

From Thesis to Startup: AI-Enhanced Incubator-Supported Graduation Projects in Algerian Higher Education

من المذكرة إلى المشروع الريادي: المشاريع التخرجية المدعومة بالحاضنات والمُعززة بالذكاء الاصطناعي في التعليم العالي الجزائري

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Abstract:

Higher education in Algeria has relied on a graduation model based on traditional theses, resulting in academic outputs that are theoretical and archival, with limited practical or socio-economic impact. In this context, Ministerial Decision No. 1275, issued by the Ministry of Higher Education and Scientific Research, has approved graduation projects supported by business incubators for bachelor's and master's students. This article critically assesses the conceptual, theoretical, and policy foundations of this reform, placing it within international frameworks such as Mode 2 knowledge production and the Triple Helix model, which emphasize the importance of context-sensitive and socially responsible knowledge creation. The analysis emphasizes the role of AI-enhanced, incubator-supported initiatives in developing entrepreneurial skills, problem-solving abilities, and socio-economic engagement, while addressing faculty readiness and equitable access. It posits that graduating from incubator support is a strategic method for aligning academic rigor with innovation, facilitating Algeria's transition to a sustainable knowledge-based economy.

Keywords: Incubator-Supported Graduation; Ministerial Decree 1275; Algerian Higher Education; Innovation and Entrepreneurship; Applied Knowledge Competencies.

ملخص:

طالما اعتمد التعليم العالي الجزائري على التخرج القائم على المذكرات ، مما أدى إلى إنتاج نتائج أكاديمية ذات طابع نظري وأرشيفي في الغالب، مع تأثير عملي أو اجتماعي اقتصادي محدود. واستجابة لذلك، أصدرت وزارة التعليم العالي والبحث العلمي بقيادة الأستاذ كامل بوضاري المرسوم الوزاري رقم 1275، الذي يقدم مشاريع مدعومة من حاضنات الأعمال كمسار بديل للتخرج لطلبة الليسانس والماستر.

تتناول هذه المقالة بشكل نقدي الأسس المفاهيمية والنظرية والسياسية لهذا الإصلاح، موضحة إياه ضمن الأطر الدولية مثل إنتاج المعرفة من النوع الثاني ونموذج الحلزونة الثلاثية، اللذان يركزان على إنشاء معرفة حساسة للسياق. يبرز التحليل كيف يمكن للمشاريع المدعومة من الحاضنات والمزودة بالذكاء الاصطناعي أن تعزز من الكفاءات الريادية، ومهارات حل المشكلات التطبيقية، والمشاركة الاجتماعية والاقتصادية ذات المعنى، بينما تتناول القدرة المؤسسية، واستعداد الكادر

التعليمي، والوصول العادل. وتدعي الدراسة أن التخرج المدعوم من الحاضنات يمثل آلية استراتيجية لمواءمة الصرامة الأكاديمية مع الابتكار، مما يسهم في انتقال الجزائر نحو اقتصاد مستدام قائم على المعرفة.

كلمات مفتاحية: التخرج المدعوم بحاضنة الأعمال؛ القرار الوزاري 1275؛ التعليم العالي الجزائري؛ الابتكار وريادة الأعمال؛ كفاءات المعرفة التطبيقية.

1. INTRODUCTION

Higher education in Algeria has traditionally focused on the mastery of disciplines and the production of graduation theses as the key indicators of academic success at the Licence and Master's levels. Although this approach has been linked to academic rigor and scholarly credibility, it is increasingly scrutinized for its inadequate alignment with current socio-economic realities and labor market needs. Scholars assert that such educational frameworks often fall short in preparing graduates for the complexities of modern professional life, especially in economies that are knowledge-driven and innovation-focused (Barnett, 2011; Marginson, 2016). According to Barnett (2011), universities may create graduates who are "well-trained in disciplinary knowledge but inadequately prepared for the complexities of economic and social life" (p. 87). This observation is particularly relevant in settings like Algeria, where higher education is anticipated to serve a crucial function in promoting innovation, employability, and sustainable development. Traditional thesis-based graduation often results in research outputs that are primarily archival, contributing to the underutilization of student knowledge and worsening graduate unemployment among young degree holders.

To address these structural challenges, the Algerian Ministry of Higher Education and Scientific Research, under the leadership of Prof. Kamel Baddari, has implemented Ministerial Decree 1275, which marks a significant transformation in graduation requirements. This reform promotes graduation projects that are driven by innovation and supported by incubators, serving as an alternative to conventional theses, with the intention of redirecting student research towards applied, market-oriented, and socially significant outcomes (Ministry of Higher Education and Scientific Research, 2021). While this initiative is part of a broader national discourse that emphasizes knowledge-based development and economic diversification, the decree retains its ministerial character and provides institutions with a degree of flexibility in its implementation. Thus, it redefines the role of universities as active participants in entrepreneurial learning, startup development, and innovation ecosystems, rather than merely as sites for theoretical knowledge production.

