modern technology. (IESALC, 2023)

Globally, higher education contributes to improved employment and income indicators, enhances countries' competitiveness in the knowledge economy, and serves as a driver of scientific research and technological innovation. Studies indicate that clear and stable educational policies can amplify the impact of universities on economic and social development by optimizing

resource allocation, supporting research, and aligning academic programs with future needs. (Gimranova, 2020)

In Algeria, higher education stands out as a strategic tool for achieving national development by building a qualified human capital, developing scientific research and innovation, and promoting graduate integration into the labor market. However, current challenges, such as limited funding, inadequate facilities, and the gap between educational outcomes and labor market needs, highlight the need for more flexible and effective educational policies. Furthermore, coordination among universities, ministries, and the private sector, along with adherence to international standards, is crucial for enhancing higher education's capacity to contribute to economic and social development. (Mabrouka Bouhajeb, 2018)

Understanding this importance at both the global and local levels forms a basic knowledge base before moving on to the prospective study, which aims to draw up future scenarios for higher education policies in Algeria until 2035, in order to ensure that educational outputs are aligned with the challenges of the times and economic and technological transformations.

iii. The current situation and main challenges of higher education in Algeria:

Higher education in Algeria is a cornerstone for building human capital and promoting economic and social development. However, the system suffers from a range of structural and institutional challenges that limit its ability to keep pace with global developments and meet labor market demands. A thorough understanding of these challenges is a necessary step before moving on to foresight studies and developing future scenarios.

1. Academic challenge and quality of education: Despite the quantitative expansion in universities, quality assurance in higher education institutions remains a fundamental challenge, as studies indicate difficulties in implementing quality assurance systems, weak or inadequate training to meet the requirements of the times, which is reflected in educational outcomes. (LAKIKZA Yacine, 2024)
2. Funding, material and human resources: Funding higher education institutions, especially public ones, is one of the most prominent problems, as there is a

limitation in material resources, a lack of equipment and research facilities, and difficulty in securing qualified human resources. (سهم، 2023)

3. Digital transformation, weak digital infrastructure, and e-learning: With global transformations, dealing with digital transformation has become a necessity, but Algerian universities face obstacles in the digitization process: weak infrastructure, lack of communication and digital tools, and unpreparedness of e-learning methods. (بوحنية، 2023)
4. Governance, management and corporate organization: The administrative and organizational system of higher education suffers from centralization in some aspects, weak coordination between universities, the state, and the private sector, which leads to slow reforms and difficulty in keeping up with rapid developments. (Zine, 2017)
5. The gap between education outputs and the labor market: There is a critical review of the relationship between the graduates produced by higher education and the needs of the labor market, as research has shown that the lack of alignment between academic training and the requirements of the economy leads to graduate unemployment or a lack of effective integration. (The Problem of Coherence Between Higher Education Policy and Employment Policy in Algeria, 2015)

Higher education in Algeria is experiencing, on the one hand, expansion and increasing demand, and on the other hand, it faces a series of interconnected challenges: from the quality of education, funding, digitalization, and administrative organization, to the alignment of university graduates with the labor market. These challenges constitute a complex context that necessitates strategic reforms and integrated policies before embarking on any future planning.

iv. **Analysis of factors influencing higher education policies:**

Higher education policies are influenced by several internal and external factors, which can be categorized as follows:

a) Internal Factors:

- Institutional Structure: The strength of universities and their ability to implement policies, and the presence of effective management of academic and research programs.
- Funding and Resources: The availability of sufficient budgets to support education and scientific research, and the balanced distribution of human and material resources.
- Quality of Academic Programs: Curriculum updates, alignment of specializations with labor market needs, and ensuring the quality of education. (Trinh, 2023)

b) External Factors:

- National Economy: The impact of economic growth and public funding on universities' ability to develop.
- Technology and Digital Transformation: The need to keep pace with the digital revolution, implement e-learning, and modernize digital infrastructure.
- International Standards and Academic Competitiveness: Commitment to international standards to ensure quality education and regional and international competitiveness. (Glenda Kruss, 2015)

c) The Relationship Between Factors

- Internal and external factors often interact, directly influencing the formulation of educational policies and the success of reforms.
- Accurately identifying these factors contributes to developing precise and effective future scenarios for strategic planning.

v. **Envisioning the future of higher education policy in Algeria:**

The process of building scenarios requires setting mechanisms and stages in order to achieve the sound and accurate construction of the expected scenarios for the phenomenon, which in turn attempt to identify the general paths of social phenomena and the variables controlling each of these paths. (ساحلي, 2019) In order to ensure an acceptable level of accuracy in the forecasting process in the field of humanities in general and the field of political science in particular, the structural analysis technique was used to identify the components of the phenomenon and the most important variables that influence the

development of the phenomenon under study, which relates to the future of higher education policy in Algeria under the LMD system.

In order to study any phenomenon and track its future course, the most important factors affecting it must be identified. Identifying the main variables is a key point in the first stage, as this process relies on structural analysis (MICMAC). This technique is based primarily on identifying the most important variables affecting the phenomenon. Accordingly, a set of variables that could have a direct or indirect impact on the future of higher education policy in Algeria was identified. 28 variables were identified after consulting with a group of professors, researchers, and some external consultants interested in the field. This was done in different stages, which are: identifying the variables, describing the relationship between the variables, identifying the main variables, and then including them in the MICMAC program, or the matrix, which is one of the stages of this forward-looking program. Filling out the matrix is a great opportunity for dialogue, finding common ideas, and creating a smart ideas sheet, which helped in accurately identifying the variables included in the matrix. (Gaudet, <http://www.lapro prospective.fr/methodes-de-prospective/les-outils-telechargeables-compatibilite-windows-uniquement/51-micmac.html>, 2025) :

Structural analysis is a tool for organizing collective thinking, through which it is possible to describe the system under study using a matrix relating to all the elements that make up this system. The purpose of this method is to reveal the main influential and independent variables and thus know the basic variables for the development of the system or phenomenon under study.

Accordingly, a set of variables related to higher education policy in Algeria was identified, and based on the study of the subject and theoretical experience, 28 variables were identified for inclusion in the MICMAC program matrix. These were classified and ranked based on the domain, as follows:

Political System, Political Stability, Legislation, Laws and Regulations, Decision Maker, Civil Society, Labor Market , Knowledge Economy , Infrastructure, Public Sector, Private Sector, Unemployment , Public Spending ,

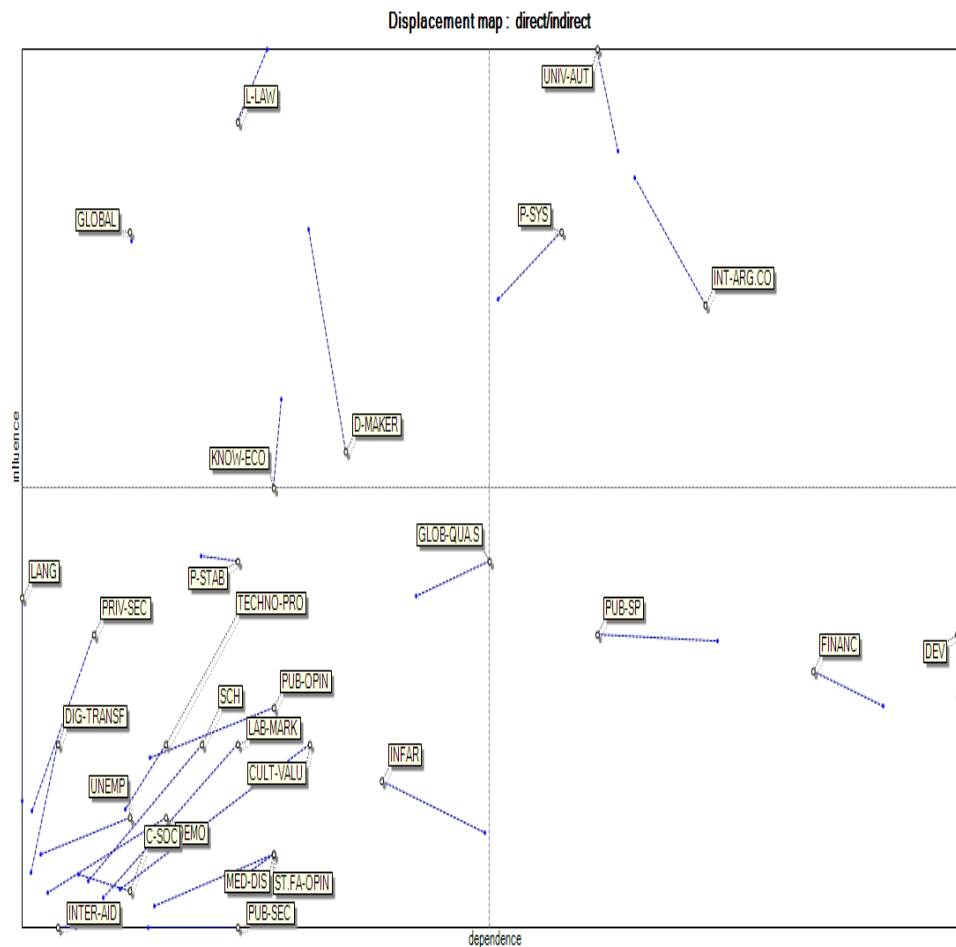
Development , Financing , University Autonomy , Cultural Values , Media Discourse , Public Opinion , Technological Progress, Global Quality Standards, International agreements and cooperation , Globalization , Demographic , Student and Faculty Opinions , International Aid , Digital Transformation.