This policy orientation aligns with significant international frameworks in higher education and innovation studies. The Mode 2 knowledge production model emphasizes knowledge created in applied, transdisciplinary, and socially responsible contexts, in contrast to traditional discipline-focused academic research (Nowotny, Scott, & Gibbons, 2001). In a similar vein, the Triple Helix model conceptualizes innovation as the product of dynamic interactions among universities, government, and industry, stressing the university's broadened role in socio-economic development (Etzkowitz & Leydesdorff, 2000, p. 110). From these viewpoints, incubator-supported graduation projects arise as a pedagogically and economically strategic option, enabling students to gain practical competencies through tackling real issues rather than generating research confined to institutional repositories (Kolb, 1984; Fayolle & Gailly, 2008).

The fusion of digital technologies and artificial intelligence (AI) significantly amplifies the transformative potential of such projects. AI tools can support students in data processing, project modeling, prototype refinement, and iterative problem-solving, thus providing cognitive and analytical scaffolding that enhances experiential learning (Luckin et al., 2016; Williamson, 2017). According to Zawacki-Richter et al. (2019), the application of AI in higher education goes beyond improving administrative efficiency; it also transforms learning processes, collaboration styles, and the societal impact of academic work (p. 39). When embedded in incubator-supported projects, AI fosters a more responsive and innovation-driven learning environment, equipping graduates with skills that are aligned with Algeria's emerging knowledge economy.

In spite of these encouraging advancements, numerous significant challenges continue to exist. The execution of Decree 1275 is inconsistent across various institutions, primarily due to differences in infrastructure, mentorship capabilities, and availability of material and human resources. Additionally, the effectiveness of technology- and AI-enhanced educational projects is greatly influenced by faculty expertise and the institutional support systems in place (Luckin et al., 2016; Zawacki-Richter et al., 2019). In the absence of effective coordination and continuous professional development, there is a risk that innovation-driven graduation projects may favor marketability over academic substance or enduring social value.

In this context, the current article is motivated by the following primary research question:

How can graduation projects, which are supported by incubators in line with Ministerial Decree 1275, reshape higher education outcomes in Algeria by fostering entrepreneurial skills, practical problem-solving abilities, and socio-economic engagement among Licence and Master's students?

In order to enhance the focus of this theoretical investigation, the study examines the subsequent sub-questions:

1. **How do graduation projects that are incubator-supported differ from traditional theses with respect to their purpose and impact?**
2. **Which theoretical frameworks are most effective in accounting for the transition to innovation-driven graduation models?**
3. **In what ways does the integration of AI enhance the effectiveness and societal relevance of these projects?**

This article offers a critical examination of the opportunities, constraints, and strategic implications of graduation projects that are supported by incubators, positioning the discussion at the intersection of educational policy, innovation theory, and applied practice. It ultimately aims to demonstrate how these reforms can redirect Algerian higher education from a focus on passive knowledge accumulation to the development of graduates who are academically competent, economically proactive, and socially responsible.

2. Theoretical And Policy Foundations Of Incubator-Supported Graduation In Algeria

The movement towards incubator-supported graduation projects in Algerian higher education cannot be fully grasped without contextualizing it within the larger theoretical discussions about the changing role of universities and the national policy frameworks that regulate academic reform. Contemporary scholarship increasingly views universities not only as sites for knowledge transmission but also as proactive agents in innovation ecosystems, socio-economic development, and workforce transformation (Barnett, 2011; Etzkowitz & Leydesdorff, 2000). In this shifting environment, policy tools are crucial in adapting global educational models into practices that are relevant to local contexts. Thus, the Algerian experience illustrates a convergence between international theoretical frameworks of innovation-driven higher education and specific regulatory measures aimed at redefining the objectives and results of graduation at the Licence and Master's levels.

To more effectively depict the transition from traditional thesis-based graduation to projects that are supported by incubators, Table 1 provides a comparative overview of key characteristics and outcomes.

Table 1. Comparison between Traditional Thesis-Based Graduation and Incubator-Supported Projects

Feature	Traditional Thesis	Incubator-Supported Project
Purpose	Demonstrate disciplinary knowledge	Produce applied, market- and society-relevant solutions
Output	Written dissertation	Startup, prototype, patent, or innovation-oriented project
Skills Developed	Research methodology, theoretical mastery	Problem-solving, entrepreneurship, applied innovation, teamwork
Engagement with Society	Minimal; confined to academic peers	High; interaction with industry, community, and real-world challenges
Assessment Focus	Academic rigor within discipline	Academic rigor + practical relevance + societal impact

Source: Adapted from Nowotny, Scott, & Gibbons (2001); Etzkowitz & Leydesdorff (2000); Fayolle & Gailly (2008).

As illustrated in Table 1, projects supported by incubators broaden the scope of student learning, extending it beyond mere disciplinary mastery to encompass applied problem-solving, entrepreneurship, and societal engagement.