After completing the matrix and the technical process for extracting the results, the program demonstrated suitability, accuracy, and conformity of the matrix to the required indicators for the validity of the process. The direct effects (MID) showed the following results:

INDICATOR	VALUE
Matrix size	28
Number of iterations	2
Number of zeros	649
Number of ones	53
Number of twos	52
Number of threes	25
Number of P	5
Total	135
Fillrate	18, 1939%

The next step is to analyze the program's results through direct and indirect impact and influence charts, classifying them into sectors as follows:

- Sector 1: Highly influential and slightly influenced variables that control the future.
- Sector 2: Highly influential and highly influenced variables; any influence on them will have a greater impact on the system and on them themselves, and they control the stakes.
- Sector 3: Variables with little influence but high influence.
- Sector 4: Variables with little influence but high influence; heavy and independent trends; influence on them does not determine the future.
- Sector 5: Variables with moderate influence and influence.



Based on the study's findings regarding the identification of the most important variables affecting the phenomenon under study, the variables can be divided into: variables that constitute the stakes of the phenomenon – sensitive and influential variables – variables with moderate influence and impact – excluded variables, as follows:

1. Input and Determinant Variables: These include globalization, legislation, laws, and regulations.
2. Leading Variables: These include infrastructure, political stability, international quality standards, the knowledge economy, decision-makers, language factors, public spending, and the private sector.
3. Variables that Constitute Keys to the Phenomenon: The results showed that certain factors are highly influential and highly influenced, and have a high degree of impact on the future of the system or phenomenon. These factors are: university autonomy, international agreements and cooperation, and the political system.

4. Sensitive Variables – Influences: Through an analysis of the results, it appears that the factors with a significant impact on the future of the studied phenomenon are funding and development.

5- Less Influential Variables: Based on the matrix filling process, the results showed that there is a group of factors that have no direct or indirect influence on the phenomenon. We divided these into two groups based on the neglected variables category, classifying them as either completely excluded or excluded but very close to the category of sensitive, influential variables:

A- Moderately Influential Variables: These are factors classified as moderate indicators but very close to the category of sensitive influencers or influential factors. They are: the response of professors and students, the public sector, and public opinion.

B- Excluded Factors: These are variables with little influence and little impact, and they are significant, independent trends that do not determine the future of the studied phenomenon. They are: civil society, demographic factors, unemployment, digital transformation, international aid, technological advancement, schools, the labor market, cultural trends and values, and media discourse.