2.1. Policy Context and Ministerial Decree 1275 in Algeria

The rapid transformation of global knowledge economies has imposed significant pressure on higher education systems to cultivate graduates who are not solely

recipients of theoretical knowledge, but also active participants in innovation and socio-economic growth. In response, Algerian policymakers have sought to rethink graduation outcomes to more closely align with national development priorities, entrepreneurship efforts, and the demands of rapidly changing labor market. (*See Appendix A which reveals how Ministerial Decree 1275 can be effectively integrated into structured academic and pedagogical practices, supporting the article's position that projects aided by incubators require solid institutional mechanisms rather than superficial reform.*)

2.1.1. Ministerial Decree 1275: Origins and Purpose

In this context, the Algerian Ministry of Higher Education and Scientific Research, led by Prof. Kamel Baddari, has formalized Ministerial Decree 1275, which serves as a regulatory framework that integrates innovation-focused projects into the graduation criteria for Licence and Master's students. This reform is ministerial in nature, having been developed and promulgated by the Ministry, rather than being directly issued by the President of the Republic. While the support from the presidency for innovation contributes to a supportive policy environment, the specific design and implementation of graduation requirements are managed by the ministry.

Ministerial Decree 1275 signifies a thoughtful change in the way graduation outputs are conceptualized. Rather than confining academic work to a dissertation stored in a library, the decree invites institutions to assist students in producing startups, patents, prototypes, and innovation-focused solutions as acceptable, and even preferred, forms of graduation research. The reform's objectives include enhancing graduate competency in entrepreneurship, promoting applied problem-solving, and advancing the social and economic contributions of university education.

This policy direction is in accordance with wider changes in international higher education, where academics highlight the constraints of knowledge that is solely archival and disciplinary. Nowotny, Scott, and Gibbons (2001) argue that contemporary knowledge must be 'socially robust and reflexively produced' — indicating that academic work should respond to actual societal needs and be accountable to community and market contexts, rather than just to disciplinary peers (p. 3). The execution of Decree 1275 illustrates this international focus, intending to reshape the aim of graduation in Algerian universities.

2.1.2. Policy Justification: Transitioning from Archival Knowledge to Innovative Capabilities

Fundamentally, Decree 1275 addresses multiple structural difficulties encountered by Algerian higher education. Table 2 provides a summary of the decree's intended objectives along with the typical implementation challenges noted in the literature.

Table 2. Ministerial Decree 1275: Policy Objectives versus Implementation Challenges

Policy Objective	Description	Potential Implementation Challenge
Enhance graduate employability	Develop entrepreneurial and applied problem-solving skills	Uneven faculty expertise and mentorship availability
Stimulate economic development	Encourage innovation, startups, and patents	Resource disparities between institutions
Promote societal engagement	Foster socially impactful projects	Limited integration with industry/community networks
Align with global knowledge economy	Encourage transdisciplinary, applied, context-driven knowledge	Variability in evaluation and quality assurance frameworks

Source: Adapted from Barnett (2011); Marginson (2016); Bruneel, Ratinho, Clarysse, & Groen (2012).

As shown in Table 2, although Decree 1275 sets forth ambitious goals aimed at redirecting graduation towards innovation and societal impact, the successful execution of these objectives relies on the preparedness of institutions, the capabilities of faculty, and the availability of external networks.

2.1.3. Implementation in Algerian Universities

While Ministerial Decree 1275 outlines a national policy framework that promotes graduation projects centered on innovation, its implementation across Algerian universities is not consistent. This inconsistency reflects variations in institutional infrastructure, financial resources, academic cultures, and the readiness to adopt innovation-focused pedagogies. Research on policy implementation consistently shows that reforms in higher education are seldom applied uniformly; rather, they are influenced by institutional contexts and local interpretations (Spillane, Reiser, & Reimer, 2002). Therefore, the enactment of Decree 1275 should be regarded as a dynamic and evolving process, rather than a standardized practice. (see Appendix A)

2.1.3.1. Institution-Level Incubators

One of the most significant strategies for the application of Decree 1275 has been the establishment of incubators and innovation laboratories at the institutional level. These structures are meant to create environments for students where they can translate academic knowledge into projects that are socially or economically pertinent. Theoretically, such incubators empower students to go beyond traditional research disciplines and engage in interdisciplinary solutions that cater to real-world challenges.

The role of university incubators has been comprehensively studied in the literature on entrepreneurial universities. According to Etzkowitz (2003), incubators act as

organizational mechanisms that connect the production of academic knowledge with its practical application in societal and economic contexts. In this sense, incubators are not merely physical facilities; they operate as pedagogical ecosystems that promote experimentation, collaborative engagement, and innovative activities. Their success, however, is dependent on ongoing institutional support, which includes adequate funding, administrative backing, and alignment with curricular goals.

In the context of Algeria, the disparities among universities reveal that while some institutions have established relatively organized incubator environments, others are reliant on more symbolic or poorly resourced initiatives. This inconsistency raises concerns regarding equity and uniformity in students' graduation experiences, as access to high-quality incubation opportunities may be more influenced by the institution's geographical location than by policy intentions.

2.1.3.2. Mentorship Networks

A second vital aspect of implementation is the development of mentorship networks, which blend academic supervision with guidance from external professionals, entrepreneurs, or industry partners. Mentorship is fundamental to innovation-centric learning because it helps students navigate uncertainty, engage in iterative design processes, and reformulate problems.