Built on the presentation of the results of the direct and indirect effects on a group of researchers, and on the previous theoretical frameworks, and considering the particularity of this study with regard to the future of higher education policy in Algeria, especially in light of the international reference of the LMD system, and based on the outputs of the structural analysis using MICMAC technology, taking into account the relationships of influence and impact between higher education policy in Algeria and the study variables, it was reached to identify the most prominent variables that control the future of the phenomenon under study, in addition to the nature of the relationships existing between these variables:

- Political factors: Decision-making, legislation, laws, and regulations, university autonomy.

- Economic factors: Funding, the knowledge economy, public spending.

- External factors: Globalization, international quality standards, international agreements and collaborations.

Therefore, the morphological analysis will rely on variables with significant and moderate influence.

Extracting the basic components that influence the phenomenon (structural analysis):

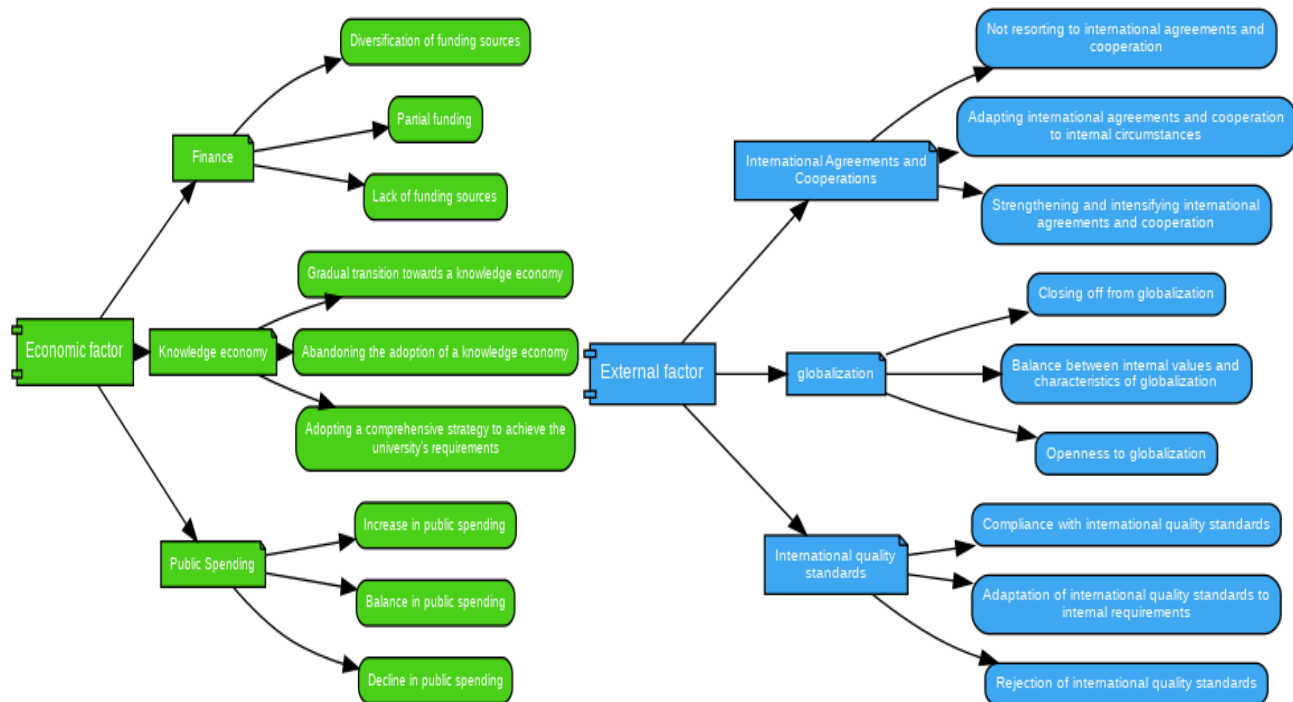
This approach relies on deconstructing the system under study into subsystems, also called system components, while ensuring maximum independence between them. This technique was developed by the American researcher F. Zwicky during World War II. The first stage of morphological analysis in the scenario building process involves deconstructing the system or function under study into smaller systems or components. Within this deconstruction, the selection of components is precise and requires in-depth thinking, which can be achieved, for example, based on the results of structural analysis. Among the results obtained using MIC MAC, and based on the theoretical frameworks and studies related to the research, the results obtained after structural analysis in the MIC MAC technique are as follows:

- Political factors: Decision-making, legislation, laws, and regulations, university autonomy.
- Economic factors: Funding, the knowledge economy, public spending.
- External factors: Globalization, international quality standards, international agreements and collaborations.

After filling in the information in the morphological analysis program on the program platform, a series of stages were passed, the first of which was determining the levels of analysis, such as the general environment or the specific systems. Then we set the dimensions of these levels by understanding the current performance of the phenomenon under study and its interactive relationships with its environment, so that a picture of the existing situation is formulated that is characterized by quantitative and qualitative detail and comprehensiveness by highlighting the various dimensions (political, economic, and external) of the phenomenon. This picture is also characterized by dynamism, as the previous developments of the phenomenon are taken into consideration. After that, the main variables are identified. Identifying the main variables is considered a key point for this first stage of the scenario technique, as this process depends on the structural analysis technique.

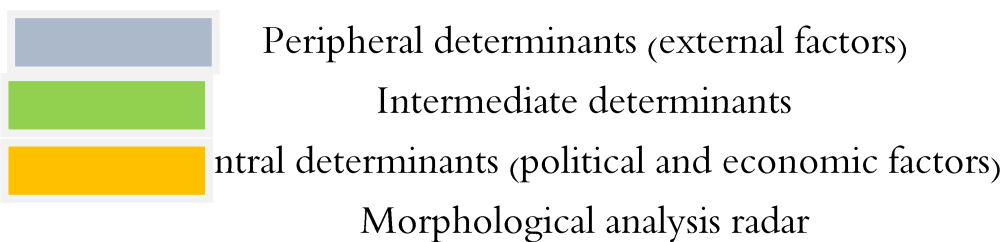
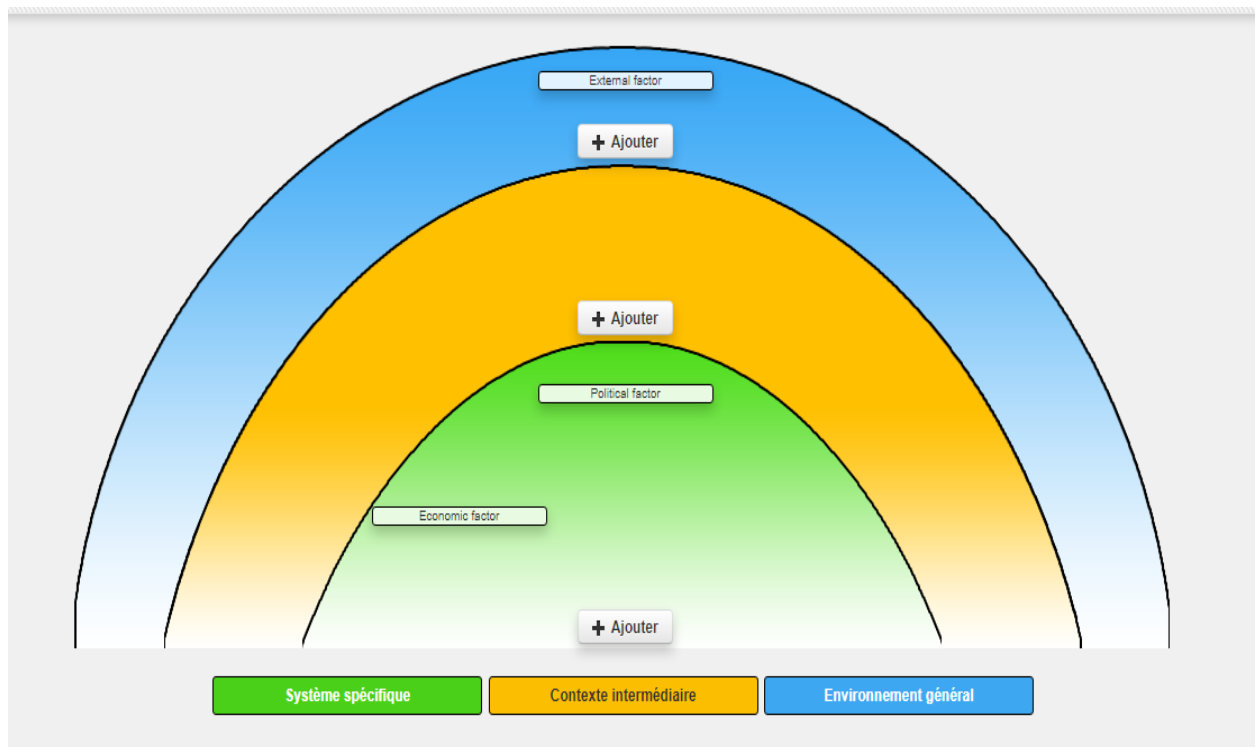
Then comes the stage of “defining the system tree diagram”, which is a diagram of the study in the form of a tree (axis and branches) that includes details of all sub-