Research on entrepreneurship and experiential education underscores that the development of innovation competencies is most successful through guided practice rather than through instruction alone. According to Fayolle and Gailly (2008), entrepreneurship education achieves its highest effectiveness when it actively involves students in learning processes that feature experimentation, reflective practice, and interaction with knowledgeable practitioners. Consequently, faculty mentors are expected to transcend traditional academic supervision, taking on roles that involve coaching, facilitating, and offering guidance that encourages reflective thinking.

However, this enlarged role brings forth significant challenges. Not every faculty member has the necessary training in innovation pedagogy or entrepreneurial processes, and the extra mentoring responsibilities may increase current workload pressures. Furthermore, the availability of external mentors differs greatly among regions and fields of study. In the absence of organized institutional support and acknowledgment, mentorship networks may become informal and inconsistent, jeopardizing their sustainability in the long run.

2.1.3.3. Digital and AI Integration

A third, increasingly significant aspect of implementation pertains to the incorporation of digital technologies and artificial intelligence (AI) into graduation projects supported by incubators. While access to advanced technologies is still inconsistent across Algerian universities, digital tools are steadily transforming how students engage in research, analyze data, and construct project prototypes.

AI, or artificial intelligence, is recognized as a valuable resource for improving

complex problem-solving and supporting advanced cognitive processes. According to Luckin et al. (2016), AI can deliver cognitive support that amplifies human potential and aids learners in handling intricate tasks. Moreover, Zawacki-Richter et al. (2019) highlight that AI applications in higher education can stimulate innovation by enabling personalized feedback, supporting data-driven decision-making, and fostering collaborative knowledge creation.

Nonetheless, researchers stress the importance of exercising caution when utilizing digital technologies. Selwyn (2019) points out that these tools are not inherently neutral in a pedagogical sense and must be assessed based on their educational objectives and ethical considerations. In this regard, technology should foster meaningful learning rather than being used exclusively for technical performance. When applied to the context of Decree 1275, this indicates that AI and other digital tools must be incorporated into pedagogical strategies that emphasize critical thinking, reflective practice, and the maintenance of academic integrity.

Collectively, these three aspects of implementation demonstrate that the effectiveness of graduation projects supported by incubators relies not solely on policy directives but also on institutional capabilities, faculty involvement, and the pedagogical application of technology. Comprehending these interacting elements is essential for evaluating the transformative possibilities of Decree 1275 within the realm of Algerian higher education.

3. Challenges and Critical Considerations

While graduation projects that receive incubator support offer promising avenues for improving graduate competencies and societal influence, their successful execution hinges on addressing a number of critical challenges. These challenges pertain to structural, pedagogical, and policy dimensions that affect the implementation of innovation-driven initiatives within the higher education system in Algeria.

3.1. Resource Disparities

A significant obstacle in the execution of graduation projects supported by incubators is the uneven allocation of material and human resources among Algerian universities. Not every institution has the requisite physical infrastructure, laboratories, or connections to industry networks that are essential for fostering high-quality innovation environments. According to Bruneel, Ratinho, Clarysse, and Groen (2012), the success of incubation systems is significantly reliant on continuous financial investment, mentorship access, and the existence of professional networks that promote knowledge exchange and collaboration. Lacking these resources, students might encounter restricted opportunities for experimentation, prototype development, and entrepreneurial participation.

In addition, differences in resources can worsen inequities in learning results, with students at well-funded universities gaining from more comprehensive experiences, while those at under-resourced institutions may face difficulties in turning their ideas

into viable projects (Etzkowitz & Zhou, 2017). This structural imbalance poses a threat of creating a two-tier system of innovation education, which undermines the broader policy objective of fostering entrepreneurial competencies throughout the entire higher education sector. To reduce such disparities, it is essential to strategically invest in university incubators, technology platforms, and collaborative partnerships with both the private and public sectors (OECD, 2019).

3.2. Faculty Preparedness

Effective supervision is a critical factor in the success of graduation projects that are incubator-supported and innovation-driven. Faculty members are expected to not only possess strong disciplinary knowledge but also to be familiar with entrepreneurial processes, innovation theory, and experiential learning methodologies. This dual expectation places considerable demands on faculty preparedness, as conventional academic training typically emphasizes theoretical mastery rather than applied problem-solving, project management, or startup guidance (Fayolle & Gailly, 2008). Furthermore, supervisors must be capable of facilitating reflective learning, encouraging collaboration among diverse student teams, and providing mentorship that connects academic theories with real-world challenges. These roles necessitate continuous professional development, interdisciplinary comprehension, and familiarity with contemporary educational technologies, including AI tools that can support project design, iterative problem-solving, and data-informed decision-making. Without adequate preparation and institutional support, faculty may encounter difficulties in effectively guiding students through complex, applied, and socially relevant projects, potentially restricting the impact of innovation-oriented curricula.

Insufficient faculty expertise can therefore lead to inadequate mentorship, which limits students' ability to navigate the complexities of iterative project development, stakeholder engagement, and market validation. As noted by Gibb (2012), faculty in entrepreneurial education must function as both subject matter experts and coaches who facilitate reflective practice, risk-taking, and adaptive learning. The disparity between the competencies that are required and those that are available among faculty highlights the importance of targeted professional development programs, including workshops on innovation pedagogy, experiential learning techniques, and digital tools for project management (Kolb, 1984; Luckin et al., 2016). Without such institutional support, incubator projects may fail to cultivate the intended entrepreneurial mindsets and practical competencies.

3.3. Policy Ambiguity

In spite of its strategic importance, Ministerial Decree 1275 presents broad policy directives without offering specific guidelines for implementation. This absence of detail may lead to significant variability in the evaluation, recognition, and accreditation of incubator-supported graduation projects across various institutions, which could result in inconsistencies in academic standards, assessment methods, and

the distribution of student credits. Such variability may influence not only the comparability of student outcomes but also the perceived legitimacy and value of innovation-driven projects within the higher education landscape. Scholars of educational policy assert that clear and well-structured assessment frameworks are crucial when integrating innovation into graduation requirements, as they help uphold academic rigor, ensure fairness in evaluation, and accommodate the diverse outputs typically produced by innovation projects (Biesta, 2015; OECD, 2019).

Moreover, clear criteria and uniform practices can assist faculty in their supervisory responsibilities, facilitating consistent mentorship and guidance, while offering students a transparent understanding of expectations and performance standards. Lacking such guidance, the potential benefits of Decree 1275 may be diminished by inconsistent institutional practices, which could reduce the overall effectiveness and societal impact of innovation-centric curricula.

In practice, policy ambiguity can lead to conflicting interpretations of what is deemed an acceptable project output, whether it be a patent, prototype, startup, or applied research report. Without standardized rubrics or evaluation criteria, faculty and students may encounter difficulties in aligning their expectations, which could potentially undermine the quality, societal relevance, and academic integrity of the projects. Therefore, effective policy implementation requires not only high-level guidance but also detailed operational frameworks, including assessment rubrics, milestone reporting, and peer review mechanisms that uphold both academic standards and the relevance of innovation (Marginson, 2016).

3.4. Risk of Superficial Innovation

Ultimately, there exists a recognized risk that projects supported by incubators may prioritize market appeal or novelty at the expense of producing substantive, socially significant outcomes. Scholars in the field of entrepreneurship education have observed that not all initiatives within incubators lead to sustainable or ethically sound ventures; some may regress into mere exercises of 'market mimicry,' where students replicate popular trends or business concepts without engaging in genuine problem-solving or addressing actual societal needs (Rideout & Gray, 2013). This tendency can undermine the broader objectives of innovation-focused curricula, limiting both the educational value for students and the potential societal impact of their projects. Furthermore, the pressure to produce marketable outputs within limited timeframes may incentivize shortcuts or superficial solutions, further compromising the quality and relevance of student work. Acknowledging this risk is essential for institutions aiming to ensure that incubator programs contribute significantly to both learning outcomes and national development objectives.

Sustainable and impactful innovation necessitates a fusion of technical competence, entrepreneurial skill, and conceptual understanding, reinforced by reflective practice and ethical considerations (Fayolle, 2013). Projects that do not incorporate these dimensions may produce outputs that are economically viable but socially trivial or

academically shallow. To alleviate this, faculty mentors, industry collaborators, and institutional oversight must stress not only the feasibility and market potential of student projects but also their social relevance, ethical integrity, and long-term viability. By promoting a culture of responsible innovation and reflective practice, incubator-supported graduation projects can achieve a significant integration of entrepreneurial learning with real-world impact, ensuring that innovation is both meaningful and sustainable.

4. Policy Implications and Future Directions

When analyzed within a comprehensive theoretical and policy framework, Ministerial Decree 1275 can be regarded as a calculated intervention aimed at repositioning Algerian higher education in alignment with both national socio-economic development objectives and global knowledge-based requirements. Similar reforms in other countries have focused on innovation, entrepreneurship, and employability as core aims of modern higher education systems (OECD, 2018). However, research consistently highlights that the effectiveness of such policy initiatives depends not only on their formal articulation but also on the conditions under which they are enacted at the institutional and pedagogical levels. Without alignment between high-level policy ambitions and operational realities, regulatory reforms risk producing symbolic changes rather than meaningful transformation.

A fundamental policy implication concerns the strengthening of institutional capacity. It is crucial for universities to possess robust governance structures, adequate material resources, and strategic planning mechanisms to translate policy objectives into sustainable academic practices. In Salmi's (2009) analysis of higher education reform, it is highlighted that for policy changes to be effective, universities must align their internal structures, governance processes, and operational priorities with broader national policy objectives while retaining their autonomy. Achieving this alignment goes beyond formal declarations; it necessitates tangible investments in physical infrastructure, digital technologies, administrative capacity, and academic support systems that collectively enable institutions to advance initiatives like incubator programs, cross-disciplinary collaborations, and innovation-driven curricula. In the absence of such institutional readiness, reforms that focus on innovation may remain largely aspirational, limiting their capacity to meaningfully affect both student learning experiences and broader developmental outcomes.

Equally significant is the development of faculty and the continuous professional training. Academic staff act as crucial mediators of policy reforms through their roles in classroom instruction, curricular design, and mentorship of student projects. Research findings in higher education reveal that innovation and entrepreneurship initiatives are most effective when faculty members receive organized pedagogical support, opportunities for professional learning, and guidance in applying experiential and strategy-based methodologies (Gibbs, 2013). Without such support, policy directives may be at odds with established teaching practices, resulting in superficial

application and inconsistent results across various institutions. Consequently, continuous professional development is crucial to prepare faculty with the necessary skills and knowledge to assist students in navigating complex, applied, and socially pertinent projects.