scenarios with highlighting and analyzing the major and uncertain trends that govern each variable in preparation for reaching the most plausible scenarios.



Variable and component tree diagram according to morphological analysis technique

The predictive radar highlights the levels of analysis and the content of each level so that the research group can exchange past, present, and future information related to each variable or component of the system, or add other variables through the interactive "Add" key as shown in the figure below (the radar). It also allows for real-time and remote discussions, and for identifying assumptions about its future development and the likelihood of its occurrence before preparing the morphological field.



The next stage would be to present the possible developments for each component within the framework of molecular scenario formation, for example, as illustrated in the Sennaring Tools program.

	Decision Maker	Somme des probabilités	Monopoly in decision-making	Participation in decision-making	Balance between monopoly and participation in decision-making
1		100 %	Probabilité 30 %	Probabilité 40 %	Probabilité 30 %
2	Laws, Legislations and Regulations	100 %	Restrictive laws	Flexible laws	Laws open to the outside world
			Probabilité 40 %	Probabilité 30 %	Probabilité 30 %
3	University independence	100 %	Full autonomy	Partial autonomy	Non-autonomy (centralization)
			Probabilité 30 %	Probabilité 40 %	Probabilité 30 %

Presenting the partial probabilities for each variable is the penultimate stage in extracting the overall probabilities through a process of linking and demonstrating the possible effects of the partial scenarios for the components of the phenomenon under study, where the partial scenarios for the phenomenon were arrived at.

As for building the overall scenarios (macro scenario), this is done after a process of brainstorming and combining the partial scenarios. A consistency matrix is built to exclude illogical combinations and determine the final scenarios (prospective hypotheses). These are then included in the morphological analysis program and analyzed through their components, and reduced to three final overall scenarios that are the most likely to be realized and closest to reality, which are as follows:

A. A realistic gradual reform scenario:

This scenario represents the most realistic approach in the Algerian context, where the higher education system progresses in measured steps and at a gradual pace, with clear improvements in governance, digital infrastructure, and the attractiveness of the programs. In this scenario, English is partially adopted in some disciplines, and limited but impactful international partnerships are activated, while funding and scientific research remain at a moderate level, supported by some incentive programs. There is a gradual improvement in the quality of curricula and their alignment with the labor market, but it remains below the level required to achieve a qualitative leap. This scenario reflects a combination of realistic progress within economic and regulatory constraints and is expected to have a moderate impact during 2030–2040.

- Its main characteristics:
 - University governance: Slight improvement without radical reforms.
 - Funding: Stability at average levels, without a qualitative leap.
 - Human resources: Continuation of current training with weak motivation.
 - Labor market: Persistent gap between doctoral training and market needs.
 - Infrastructure and digitalization: Slow modernization.
- The result:
 - An increase in the number of PhD graduates, but weak job placement.
 - Scientific output is slowly improving.
 - The system remains "stable but ineffective."