Another crucial policy matter involves the creation of transparent evaluation and quality assurance systems. Such frameworks permit universities to systematically track how well students are achieving their intended learning outcomes, evaluate the effectiveness of teaching, and ensure that programs stay aligned with their broader institutional missions. In the academic discourse on higher education quality, researchers argue that quality should be understood not merely as a matter of accountability, but as a continuous process that enhances both student learning and organizational performance. From this perspective, assessment and evaluation mechanisms should be designed to foster ongoing reflection and improvement, particularly in the development of innovation-related competencies, rather than concentrating solely on administrative compliance. When evaluation practices are carefully designed, they can also play a role in ensuring that graduation projects supported by incubators maintain high academic standards while yielding outcomes that are significant and pertinent to society.

Developing sustainable partnerships with industry and civil society represents another significant consideration. These collaborations can enhance the relevance of academic programs, promote knowledge and technology transfer, and improve the employability of graduates. At the same time, scholars caution that these partnerships must be managed carefully to maintain the university's intellectual independence. According to Etzkowitz and Leydesdorff (2000), fruitful university–industry interactions should focus on reciprocal knowledge exchange rather than yielding academic inquiry to market pressures (p. 112). Therefore, it is vital to define clear roles, expectations, and ethical boundaries in these collaborations to maximize their benefits while safeguarding the academic mission.

It is crucial that the rising emphasis on innovation and entrepreneurship is carefully balanced with the fundamental academic mission of higher education. Scholars advise against viewing universities merely as instruments of economic policy, underscoring their continued role as central institutions for generating critical knowledge and fostering informed, responsible citizenship (Marginson, 2016). In a similar vein, higher education is expected to develop reflective and ethically aware individuals who can assess complex societal challenges and make informed decisions (Barnett, 2011). From this viewpoint, innovation and entrepreneurial skills should be incorporated in ways that support, rather than undermine, disciplinary rigor, critical inquiry, and ethical development, enabling students to achieve both practical competencies and a deep intellectual understanding.

Looking ahead, it is essential for future research to examine how policy directives such as Ministerial Decree 1275 are interpreted and enacted within classroom environments, particularly in disciplines like language and writing instruction.

Analyzing the correspondence or possible discrepancies between policy discussions, institutional practices, and teaching realities would yield essential insights into the enduring viability of innovation-driven reforms in Algerian higher education. These studies could also contribute to the development of support systems, professional development programs, and assessment frameworks that bolster the educational and societal impact of graduation projects backed by incubators

5. Discussion and Implications

The shift towards graduation projects supported by incubators, as outlined in Ministerial Decree 1275, has significant consequences for higher education policy and institutional practices in Algeria. This reform not only changes graduation standards but also prompts universities to reevaluate the ways in which knowledge is generated, assessed, and utilized to meet societal and economic requirements. Thus, effective implementation of this reform requires collaborative efforts at the policy, institutional, and pedagogical levels.

5.1. Policy Alignment and Strategic Coherence

At the policy level, it is imperative for universities to transform the extensive objectives of Ministerial Decree 1275 into structured institutional frameworks that harmonize local capacities with national priorities. While the decree places a strong emphasis on innovation, entrepreneurship, and employability, these aspirations must be realized through explicitly defined strategies that uphold academic rigor and social relevance. Marginson (2016) posits that reforms in higher education are most successful when they are integrated within a larger vision of the public good, rather than being narrowly concentrated on market results. Consequently, projects supported by incubators should be structured not only to create economic value but also to tackle urgent social issues, thus reinforcing the civic mission of Algerian universities.

5.2. Institutional Capacity Building

The successful implementation of strategies is also contingent upon continuous enhancement of institutional capacity. Graduation projects that receive support from incubators require sufficient physical infrastructure, access to digital and AI-oriented tools, and effectively organized mentorship systems. Studies focusing on university incubators indicate that thriving innovation ecosystems depend more on sustained investment and institutional dedication than on fleeting policy enthusiasm (Bruneel et al., 2012). Within the Algerian context, the unequal distribution of resources among universities poses a risk of generating inconsistent outcomes, where certain institutions can fully leverage the advantages of incubator-supported graduation while others find it challenging to progress beyond mere symbolic compliance. Therefore, it is imperative to address these disparities to ensure equity and coherence in policy across the higher education system.

5.3. Faculty Development and Professional Transformation

The development of faculty is another crucial element of policy and practice. Supervising projects that are supported by incubators requires academic staff to broaden their roles beyond traditional disciplinary supervision to include mentorship in innovation processes, project management, and applied problem-solving. In the same vein, Fayolle and Gailly (2008) highlight that entrepreneurship education achieves its greatest effectiveness when educators have both pedagogical skills and a robust comprehension of entrepreneurial practices. This calls for organized professional development programs that provide faculty with the theoretical and practical resources required to assist students in navigating intricate, real-world projects. In the absence of such support, there is a risk that incubator projects may end up replicating traditional thesis supervision models, thus limiting their potential for transformation.

5.4. Evaluation and Quality Assurance Mechanisms

The transition towards diverse and practical graduation outcomes prompts significant inquiries regarding evaluation and quality assurance. Conventional assessment frameworks, which emphasize theoretical coherence and textual production, may not adequately reflect the multifaceted results of incubator-supported initiatives. Researchers assert that education aimed at innovation requires assessment models that blend academic rigor, practical viability, reflective learning, and societal impact (Barnett, 2011). Therefore, it is essential to have clear, transparent, and multidimensional evaluation criteria to uphold standards, ensure fairness, and validate alternative graduation pathways within the academic community. Such criteria can also help prevent the risk of superficial innovation, where projects focus on novelty or market appeal at the expense of depth and sustainability. (See Appendix B which outlines a methodical yet versatile framework for the evaluation of graduation projects that receive incubator support. It strengthens the conversation regarding quality assurance and policy coherence, illustrating how academic standards, innovation, and societal relevance can be preserved at the same time.)

5.5. Integration with National Development Goals

In summary, incubator-backed graduation projects provide a strategic framework for aligning higher education with national development initiatives. By connecting student projects to Algeria's extensive innovation and entrepreneurship policies, universities can enhance the employability of graduates while supporting economic diversification and the establishment of a knowledge-based economy. The Triple Helix model emphasizes the critical need for continuous collaboration among universities, industry, and government to foster innovation-driven growth (Etzkowitz & Leydesdorff, 2000). Consequently, graduation projects can function as entry points for students into national innovation ecosystems, promoting a sense of agency and social responsibility along with technical expertise.

All in all , the implications of these policies and practices indicate that graduation

projects supported by incubators represent not just a procedural change but a fundamental transformation of higher education in Algeria. When thoughtfully implemented and reinforced by coherent policies, institutional investment, and pedagogical innovation, this model has the potential to elevate universities from passive knowledge transmission to active engagement with society. Thus, it presents a sustainable alternative to traditional thesis frameworks, enabling graduates to emerge as innovative, employable, and socially responsible participants in Algeria's burgeoning knowledge-driven economy.

6. CONCLUSION

This article has explored the rise of graduation projects supported by incubators under Ministerial Decree 1275, concentrating on how these reforms are transforming higher education in Algeria. It sought to investigate both the theoretical and practical ramifications of moving past conventional thesis models, emphasizing the transition towards innovation, applied learning, and socio-economic involvement. Through the analysis of theoretical frameworks, policy initiatives, and the impact of AI and digital technologies, the study clarifies how these projects can enhance graduate competencies, employability, and their contributions to national advancement. In this regard, the article underscores the significance of coordinated institutional support, faculty readiness, and effective evaluation systems in realizing the full promise of innovation-oriented graduation reforms.

The assessment of graduation projects that are supported by incubators, in accordance with Ministerial Decree 1275, highlights a remarkable conceptual shift within Algerian higher education. This reform progresses beyond the standard thesis model, which typically generates archival and theory-based outputs, towards a paradigm that prioritizes innovation, applied skills, and socio-economic engagement. By promoting entrepreneurial abilities, critical analysis, and advanced problem-solving skills, projects backed by incubators not only have the capacity to improve graduate employability but also to make substantial contributions to national development goals (Fayolle & Gailly, 2008; Barnett, 2011).

Theoretical perspectives such as Mode 2 knowledge production and the Triple Helix model present a robust justification for this policy change. Mode 2 prioritizes context-sensitive, socially accountable knowledge development, highlighting the critical need for knowledge that addresses real-world challenges (Nowotny, Scott, & Gibbons, 2001). Similarly, the Triple Helix model points to the dynamic collaboration between universities, government, and industry as a driver of innovation and societal progress (Etzkowitz & Leydesdorff, 2000). The integration of AI and digital technologies into projects supported by incubators further enhances their significance by offering cognitive support, facilitating data-informed decision-making, and enabling students to produce outputs that are both high-quality and socially relevant (Luckin et al., 2016; Zawacki-Richter et al., 2019).

Nonetheless, the successful execution of these reforms encounters various obstacles.

Institutional inequalities, insufficient faculty readiness, unequal availability of mentorship and technological tools, along with the risk of market-driven superficiality, highlight the intricacies involved in implementing innovation-oriented curricula. According to Marginson (2016) and Biesta (2015), educational reforms must carefully balance the development of practical competencies with the preservation of academic rigor, critical inquiry, and ethical reflection. Without coordinated institutional support and strategic planning, the transformative potential of graduation projects backed by incubators may remain unrealized.