B. The scenario of an accelerated reform boom:

This scenario hinges on a significant shift in the state's political and economic will toward higher education. It entails a radical overhaul of legislation, the comprehensive adoption of English in teaching and research, and the launch of an exceptional national program to digitize universities, develop curricula, and align them with the demands of the knowledge economy. Scientific research would also experience a surge in funding and international partnerships, transforming universities into hubs of innovation and leadership. This scenario requires sustained financial resources, profound organizational stability, and a restructuring of governance; therefore, it remains possible but less likely than the first scenario due to its demanding implementation requirements.

- Its key features include:
 - Structural reforms in governance: greater university autonomy, modern management, and economic partnerships.
 - Dynamic funding: diversification of funding sources and effective research funds.
 - High-quality education: education geared towards innovation and entrepreneurship.
 - Strong digitalization: educational platforms, smart laboratories, and comprehensive digital management.
 - The job market: rapid integration of PhD graduates into the national economy, particularly in emerging sectors.
- The result:
 - Lower unemployment among PhD graduates.
 - A strong, industry-linked research system.
 - Universities that compete regionally in North Africa.

C. Scenario of stagnation and slow transformation:

This scenario represents a situation where Algerian universities remain largely stagnant, with very limited reforms and little impact from national policies. Reliance on a traditional teaching model persists, English language integration is slow, international partnerships are weak, and the research system is unable to improve due

to financial and infrastructural constraints. The skills gap with the labor market widens, graduate unemployment rates rise, leading to brain drain and a decline in the university's societal influence. This scenario remains the least desirable and is used in this study as a "warning scenario" to illustrate the risks of inaction.

- Its main characteristics:

- Funding: Severe decline due to general economic pressure.
- Infrastructure: Modernization projects halted and equipment shortages.
- Human resources: Brain drain, shortage of research professors.
- Governance: Excessive centralization, lack of initiative.
- Labor market: Declining integration of PhD graduates, unproductive oversupply.

- The result:

- A severe decline in the quality of education.
- Brain drain at its highest levels.
- The university becomes an "ineffective" institution performing only basic functions.

Conclusion:

A study of higher education policy in Algeria reveals that the sector stands at a critical crossroads, necessitating a profound review of its organizational, pedagogical, and research systems. Rapid global transformations, coupled with internal challenges, have demonstrated that developing higher education is no longer an option but a strategic imperative to ensure integration into the knowledge economy. Analysis of influencing factors highlights the importance of good governance, sustainable funding, and quality education as fundamental pillars for any effective reform. By examining the current situation and projecting future trends, it becomes clear that achieving positive transformation requires a long-term vision and bold decisions grounded in evidence and international standards. The system's capacity for adaptation and innovation remains the decisive factor in establishing a new position for Algerian higher education within the global landscape.

Conclusions:

- The pace of higher education reform in Algeria remains below the level of rapid global transformations.

- Data indicates a clear gap between university outputs and labor market demands.
- Reliance on traditional governance models limits the effectiveness of decisions and reforms.
- Scientific research suffers from inadequate funding, fragmented efforts, and limited international engagement.
- A study of influencing factors reveals that digitalization has become a fundamental requirement for improving university performance.
- International comparisons confirm that global quality standards have not yet been sufficiently integrated into national policies.
- A forward-looking analysis demonstrates that the future of higher education depends on the system's capacity for adaptation and innovation.
- Scenario analysis shows that a realistic, gradual reform is the most likely outcome, but it requires strong institutional commitment.

Recommendations:

- Strengthen university autonomy and link it to clear accountability mechanisms.
- Update curricula to align with the skills required for the digital economy and the job market.
- Support scientific research through competitive funding and encourage international partnerships.
- Improve governance by establishing data-driven decision-making mechanisms.
- Invest in digitalization and develop the university's digital infrastructure.
- Enhance faculty development and career paths.
- Expand collaboration between the university, industry, and government institutions.
- Adopt a proactive and forward-looking approach to educational policy planning.

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