6.1. Recommendations for Policy and Practice

In order to boost the effectiveness and sustainability of graduation projects that receive incubator support in Algeria, the following recommendations are put forward:

- **Enhance Institutional Capacity:** Universities must commit to investing in physical infrastructure, incubation laboratories, innovation hubs, and administrative support systems to ensure that students have the resources and mentorship networks required for successful project development.
- **Faculty Development Initiatives:** Academic personnel should undergo professional training that goes beyond their specific fields of study to encompass entrepreneurial mentorship, innovative teaching strategies, experiential learning techniques, and proficient utilization of digital resources. Such preparation will empower faculty to manage projects more efficiently and promote reflective, practical learning experiences for students.
- **Formulate Clear Assessment Frameworks:** Evaluation systems should be comprehensive, considering academic rigor, practical relevance, and social impact. Well-defined and transparent assessment criteria will aid in ensuring that projects sustain high standards while promoting innovation and creativity.
- **Promote Equal Access Across Educational Institutions:** It is essential for policymakers to introduce strategies that address the disparities present among universities, ensuring that all students, no matter their institution, can partake in high-quality, innovation-oriented graduation projects.
- **Align Projects with National Development Goals:** Graduation projects supported by the incubator should be strategically linked to initiatives for economic diversification, startup ecosystems, and societal challenges. This connection strengthens the relationship between higher education and socio-economic development, enhancing the significance and influence of student outputs.
- **Establish Monitoring and Continuous Improvement:** Institutions should create systems for the regular assessment of project results, graduate employability, and the overall effectiveness of programs. The insights

gained from these assessments can guide continuous policy enhancement, faculty training, and the adoption of best practices.

In summary, Ministerial Decree 1275 represents a pivotal advancement in the reform of graduation practices in Algeria, moving from passive knowledge accumulation to a more active, applied, and socially responsive approach to learning. Despite the ongoing challenges in its implementation, the decree lays down both a conceptual and practical basis for equipping graduates with the essential skills, knowledge, and competencies required to excel as innovative and socially responsible citizens. By adopting the recommendations mentioned above, Algerian universities can improve the relevance, quality, and societal impact of higher education, thereby contributing to a knowledge-driven and innovation-focused national economy.

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8. Appendices

8.1. Appendix A: Operational Framework for Incubator-Supported, AI-Enhanced Graduation Projects under Ministerial Decree 1275

➤ Purpose

This appendix provides a practical framework for the implementation of incubator-supported, AI-enhanced graduation projects within Algerian higher education. While the primary article covers policy foundations and theoretical considerations, this appendix details the stages, stakeholders, and tools essential for the operationalization of Ministerial Decree 1275.

➤ Framework Overview

Projects supported by the incubator generally progress through four interrelated phases

- 1) **Identification of Problems and Analysis of Needs:** Students pinpoint research challenges arising from local socio-economic issues. This strategy is in line with Mode 2 knowledge production, which stresses the significance of context-sensitive and socially accountable knowledge generation (Nowotny, Scott, & Gibbons, 2001).
- 2) **Project Design and Conceptualization:** Interdisciplinary collaboration is advocated. AI-enabled tools—such as data analysis platforms, idea-mapping software, or prototype simulation tools—support students in clarifying research questions, modeling solutions, and determining feasibility. AI acts as cognitive scaffolding that bolsters higher-order thinking and sophisticated problem-solving (Luckin et al., 2016).
- 3) **Incubation and Mentorship:** Students are provided with support from academic supervisors, incubator managers, entrepreneurs, or industry partners. This blended mentorship embodies the Triple Helix model, which highlights the importance of collaboration among universities, industry, and government as a catalyst for innovation (Etzkowitz & Leydesdorff, 2000).
- 4) **Evaluation and Dissemination:** Outcomes of the project may include startups, prototypes, patents, or applied research reports. The assessment integrates academic rigor, innovation quality, and societal relevance, reflecting the understanding of quality as a transformative process rather than merely a form of accountability (Harvey & Green, 1993).

8.2. Appendix B: Illustrative Evaluation Criteria for Incubator-Supported Graduation Projects

➤ **Purpose:**

This appendix offers recommended evaluation criteria for graduation projects supported by incubators, tackling the policy ambiguities and assessment inconsistencies pointed out in the main article. It functions as a versatile reference framework that can be tailored to fit various institutional and disciplinary contexts.

➤ **Proposed Evaluation Dimensions**

- ✓ **Academic Rigor:** Evaluation should focus on assessing the theoretical basis, the clarity in formulating the problem, and the correct application of disciplinary or interdisciplinary knowledge to uphold intellectual depth (Barnett, 2011).
- ✓ **Innovation and Creativity:** Projects should reflect originality, innovative reasoning, and the formulation of fresh solutions instead of copying existing models, consistent with the tenets of entrepreneurship education (Fayolle & Gailly, 2008).
- ✓ **Application of AI and Digital Technologies:** Where appropriate, examine how well AI and digital tools facilitate data analysis, modeling, or decision-making. The priority should be on the educational benefits rather than solely on the sophistication of the technology (Selwyn, 2019).
- ✓ **Social and Economic Significance:** Initiatives must tackle recognizable social, economic, or environmental requirements, showcasing their potential influence beyond the university setting. This is in accordance with Mode 2 knowledge production and highlights the social responsibility of higher education (Nowotny et al., 2001).
- ✓ **Reflective Learning and Ethical Awareness:** Learners should present reflective descriptions of their educational journeys, the obstacles they encountered, and the ethical dilemmas they addressed. This approach aids in cultivating a "critical being," which promotes responsible behavior in complex social environments (Barnett, 2011).